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No. of courses in all programme for AY 2019-2020

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SAGI RAMAKRISHNAM RAJU ENGINEERING COLLEGE (A)

China Amiram, Bhimavaram, Andhra Pradesh- 534204

Number of courses in all programs for the AY 2019-2020

Sl No	Programme Name	Programme Code	First Year		Second Year		Total
			SEM I	SEM II	SEM I	SEM II	
1	Civil Engineering	UG-CE	8	10	9	9	36
2	Computer Science and Engineering	UG-CSE	9	10	8	10	37
3	Electronics and Communications Engineering	UG-ECE	9	11	9	8	37
4	Electrical and Electronics Engineering	UG-EEE	9	10	9	9	37
5	Information Technology	UG-IT	9	10	9	10	38
6	Mechanical Engineering	UG-MECH	9	10	10	9	38
7	Structural Engineering	PG-STR	18	19	4	1	42
8	Computer Science and Technology	PG-CST	23	23	4	1	51
9	Communication Systems	PG-CS	16	19	4	1	40
10	Power Systems and Automation	PG-PSA	19	11	4	1	35
11	Information Technology	PG-IT	23	23	4	1	51
12	CAD/CAM	PG-CAD/CAM	12	14	7	1	34
Total			164	170	81	61	476



H. Jagapathi Reddy

Principal
PRINCIPAL
S.R.K.R. Engg. College
BHIMAVARAM-534 204.



CIVIL ENGINEERING



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Regulation: R19				I / IV - B.Tech. I - Semester					
CIVIL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	C	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 HS 1101	English	HS	3	3	--	--	25	75	100
B19 BS 1101	Mathematics-I	BS	3	3	--	--	25	75	100
B19 BS 1103	Engineering Physics	BS	3	3	--	--	25	75	100
B19 CE 1101	Engineering Mechanics	ES	4	3	1	--	25	75	100
B19 ME 1101	Engineering Drawing	ES	2.5	1	--	3	25	75	100
B19BS1106	Engineering Geology Lab	ES	1.5	--	--	3	20	30	50
B19 HS 1102	English Lab	HS	1.5	--	--	3	20	30	50
B19 CE 1102	Engineering ExplorationProject	PR	1	--	--	2	--	50	50
TOTAL			19.5	13	1	11	165	485	650



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CIVIL ENGINEERING

SYLLABUS: ENGLISH (B19HS1101)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: Lesson: A Drawer full of happiness from *Infotech English*, Maruthi Publications.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self-introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.

Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.

Pronunciation: Vowels, consonants, plural markers and their realizations.

UNIT-II: Lesson:- Nehru's letter to his daughter, Indira on her birthday from *Infotech English*, Maruthi Publications.

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (précis writing); avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.

Grammar: Articles, prepositions, conjunctions, use of synonyms and antonyms.

Pronunciation: Past tense markers, word stress-di-syllabic words.

UNIT-III: Lesson: Stephen Hawking-Positivity' Benchmark' from *Infotech English*, Maruthi Publications.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.



Functional English: complaining and apologizing.

Reading: Reading a text in detail by making basic inferences -recognizing: and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Reading for Writing: Letter writing- types, format and principles of letterwriting, E-mail etiquette, writing a Resume/CV and covering letter.

Vocabulary: Technical vocabulary from across technical branches (20 words. GRE. Vocabulary 20 words), Idioms & Phrasal verbs, Homonyms, word applications, sequencing of words.

Grammar: Sentence Structures, Transformation of sentences (Active and passive Voice, Degrees of comparison, Simple, Compound and Complex).

Pronunciation: Word stress-poly-syllabic words.

UNIT-IV: Lesson: Liking a Tree, Unbowed: Wangari Maathai biography from *Infotech English*, Maruthi Publications.

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: asking for permissions, requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Pamphlet writing, writing for media, writing SOP's.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, cloze encounters, foreign phrases.

Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting, question Tags, direct and indirect speech, reporting for academic purposes.

Pronunciation: Contrastive Stress.

UNIT-V: Lesson: Stay Hungry–Stay Foolish from *Infotech English*, Maruthi Publications.

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts–with/without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.

Reading for Writing: Report writing, writing academic proposals- writing research articles: format a

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and style.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE 'Vocabulary' (20 words, antonyms and synonyms, word applications, coherence, matching emotions).

Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement, parallel structures, phrases and clauses).

Pronunciation: Stress in compound words.

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1101	
Course Title: ENGLISH	
CO-1	Identify the context, topic and pieces of specific information by understanding and responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.



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SYLLABUS: MATHEMATICS-I (B19BS1101)

(LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)

(Common to All Branches)

UNIT-I: Linear systems of equations: Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.

UNIT-II: Eigen values - Eigen vectors and Quadratic forms: Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.

UNIT-III: Differential equations of first order and first degree: Linear, Bernoulli, Exact, Reducible to exact types. Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits. (R-L and R-C circuits only)

UNIT-IV: Linear differential equations of higher order: Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $x V(x)$. Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

UNIT-V: Laplace transformation: Laplace transforms of standard functions, properties, transforms of $tf(t)$, $f(t)/t$, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function; Inverse Laplace transforms, convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1101	
Course Title: MATHEMATICS – I	
CO-1	Solve a given system of linear algebraic equations
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform, inverse Laplace transform and solve linear ODE



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SYLLABUS: ENGINEERING PHYSICS (B19 BS1103)

(Common to CE & ME)

UNIT-I: SCIENCE OF SOLIDS –CRYSTALLOGRAPHY AND NANOMATERIALS: Crystallography:

Basis and lattice, Crystal systems, Bravais lattice, Characteristics of unit cell, Atomic packing fraction for S.C, B.C.C, F.C.C lattices, Miller indices – representation of lattice planes, Diffraction of x rays in Crystals and Bragg's law.

Nanomaterial's : Introduction, Salient features of Nano materials, Synthesis methods – Ball milling, Condensation, Chemical Vapour Deposition, Sol – Gel. Characterization techniques for nano materials, Carbon Nano Tubes (C N T s), Applications of Nanomaterials

UNIT-II: ACOUSTICS & ULTRASONICS

Acoustics: Introduction – Reverberation time – Sabine's formula (Derivation using growth and decay method) – absorption coefficient and its determination – factors affecting acoustics of buildings and their remedies.

Ultrasonics: Production of ultrasonics by Magnetostriction and piezoelectric methods – Detection of ultrasonics - acoustic grating – Non-Destructive Testing – pulse echo system through transmission and reflection modes – Applications.

UNIT-III: ELASTICITY

Elasticity: Stress, Strain; Hooke's law, stress – strain curve, generalized Hooke's law with and without thermal strain for isotropic materials, different types of moduli and their relations, bending of beams – Bending moment of a beam – Depression of c

UNIT-IV: MAGNETICS AND DIELECTRICS

Magnetics: Introduction – Magnetic dipole moment – Magnetization – Magnet's susceptibility and permeability – Origin of permanent magnetic moment – Bohr Magneton– Classification of magnetic materials (Dia, Para and Ferro) – Domain concept of Ferromagnetism – Hysteresis – soft and hard magnetic materials – Applications of Ferromagnetic materials.

Dielectrics: Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz internal field – Claussius-Mossotti equation – Frequency dependence of polarization – Applications of dielectrics.

UNIT-V: LASERS AND OPTICAL FIBERS

Lasers: Introduction, Interaction of radiation with matter, conditions for light amplification, Einstein's relations. Requirements of lasers device, Types of lasers, Design and working of Ruby and He – Ne lasers, Laser

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characteristics and applications.

Fiber Optics: Introduction to optical fibers, Principle of light propagation in fiber, Acceptance angle, Numerical aperture, Modes of propagations, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1103	
Course Title: ENGINEERING PHYSICS	
CO-1	Explain the structure of solids and their determination
CO-2	Demonstrate the synthesis methods and applications of nano materials
CO-3	Understand the concepts of elasticity and different types of moduli and their relation
CO-4	Explain the sound propagation in buildings and related aspects
CO-5	Characterize the magnetic and dielectric materials from their basic behaviour and learn their applications.
CO-6	Understand the basics of modern technologies ultrasonics, lasers and optical fibers and their applications in various fields



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SYLLABUS: ENGINEERING MECHANICS (B19CE1101) **(Civil Engineering)**

UNIT-I: Concurrent forces in a plane, parallel forces in a plane, centroid, moment of inertia, radius of gyration, parallel axis theorem, principle axes.

UNIT-II: General Case of Forces in a Plane, Resultant and equilibrium of general case of forces in a plane, Statically determinate plane trusses-Method of joints and Method of sections.

Friction – Coulombs laws of dry friction – Limiting friction, Problems on Wedge friction.

UNIT-III: Principle of virtual work, stable and unstable equilibrium – efficiency – beams & pulley systems.

UNIT-IV: Kinematics of particles – rectilinear & curvilinear motion, rectangular components, tangential & normal components.

Kinetics of particles – Newton's second law, Energy method, Impulse & momentum method.

UNIT-V: Kinematics of rigid bodies – translation, rotation, plane motion, instantaneous centre of rotation.

Plane motion of rigid bodies – forces & acceleration, D'Alembert's principle, energy & momentum methods.

Course Outcomes for First Year First Semester Course	
Course Code: B19CE1101	
Course Title: ENGINEERING MECHANICS	
CO-1	Apply laws of mechanics for various force conditions and properties of bodies
CO-2	Apply laws of forces for general cases in plane
CO-3	Apply principle of virtual work for various equilibrium conditions
CO-4	Apply laws of kinematics and kinetics to particles
CO-5	Apply laws of kinematics and kinetics to rigid bodies



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SYLLABUS: ENGINEERING DRAWING (B19ME1101)

(Common to CE, EEE & ME)

UNIT-I: Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general method (eccentricity method only), cycloids, involutes, tangents & normals for the curves.

UNIT-II: Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to one of the reference planes (HP, VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III: Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes for First Year First Semester Course	
Course Code: B19ME1101	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.



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SYLLABUS: ENGINEERING PHYSICS LAB (B19BS1106)

(Common to CE& ME)

1. Determination of the Rigidity modulus of elasticity of a material - Torsional pendulum.
2. Determination Young's modulus by single Cantilever oscillations method.
3. Verification of the laws of vibrations in stretched strings – Sonometer
4. Magnetic field along the axis of a current carrying coil –Stewart and Gee's apparatus.
5. Determination of Magnetic susceptibility by Quinke's method.
6. Determination of velocity of sound - Volume Resonator method.
7. Determination of dielectric constant by charging and discharging method.
8. Determination of wave length of lasers by diffraction grating
9. Determination of wave length of light from a source using Diffraction Grating by Normal Incidence method.
10. Determination of radius of curvature of Plano convex lens – Newton's Rings.
11. Determination of the thickness of a thin spacer using interference – Air Wedge method.
12. Verification of Laws of series and parallel combinations of resistances – Carey Foster's bridge.
13. Resolving power of a grating.
14. Determination of Temperature Coefficient of Resistance of a thermistor.
15. Determination of resistivity of semiconductors by Four probe method.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1106	
Course Title: ENGINEERING PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.



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SYLLABUS: ENGLISH LAB (B19HS1102)

(Common to All Branches)

UNIT-I: Pronunciation

Letters and Sounds

The Sounds of English

Phonetic Transcription

UNIT-II: Past tense markers

Word stress-di-syllabic words

Poly-syllabic words

UNIT-III: Rhythm & Intonation

UNIT-IV: Contrastive Stress (Homographs)

UNIT-V: Word Stress: Weak and Strong forms

Stress in compound words

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1102	
Course Title: ENGLISH LAB	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.



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SYLLABUS: ENGINEERING EXPLORATION PROJECT (B19CE1102)

(Civil Engineering)

Apply Design Thinking on the following Streams to

Project Stream 1:

Electronics, Robotics, IOT and Sensors

Project Stream 2:

Computer Science and IT Applications

Project Stream 3:

Mechanical and Electrical tools

Project Stream4:

Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

TASKS TO BE DONE:

Task 1: Everyone is a Designer

- Understand class objectives & harness the designer mindset

Task 2: The Wallet/Bag Challenge and Podcast

- Gain a quick introduction to the design thinking methodology
- Go through all stages of the methodology through a simple design challenge
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

Task 3: Teams & Problems

- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems

Task 4: Empathizing

- Continue Design Challenge and learn empathy
- Learn techniques on how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

Task 5: Ideating

- Continue Design Challenge and learn how to brainstorm effectively
- Encourage exploration and foster spaces for brainstorming
- Submit Activity Card

Task 6: Prototyping

- Continue Design Challenge and learn how to create effective prototypes



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- Build tangible models and use them as communication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

Task 7: Testing

- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual and group performance
- Submit Activity Card

Task 8:

- Final Report Submission and Presentation



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SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	C	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS 1201	Mathematics-II	BS	3	3	-	-	25	75	100
B19 BS 1202	Mathematics-III	BS	3	3	-	-	25	75	100
B19 BS 1203	Mathematics-IV	BS	3	3	-	-	25	75	100
B19 CS 1201	Programming for ProblemSolving using C	ES	3	3	--	--	25	75	100
B19 CE 1201	Computer Aided Engineering Drawing	ES	2.5	1	--	3	25	75	100
B19 BS 1207	Engineering Chemistry Lab	BS	1.5	--	--	3	20	30	50
B19 HS 1202	Communication Skills Lab	HS	1.5	--	--	3	20	30	50
B19 CS 1204	Programming for ProblemSolving Using C Lab	ES	1.5	--	--	3	20	30	50
B19 ME 1205	Workshop Practice Lab	ES	1.5	--	--	3	20	30	50
B19 MC 1203	Environmental Science	MC	0	3	--	--	--	--	--
TOTAL			20.5	16	--	15	205	495	700



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CIVIL ENGINEERING

SYLLABUS: MATHEMATICS – II (B19BS1201)

(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)

(Common to CE, EEE, & ME)

UNIT-I: Interpolation: Interpolation, forward differences, backward differences, Central differences and relations between the operators, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unequal intervals, Lagrange interpolation.

UNIT-II: Solution of Algebraic and Transcendental Equations & Numerical Integration and solution of Ordinary Differential equations: Introduction, Bisection method, Method of false position, Iteration method & Newton-Raphson method. Trapezoidal rule, Simpson's 1/3 rule, Solution of ordinary differential equations by Taylor's method, Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method.

UNIT-III: Partial differentiation: Introduction, Homogeneous functions, Euler's theorem, Chain rule, Total derivative, Jacobians and their properties.

Applications: Taylor series expansion for a function of two variables, Maxima and Minima of functions of two variables with and without constraints, Lagrange's method. Leibnitz's rules for differentiation under integral sign.

UNIT-IV: First order and higher order partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of Lagrange linear equation. Solutions of Linear homogeneous and non-homogeneous partial differential equations with constant coefficients – source (RHS) terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

UNIT-V: Applications of partial differential equations: Method of separation of variables, One – dimensional wave equation, the Alembert's solution, one- dimensional heat equation

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1201	
Course Title: MATHEMATICS–II	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian.
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation.



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SYLLABUS: MATHEMATICS-III (B19BS1202)

(Common to CE, CSE, ECE, EEE & IT)

UNIT-I: Fourier Series Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

UNIT-II: Fourier Transforms Fourier integral theorem (without proof), Complex form of Fourier integral, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms, Finite Fourier transforms, properties, inverse transforms, Parseval's Identities.

UNIT-III: Single and Multiple integrals Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Applications: evaluation of improper integrals, error function and the complimentary error function.

Double and triple integrals, change of variables, Change of order of integration. Applications: Areas and volumes.

UNIT-IV: Vector Differentiation: Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.

UNIT-V: Vector Integration Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux. Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1202	
Course Title: MATHEMATICS-III	
CO-1	Develop the knowledge of fuels and their economics, advantages and limitations. Make use of the basic concepts of semiconductors and liquid crystals for engineering applications..
CO-2	Identify constituents of various ceramic materials, characteristics and their appropriate use in construction. Apply the knowledge of electrochemistry principles to design energy storage
CO-3	Develop the knowledge of fuels and their economics, advantages and limitations. Make use of the basic concepts of semiconductors and liquid crystals for engineering applications..
CO-4	Identify constituents of various ceramic materials, characteristics and their appropriate use in construction. Apply the knowledge of electrochemistry principles to design energy storage
CO-5	Develop the knowledge of fuels and their economics, advantages and limitations. Make use of the basic concepts of semiconductors and liquid crystals for engineering applications..
CO-6	Identify constituents of various ceramic materials, characteristics and their appropriate use in construction. Apply the knowledge of electrochemistry principles to design energy storage



Estd:1980

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SYLLABUS: ENGINEERING CHEMISTRY (B19BS1204)

(Common to CE & ME)

UNIT-I: Water and its treatment: Introduction – source of water – impurities of water – Hardness of water – Estimation of water hardness by EDTA method – Boiler troubles: Sludge and scale formation in boilers; caustic embrittlement; Boiler corrosion; Priming and foaming – Water softening: Lime – Soda Process, Zeolite Process; Demineralization by Ion – Exchange Process. Municipal Water treatment – Desalination of Brackish water: Electrodialysis; Reverse osmosis. Indian standards and WHO standards of drinking water. Design of drinking water plant

UNIT-II: Fuels and Lubricants: Fuels: Introduction – classification of fuels – calorific value: HCV and LCV; Determination of calorific value of solid fuel by bomb calorimeter; Proximate and ultimate analysis of coal; coke: Manufacture of coke by Otto – Hoffmann's by-product coke oven process; Refining of Petroleum; cracking FB MB Knocking – octane number of gasoline; cetane number of diesel oil. Synthetic Petrol; LPG, CNG. Lubricants: Definition; Mechanism of lubrication; Properties of Lubricants (Definition and Significance)

UNIT-III: Corrosion and its Prevention: Definition- Theories of corrosion (i) Dry Corrosion (ii) Wet Corrosion. Types of Electrochemical corrosion: Pitting corrosion, Differential aeration corrosion, galvanic corrosion, Stress corrosion. Factors influencing corrosion; Protection from corrosion- material selection and design, cathodic Protection, corrosion inhibitors, Protective coatings – Galvanizing, Tinning. Inorganic coatings – Anodizing; organic coatings – Paints, Varnishes – Special Paints.

UNIT-IV: High Polymers and Plastics; Rubber & Elastomers Definition – Types of polymerisation – Free radical mechanism of addition Polymerisation; - Plastics as engineering materials, Thermo Plastics and thermosetting Plastics – compounding of Plastics – Fabrication of Plastics – Preparation, Properties and applications of Polyethylene, PVC, Nylon 6,6; - Bullet Proof Plastics: Kelvar and Polycarbonate – Fiber reinforced Plastics – Conducting Polymers; Biodegradable Polymers – PHBV; Nylon-2, nylon – 6; Natural rubber: Vulcanization – compounding of rubber, Preparation, Properties and applications of Buna – S; Buna – N.

UNIT-V: Building & Construction Materials

Ceramics:- Definition – Characteristics – Classification of Ceramics – Application of Ceramics.

Portland Cement:- Manufacture of Portland Cement – Setting and hardening of Portland Cement – Mortar-Concrete – Reinforced Cement Concrete (RCC); Decay of Concrete – Special Cements.

Refractories:- Definition – Characteristics – Classification – Properties and failure of refractories.

Insulators: Thermal and electrical insulators.



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Course Outcomes for First Year First Semester Course	
Course Code: B19BS1204	
Course Title: ENGINEERING CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C (B19CS1201)

(For CE, EEE & ME)

UNIT-I: Introduction to Computers: Computer Systems, Computing Environments, Computer languages, Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

UNIT-II: Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

UNIT-III: Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

UNIT-IV: Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application

Processor Commands: Processor Commands

UNIT-V: Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter- Function Communication, Standard Functions, Passing Array to Functions, Passing Pointer to Functions, Recursion

Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1201	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C	
CO-1	Students will learn about computer systems, computing environments, developing of a computer program and Structure of a C Program.
CO-2	Students will learn to use different operators, data types and loops for developing C Programs.
CO-3	Students will able to write programs using Arrays, Strings, enumerated types, Structure and Union.
CO-4	Students will able to design and implement programs to analyze the different pointer applications.
CO-5	Students will able to decompose a problem into functions and to develop modular reusable code.



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SYLLABUS: COMPUTER AIDED ENGINEERING DRAWING (B19CE1201)

(For CE)

UNIT-I: PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes –Auxiliary Views.

UNIT-II: SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism,Cylinder, Pyramid, Cone – Auxiliary views.

DEVELOPMENT OF SOLIDS: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone and their parts.

UNIT-III: INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder VsCylinder, Prism Vs Prism and Cylinder Vs Cone.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

UNIT-IV: INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,

VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore and delete.

UNIT-V: COMPUTER AIDED SOLID MODELING: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling ofBuilding & Building Parts.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CE1201	
Course Title: BUILDING MATERIALS AND CONCRETE TECHNOLOGY	
CO-1	Apply principles of drawing to draw the projections of solids.
CO-2	Apply principles of drawing to draw sections of solids and sectional views.
CO-3	Apply principles of drawing to draw the development of solids
CO-4	Apply the principles of drawing to draw the intersection of right regular solids.
CO-5	Apply the principles of drawing to draw the perspective views of points, lines, plane figures and simple solids.
CO-6	Draw isometric and orthographic drawings using CAD packages.



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SYLLABUS: ENGINEERING CHEMISTRY LAB (B19BS1207)

(Common to CE & ME)

LIST OF EXPERIMENTS:

1. Estimation of HCL using standard Sodium Hydroxide.
2. Determination of total hardness of water by EDTA method.
3. Estimation of Ferrous Iron by KMnO_4 .
4. Estimation of oxalic acid by KMnO_4 .
5. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
6. Estimation of Dissolved oxygen by Winkler's method.
7. Determination of pH by pH meter and universal indicator method.
8. Conductometric titration of strong acid Vs strong base.
9. Conductometric titration of strong acid Vs weak base.
10. Potentiometric titration of strong acid Vs strong base.
11. Potentiometric titration of strong acid Vs weak base.
12. Preparation of Phenol formaldehyde resin.
13. Determination of saponification value of oils.
14. Determination of pour and cloud points of lubricating oil.
15. Determination of Acid value of oil.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1207	
Course Title: ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1202)

(Common to CE, ECE, EEE & ME)

UNIT-I: JAM, Common Errors Neutralizing accent

UNIT-II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-III: Presentation Skills Public Speaking Data Interpretation

UNIT-IV: Group Discussion Do's and Don'ts

UNIT-V: Curriculum Vitae Covering Letter Interview Skills Mock Interviews, FAQ's.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS1202	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C LAB (B19CS1204)

(Common to CE, EEE & ME)

1. Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

2. Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

3. Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

4. Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

5. Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

6. Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

7. Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

8. Exercise 8:

1. Write a program in C to compare two strings without using string library functions.



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2. Write a program in C to copy one string to another string.

9. Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

2. Write a program in C to demonstrate how to handle the pointers in the program.

10. Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

2. Write a program in C to add two numbers using pointers

11. Exercise 11:

1. Write a program in C to add numbers using call by reference.

2. Write a program in C to find the largest element using Dynamic Memory Allocation

12. Exercise 12:

1. Write a program in C to swap elements using call by reference.

2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

13. Exercise 13:

1. Write a program in C to show how a function returning pointer.

2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function

14. Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two program.

2. Write a program in C to convert decimal number to binary number using the function.

15. Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.

2. Write a program in C to get the largest element of an array using the function.

16. Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.

2. Write a program in C to copy a file in another name.

3. Write a program in C to remove a file from the disk.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1204	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C LAB	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills .
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program.



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SYLLABUS: WORK SHOP PRACTICE LAB (B19ME1205)

(Civil Engineering)

LIST OF EXPERIMENTS:

CARPENTRY

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

FITTING

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

TIN SMITHY

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

HOUSE WIRING

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Note: At least THREE exercises to be done from each trade.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME1205	
Course Title: WORK SHOP PRACTICE LAB	
CO-1	Apply wood working skills in real world applications.
CO-2	Build different parts with metal sheets in real world applications.
CO-3	Apply fitting operations in various applications.
CO-4	Apply different types of basic electric circuit connections.



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SYLLABUS: ENVIRONMENTAL SCIENCE (B19MC1201)

(Common to CE, ECE & EEE)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid



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wastes. Consumerism and waste products, Biomedical, Hazardous and e- waste management.

UNIT-V: Social Issues and the Environment: Urban problems related to energy -Waterconservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

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Regulation: R19			II / IV - B.Tech. I - Semester						
CIVIL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	C	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
		BS	3	3	--	--	25	75	100
B19 CE2101	Mechanics of Solids	PC	3	3	--	--	25	75	100
B19 CE2102	Fluid Mechanics	PC	3	3	--	--	25	75	100
B19 CE2103	Building Materials, construction and Planning	PC	3	3	--	--	25	75	100
B19 CE2104	Surveying	PC	3	3	--	--	25	75	100
B19 CE2105	Environmental Engineering I	PC	3	3	--	--	25	75	100
B19 CE2106	Surveying Field Work	PC	1.5	--	--	3	20	30	50
B19 CE2107	Strength of Materials Lab	PC	1.5	--	--	3	20	30	50
B19MC2103	Constitution of India	MC	0	3	--	--	--	--	--
TOTAL			21	21	--	6	190	510	700



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CIVIL ENGINEERING

SYLLABUS: MATHEMATICS IV (B19BS2102)

(Complex Variables & Statistical Methods)

(Common to CE & EEE)

Pre-requisites: Basic concepts of Probability theory and Baye's Theorem

UNIT-I : Functions of a Complex Variable Review- Cartesian form and polar form of a complex variable, Real and imaginary parts of z^n , e^z , $\sin z$, $\sinh z$ and $\log z$ (**no questions may be set on the review portion**). Limit and continuity of a function of a complex variable, derivative, analytic function, entire function, Cauchy- Riemann equations, determine an analytic function based on the knowledge of its real and imaginary parts, Milne-Thomson method, Applications of analytic function to flow problems, and in Electrostatics. Conformal mapping: the transformations defined by $w=z+c$, $w=cz$, $w=1/z$. The Bilinear transformation.

UNIT-II: Complex Integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula. Expansion of a function in a Taylor series, McLaren series and Laurent series. Types of singularities, Residues, Cauchy's residue theorem. Evaluation of real definite integrals –integration around unit circle (Theorems without proofs).

UNIT-III: Difference equations and Z-transforms: Formation of a difference equation, Rules for finding complimentary function and particular integral for linear difference equations. Definition of Z- transform, some standard Z- transforms, properties, transform of a function multiplied by n, initial value theorem and final value theorem(without proof), evaluation of inverse Z- transforms, convolution theorem (without proof), solution of linear difference equations by the use of Z- transforms.

UNIT-IV: Probability Distributions: A brief review of random variables, Binomial, Poisson and Normal distributions, definitions of pmf/ pdf, notation, mean, variance, moment generating function. Fitting of Binomial or Poisson distributions for a given frequency distribution.

UNIT-V: Sampling theory and Testing of Hypothesis:

Sampling theory: Introduction, population and samples, Sampling distribution, standard error, central limit theorem (without proof), level of significance, procedure of testing of hypothesis.

Large samples: Testing of hypothesis for single proportion and two proportions.

Small samples: Degrees of freedom, Students' t- distribution, t-test for single mean, two means; Chi- squared distribution, test for goodness of a fit.



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Course Outcomes for Second Year First Semester Course	
Course Code: B19BS2102	
Course Title: MATHEMATICS IV	
CO-1	Comprehend the concept of Analytic function and apply in Electrostatics and Fluid dynamics
CO-2	Determine Laurent series of functions about isolated singularities, and determine residues. Use the residue theorem to evaluate certain real definite integrals.
CO-3	Formulate and solve linear difference equations.
CO-4	Use Z-transforms to solve linear difference equations with constant coefficients.
CO-5	Identify a random variable as discrete/continuous, find its expected value and also fit a probability distribution for a given frequency distribution.
CO-6	Decide the test applicable and apply it for giving inference about Population Parameter based on sample statistic for some large samples and small samples.



Estd:1980

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SYLLABUS: MECHANICS OF SOLIDS (B19CE2101)
(LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)
(Common to All Branches)

UNIT-I: Definitions of stress and strain – types of stresses and strains – Elasticity – Hooke's law – Stress – Strain diagram for Mild steel – working stress- factor of safety- Lateral strain – Poisson's ratio and volumetric strain – Elastic Moduli and the relationship between them – Bars of varying section – composite bars – temperature stresses.

Strain Energy: Definition – Resilience – SE due to gradually applied; suddenly applied and impact loads – simple applications

Principal Stresses and Strains:

Introduction-stresses on an inclined section of a bar under axial loading- compound stresses-Normal and tangential stresses on an inclined plane for biaxial stresses-Two perpendicular normal stresses accompanied by a state of simple shear-Mohr's circle of stress-Principal planes and principal stresses- Construction of Mohr's Circle (graphical Method)

UNIT-II: Shear Force & Bending Moment Diagrams:

Definition of beam – Types of beams – concept of SF and BM – SF & BM diagrams for cantilever, SS and overhanging beams subjected point loads, UDL, Uniformly varying loads and combination of these loads – point of contraflexure – Relationship b/w S.F, BM and rate of loading.

UNIT-III: Flexural Stresses & Shear Stresses:

Flexural Stresses: Theory of simple Bending – Assumptions–Derivation of Bending equation -
$$\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$$
 Neutral axis – Determination of bending stresses – section modulus of rectangular & Circular

sections (Solid and Hollow), I, T, channel sections – Design of simple beam sections.

Shear Stresses: Derivation of shear stress formula – shear stress distribution across various beam sections like rectangular, circular, Triangular, I, T, angle sections, built up beams, Definition of shear centre. **Torsion of**

Circular Shafts: Theory of pure Torsion –Derivation of Torsion equation
$$\frac{T}{l} = \frac{C \max}{R} = \frac{G\theta}{l}$$
 – Torsional

moment of Resistance – polar section Modulus – power transmitted by a shaft – combined bending and torsion.

Springs: Types of springs – springs in series and parallel – close coiled helical springs

UNIT-IV: Deflections of Beams: (i) Cantilever (ii) Simply supported and (iii) Over hanging beams using (a) Double integration and (b) Macaulay's method



UNIT-V: Columns & Struts: Introduction – short, medium and long columns – axially loaded compression members – crushing load–Buckling load (or) critical load (or) crippling load – Euler’s theory for long columns – Assumptions – Derivations of Euler’s critical load formula for various end conditions – Effective length of column – slenderness ratio – limitations of Euler’s Theory – Rankine formula – for both long and short columns – column subjected to Eccentric loading – Euler’s Method and prof. Perry’s formula.

Thin & Thick cylinders: Calculation of longitudinal and hoop stresses in thin cylinders subjected to internal pressure, Wire wound thin cylinders. Thick cylinders-Lame’s theory, Compound tubes

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2101	
Course Title: MECHANICS OF SOLIDS	
CO-1	Summarize the behavior of basic materials under the influence of different external loading conditions and support conditions and also to determine the principal stresses & strains under different loadings.
CO-2	Determine shear Force and Bending moments in statically determinate Beams and draw the Diagrams.
CO-3	Calculate the bending stresses, shear stresses, torsional stresses in structural members and also stiffness of springs.
CO-4	Examine the basic methods to find slope and deflection of beams subjected to loads.
CO-5	Determine the crippling load for columns with different end conditions and calculate the stresses in Thin & Thick cylinders



Estd:1980

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SYLLABUS: FLUID MECHANICS (B19CE2102)

UNIT-I: Basic Fluid Properties: Definition of Fluid, basic properties of fluid, Viscosity - Newton's Law of Viscosity, Capillarity and Surface Tension.

Fluid Pressure: Fluid Pressure at a point, Pascal's law, Variation of pressure with elevation, Hydrostatic law, Absolute, Gauge and Vacuum Pressures. Pressure measurement – Piezometers, Manometers and Pressure Gauges. Centre of Pressure, Forces on submerged surfaces, crest gates and lock gates.

UNIT-II: Buoyancy and Floatation: Archimedes Principle- Buoyancy & Floatation - Stability of Floating Bodies- Centre of Buoyancy – Meta centric Height and its Determination.

Fluid Kinematics: Types of fluid flow, Velocity, Rate of flow, Continuity Equation, Streamline, Path line, Streak line, Local, Convective and Total Acceleration; One & Two Dimensional Flows. Stream Function, Velocity Potential- Rotational & Irrotational Flows, Laplace Equation, Flow net.

UNIT-III: Fluid Dynamics: Energy possessed by fluid in motion, Euler's equation of motion - Bernoulli's equation. Energy correction factor. Venturimeter, orifice meter and nozzle meter.

Flow through orifices and mouth pieces: Types of orifices and mouth pieces, coefficient of contraction, velocity and discharge.

Flow through notches and weirs: Types of notches and weirs, Measurement of discharge

UNIT-IV: Impulse momentum equation – Momentum correction factor, Forces on pipe bends and reducers. Angular Momentum – Torque and work done; Sprinkler Problems.

Laminar Flow: Relation between shear and Pressure Gradients in Laminar Flow; Reynold's experiment; Critical velocity; Steady laminar flow through a circular pipe – Hagen Poiseuille's Law. Turbulent flow: shear stress in Turbulent flow, Prandtl mixing length theory, Velocity distribution in pipes, Hydro-dynamically smooth and rough boundaries, Velocity distribution in rough and smooth pipes, Resistance of smooth and rough pipes.

UNIT-V: Flow through pipes: Flow measurement through pipes – head due to friction – Darcy – Weisbach equation, minor losses, Total Energy Line, Hydraulic Gradient Line. Pipes in Series, pipes in parallel. Problems on Two reservoir and three reservoir flows. Water hammer, surge tanks.



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Estd:1980

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2102	
Course Title: FLUID MECHANICS	
CO-1	Determine the physical properties of fluids and different types of forces acting on a fluid element extended to forces on various gates.
CO-2	Determine the forces that are acting on immersed bodies in static fluids through application of buoyancy and floatation
CO-3	Determine velocity of fluid flows, local and convective accelerations in 1D, 2D flows fields and derive the Laplace equation.
CO-4	Apply conservation principles of mass, momentum and energy on fluids using control volume approaches.
CO-5	Calculate the force exerted by the fluid on bends, nozzles using impulse momentum principle
CO-6	Determine the shear stress, Velocity, loss of head in Laminar flow through circular pipes and Turbulent flow for rough and smooth pipes
CO-7	Analyze the steady laminar and turbulent flows in pipes and solve the pipe networks problems



SYLLABUS: BUILDING MATERIALS CONSTRUCTION AND PLANNING (B19CE2103)

UNIT-I: Stones, Bricks and Tiles: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT-II: Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel and Aluminium

UNIT-III: Lime and Cement: Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT-IV: Building Components: Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

Planning of Residential and Public buildings, specifications with line diagram

UNIT-V: Finishings and Aggregates: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings. **Aggregates** - Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2103	
Course Title: BUILDING MATERIALS CONSTRUCTION AND PLANNING	
CO-1	Identify different building materials and their importance in building construction
CO-2	Differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions
CO-3	Learnt the importance of building components and finishings.
CO-4	Draw developed plan, elevation, section, site plan for residential and public buildings.
CO-5	know the classification of aggregates, sieve analysis and moisture content usually required in building construction.



Estd:1980

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SYLLABUS: SURVEYING (B19CE2104)

UNIT-I: Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, surveying accessories. Introduction to Compass, leveling and Plane table surveying

Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – W.C.B systems and Q.B. system of locating bearings (simple problems only)

UNIT-II: Leveling- Types of levels, temporary and permanent adjustments, methods of leveling, booking and Determination of levels, Effect of Curvature of Earth and Refraction **Contouring-** Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes - Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits

UNIT-III: Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrically leveling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements. (simple problems only)

UNIT-IV: Tachometric Surveying: Principles of Tachometry, stadia and tangential methods of Tachometry

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves

UNIT-V: Modern Surveying Methods: Total Station and Global Positioning System. : Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS, Photogrammetric surveying applications and the limitations



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Estd:1980

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2104	
Course Title: SURVEYING	
CO-1	Apply the knowledge to calculate angles, distances and levels
CO-2	Identify data collection methods and prepare field notes
CO-3	Understand the working principles of survey instruments, measurement errors and corrective
CO-4	Measures Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies



SYLLABUS: ENVIRONMENTAL ENGINEERING-I (B19CE2105)

UNIT-I: Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Evolution of water supply system

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population forecasting.

UNIT-II: Surface Sources of Water: Lakes, Rivers, Impounding Reservoirs, Capacity of storage reservoirs, Mass curve analysis.

Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from wells and infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints

UNIT-III: Quality and Analysis of Water: Characteristics of water– Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- IS 10500 2012 and WHO guidelines for drinking water - Water quality standards for Agriculture, Industries and Construction

UNIT-IV: Treatment of Water: Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration.

Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odors- Removal of Iron and Manganese - Adsorption- Fluoridation and defluoridation– Aeration– Reverse Osmosis- Ion exchange– Ultra filtration.

UNIT-V: Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods.



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Estd:1980

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2105	
Course Title : ENVIRONMENTAL ENGINEERING-I	
CO-1	Apply the concepts of population forecasting studies to determine the water demand
CO-2	Explain the concepts of intake structures and pipes in water supply
CO-3	Explain the quality of water with its physical, chemical and biological characteristics
CO-4	Determine the sizes of different unit operations in a water treatment plant using the treatment principles
CO-5	Utilize the concepts of distribution systems for building a better distribution network



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Estd:1980

SYLLABUS: SURVEYING FIELD WORK (B19CE2106)

LIST OF EXPERIMENTS:

1. Study of chains and its accessories, Aligning, Ranging and Chaining and Chain Traversing
2. Compass Traversing – Measuring Bearings & arriving included angles
3. Levelling: Longitudinal & Cross section levelling for an open traverse
4. Theodolite: Distance between two in-accessible points by theodolite
5. Trigonometric Leveling - Heights and distance problem
6. Determination of Heights and distance using Principles of tacheometric surveying
7. Setting out a simple circular curve
8. Determine of area using total station
9. Traversing using total station
10. Contouring using total station
11. Stake out using total station
12. Distance, gradient, diff, height between two inaccessible points using total station

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2106	
Course Title: SURVEYING FIELD WORK	
CO-1	Apply the linear measurement in simple Boundary Surveys.
CO-2	Identify direction of any line using compass survey
CO-3	Relate the importance of Theodolite in Surveying
CO-4	Apply Concepts of Tachometry in Surveying
CO-5	Use the Total Station in Surveying



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SYLLABUS: STRENGTH OF MATERIALS LAB (B19CE2107)

LIST OF EXPERIMENTS:

1. Tension test on Mild Steel bar
2. Tension test on HYSD Steel bar
3. To determine Compressive strength of wood (parallel and perpendicular to grains)
4. To determine Modulus of rigidity of a spring
5. To determine Brinell's hardness & Rockwell hardness on mild steel and Aluminium Specimen
6. To determine Vicker's hardness on mild steel and Aluminium Specimen
7. To determine Impact strength of mild steel by Charpy test
8. To determine Impact strength of mild steel by Izod test
9. To determine shear strength of mild steel by Double shear test
10. Bending test on simply supported Steel /Wooden beams
11. Bending test on cantilever Steel / Wooden beams
12. Draw linear arch for the given two/three point loads
13. Verification of Maxwell's reciprocal theorem on simply supported beam

Course Outcomes for Second Year First Semester Course	
Course Code: B19CE2107	
Course Title: STRENGTH OF MATERIALS LAB	
CO-1	Conduct test and find Physical properties of steel and wood
CO-2	Design the specimens for assessing a particular property of the materials with available machines
CO-3	Decide the range of machine and set the machine accordingly by suitable modifications
CO-4	Design experiments making use of various techniques of load measuring or deformation measuring instruments



SYLLABUS: CONSTITUTION OF INDIA (B19MC2103)

UNIT-I: Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II: Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Learning outcomes:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV: Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning outcomes:-After completion of this unit student will Understand the local Administration

- Compare and contrast district administration role and importance
- Analyze the role of Mayor and elected representatives of Municipalities



Evaluate Zillapanchayat block level organization

UNIT-V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission; Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes:-After completion of this unit student will Know the role of Election Commission apply knowledge Contrast and compare the role of Chief Election commissioner and Commissionerate
Analyze role of state election commission Evaluate various commissions of viz SC/ST/OBC and women

Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2103	
Course Title: CONSTITUTION OF INDIA	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self-government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO-6	a) Know the sources, features and principles of Indian Constitution. b) Learn about Union Government, State government and its administration. c) Get acquainted with Local administration and Panchayati Raj. d) Be aware of basic concepts and developments of Human Rights. e) Gain knowledge on roles and functioning of Election Commission.



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Estd:1980

Regulation: R19				II / IV - B.Tech. II - Semester					
CIVIL ENGINEERING									
(Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION									
(With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
		ES	3	3	-	-	25	75	100
					-	-			
B19 CE2202	Structural Analysis-I	PC	3	3	-	-	25	75	100
					-	-			
B19 CE2203	Concrete Technology	PC	3	3	-	-	25	75	100
					-	-			
B19 CE2204	Hydraulics and Hydraulic Machinery	PC	3	3	--	--	25	75	100
B19 CE2205	Environmental Engineering-II	PC	3	3	--	3	25	75	100
B19 CE2206	Engineering Geology Lab	ES	1.5	--	--	3	20	30	50
B19 CE2207	Fluid Mechanics and Hydraulic Machinery Lab	PC	1.5	--	--	3	20	30	50
B19CE2208	Concrete Lab	PC	1.5	--	--	3	20	30	50
B19 MC2202	Professional Ethics and Human Values	MC	0	3	--	--	--	--	--
TOTAL			19.5	18	0	12	185	465	650



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CIVIL ENGINEERING

SYLLABUS: ENGINEERING GEOLOGY (B19CE2201)

UNIT-I: Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies.

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers

UNIT-II: Mineralogy and Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for Megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite.

Ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite.

Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their Megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III: Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV: Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic belts, Richter scale intensity, Precautions of building constructions in seismic areas.

Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-V: Geology of Dams, Reservoirs and Tunnels: Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunneling, effects, Lining of Tunnels. Influence of Geology for successful Tunneling



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Estd:1980

Course Outcomes for Second Year Second Semester Course	
Course Code: B19CE2201	
Course Title: ENGINEERING GEOLOGY	
CO-1	The course will provide the students with basic knowledge and understanding in the most central part of engineering geology, rock and soil.
CO-2	Students should develop an appreciation of geologic processes and their influence civil engineering works
CO-3	The course will give students an overview and an understanding of the engineering properties of rock and soil materials
CO-4	Based on lectures and exercises, students will gain basic understanding of the importance of engineering geology related to technical issues during construction
CO-5	Students will develop the ability to perform basic engineering geological assessments and analysis, and to understand the relevance of engineering geology in complex projects in and on solid rock



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SYLLABUS: STRUCTURAL ANALYSIS - I (B19CE2202)

UNIT-I: Deflections of Beams: By using (i) Moment area method (ii) Conjugate beam method (iii) Unit load method (iv) Castigliano's theorem-II.

Strain- energy due to (i) Axial load (ii) Bending Moment (iii) Shear force and (iv) Torque Deflections of Statically Determinate Structures: (a) Single storey, single bay rectangular portal frames using (i) Unit load method, (ii) Castigliano's theorem-II. (b) Trusses (having 9 members or less) using (i) Unit load method, (ii) Castigliano's theorem-II.

UNIT-II: Propped Cantilevers, Fixed Beams: Analysis of propped cantilever by method of consistent deformation.

Fixed Beams: Fixed end moments for beams of uniform section for different types of loading; Effect of sinking of support; effect of Rotation of a support; BMD for fixed beam

UNIT-III: Continuous Beams: Analysis of continuous beams by

Theorem of three moments

Slope deflection method

Moment distribution method

Kani's method.

UNIT-IV: Influence Lines and Moving Loads for beams: Definition – Influence line for Reaction, SF and BM in case of simply supported and over hanging beams-Load position for Max SF at a section –Load position for max BM at a section- Single point load, U.D.L longer than the span, U.D.L. shorter than the span- Focal length.

Introduction of moving loads – Max SF and BM at a given section and absolute Max SF and BM due to single concentrated load, U.D.L. longer than the span, U.D.L. shorter than the span, two point loads with fixed distance between them and several point loads, Maximum Bending moment at a section under a wheel load and absolute maximum Bending moment in the case of several wheel loads- Equivalent uniformly Distributed load.

UNIT-V: Influence Lines for Trusses: Influence lines for axial forces in the members of determinate trusses (Through type and deck type bridges. Maximum axial force due to moving concentrated loads and UDL



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Estd:1980

Course Outcomes for Second Year Second Semester Course	
Course Code: B19CE2202	
Course Title: STRUCTURAL ANALYSIS - I	
CO-1	Determine deflections in determinate beams, frames & trusses by different methods and apply strain energy concept
CO-2	Analyze propped cantilever and fixed beams for BM and SF.
CO-3	Analyze different Continuous beams for BM and SF by different methods of analysis
CO-4	Determine reactions, BM & SF in beams subjected to moving loads using ILD
CO-5	Determine axial forces in trusses by using influence lines



Estd:1980

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SYLLABUS: CONCRETE TECHNOLOGY (B19CE2203)

UNIT-I: CEMENTS & ADMIXTURES: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures accelerators, retarders, plasticizers, super-plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates. Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size. Quality of mixing water

UNIT-II: FRESH CONCRETE: Steps in manufacture of concrete – proportion, mixing, placing, compaction, finishing, curing including various types in each stage. Properties of fresh concrete – Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete, Ready mixed concrete, Shotcrete.

UNIT-III: HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gelspace ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing.

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT-IV: ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT-V: MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – concepts proportioning of concrete mixes by various methods – ACI method of mix design, British DoE method of mix design and BIS method of mix design.

SPECIAL CONCRETES: Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete – Properties of polymer concrete, High performance concrete, self healing concrete.



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Estd:1980

Course Outcomes for First Year First Semester Course	
Course Code: B19CE2203	
Course Title: CONCRETE TECHNOLOGY	
CO-1	Understand the basic ingredients like cement, sand and pebbles
CO-2	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour by conducting tests
CO-3	Testing the hardened concrete for different properties
CO-4	Evaluate elasticity, shrinkage and creep properties
CO-5	Design the concrete mix by standard mix designs and familiarize the basic concepts of special concrete, their production and applications



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SYLLABUS: HYDRAULICS AND HYDRAULIC MACHINERY (B19CS1201)
(For CE, EEE & ME)

UNIT-I: Introduction to Computers: Computer Systems, Computing Environments, Computer languages, Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

UNIT-II: Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

UNIT-III: Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

UNIT-IV: Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application

Processor Commands: Processor Commands

UNIT-V: Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter- Function Communication, Standard Functions, Passing Array to Functions, Passing Pointersto Functions, Recursion

Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.



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Estd:1980

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1201	
Course Title: HYDRAULICS AND HYDRAULIC MACHINERY	
CO-1	Students will learn about computer systems, computing environments, developing of a computer program and Structure of a C Program.
CO-2	Students will learn to use different operators, data types and loops for developing C Programs.
CO-3	Students will able to write programs using Arrays, Strings, enumerated types, Structure and Union.
CO-4	Students will able to design and implement programs to analyze the different pointer applications.
CO-5	Students will able to decompose a problem into functions and to develop modular reusable code.



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SYLLABUS: COMPUTER AIDED ENGINEERING DRAWING (B19CE1201)
(For CE)

UNIT-I: PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes –Auxiliary Views.

UNIT-II: SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism,Cylinder, Pyramid, Cone – Auxiliary views.

DEVELOPMENT OF SOLIDS: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone and their parts.

UNIT-III: INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder VsCylinder, Prism Vs Prism and Cylinder Vs Cone.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

UNIT-IV: INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,

VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore and delete.

UNIT-V: COMPUTER AIDED SOLID MODELING: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling of Building & Building Parts.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CE1201	
Course Title: BUILDING MATERIALS AND CONCRETE TECHNOLOGY	
CO-1	Apply principles of drawing to draw the projections of solids.
CO-2	Apply principles of drawing to draw sections of solids and sectional views.
CO-3	Apply principles of drawing to draw the development of solids
CO-4	Apply the principles of drawing to draw the intersection of right regular solids.
CO-5	Apply the principles of drawing to draw the perspective views of points, lines, plane figures and simple solids.
CO-6	Draw isometric and orthographic drawings using CAD packages.



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SYLLABUS: ENGINEERING CHEMISTRY LAB (B19BS1207)

(Common to CE & ME)

LIST OF EXPERIMENTS:

1. Estimation of HCL using standard Sodium Hydroxide.
2. Determination of total hardness of water by EDTA method.
3. Estimation of Ferrous Iron by KMnO_4 .
4. Estimation of oxalic acid by KMnO_4 .
5. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
6. Estimation of Dissolved oxygen by Winkler's method.
7. Determination of pH by pH meter and universal indicator method.
8. Conductometric titration of strong acid Vs strong base.
9. Conductometric titration of strong acid Vs weak base.
10. Potentiometric titration of strong acid Vs strong base.
11. Potentiometric titration of strong acid Vs weak base.
12. Preparation of Phenol formaldehyde resin.
13. Determination of saponification value of oils.
14. Determination of pour and cloud points of lubricating oil.
15. Determination of Acid value of oil.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1207	
Course Title: ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1202)

(Common to CE, ECE, EEE & ME)

UNIT-I: JAM, Common Errors Neutralizing accent

UNIT-II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-III: Presentation Skills Public Speaking Data Interpretation

UNIT-IV: Group Discussion Do's and Don'ts

UNIT-V: Curriculum Vitae Covering Letter Interview Skills Mock Interviews, FAQ's.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS1202	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C LAB (B19CS1204)
(Common to CE, EEE & ME)

1. Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

2. Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

3. Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

4. Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

5. Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

6. Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

7. Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

8. Exercise 8:

1. Write a program in C to compare two strings without using string library functions.



2. Write a program in C to copy one string to another string.

9. Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

10. Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers

11. Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation

12. Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

13. Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function

14. Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two program.
2. Write a program in C to convert decimal number to binary number using the function.

15. Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

16. Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1204	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C LAB	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills .
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program.



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SYLLABUS: WORK SHOP PRACTICE LAB (B19ME1205)
(Civil Engineering)

LIST OF EXPERIMENTS:

CARPENTRY

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

FITTING

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

TIN SMITHY

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

HOUSE WIRING

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Note: At least THREE exercises to be done from each trade.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME1205	
Course Title: WORK SHOP PRACTICE LAB	
CO-1	Apply wood working skills in real world applications.
CO-2	Build different parts with metal sheets in real world applications.
CO-3	Apply fitting operations in various applications.
CO-4	Apply different types of basic electric circuit connections.



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SYLLABUS: ENVIRONMENTAL SCIENCE (B19MC1201)

(Common to CE, ECE & EEE)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid



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wastes. Consumerism and waste products, Biomedical, Hazardous and e- waste management.

UNIT-V: Social Issues and the Environment: Urban problems related to energy -Waterconservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.



COMPUTER SCIENCE AND ENGINEERING



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Regulation: R19				I / IV - B.Tech. I - Semester					
COMPUTER SCIENCE AND ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
B19 HS 1101	English	HS	3	3	--	--	25	75	100
B19 BS 1101	Mathematics-I	BS	3	3	--	--	25	75	100
B19 BS 1102	Mathematics-II	BS	3	3	--	--	25	75	100
B19 BS 1105	Applied Chemistry	BS	3	3	--	--	25	75	100
B19 CS 1101	Computer Fundamentals &Problem Solving Using C	ES	3	3	--	--	25	75	100
B19BS 1108	Applied Chemistry Lab	BS	1.5	--	--	3	20	30	50
B19 HS 1102	English Lab	HS	1.5	--	--	3	20	30	50
B19 CS1104	Computer Fundamentals &Problem Solving Using C Lab	ES	1.5	--	--	3	20	30	50
B19 MC 1101	Environmental Science	MC	0	3	--	--	--	--	--
TOTAL			19.5	18	0	9	185	465	650



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COMPUTER SCIENCE & ENGINEERING

SYLLABUS: ENGLISH (B19HS1101)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: Lesson: A Drawer full of happiness from *Infotech English*, Maruthi Publications.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self-introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.

Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.

Pronunciation: Vowels, consonants, plural markers and their realizations.

UNIT-II : Lesson:- Nehru's letter to his daughter, Indira on her birthday from *Infotech English*, Maruthi Publications.

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (précis writing); avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.

Grammar: Articles, prepositions, conjunctions, use of synonyms and antonyms.

Pronunciation: Past tense markers, word stress-di-syllabic words.

UNIT-III: Lesson: Stephen Hawking-Positivity' Benchmark' from *Infotech English*, Maruthi Publications.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.



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Functional English: complaining and apologizing.

Reading: Reading a text in detail by making basic inferences -recognizing: and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Reading for Writing: Letter writing- types, format and principles of letterwriting, E-mail etiquette, writing a Resume/CV and covering letter.

Vocabulary: Technical vocabulary from across technical branches (20 words. GRE. Vocabulary 20 words), Idioms & Phrasal verbs, Homonyms, word applications, sequencing of words.

Grammar: Sentence Structures, Transformation of sentences (Active and passive Voice, Degrees of comparison, Simple, Compound and Complex).

Pronunciation: Word stress-poly-syllabic words.

UNIT-IV: Lesson: Liking a Tree, Unbowed: Wangari Maathai biography from *Infotech English*, Maruthi Publications.

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: asking for permissions, requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Pamphlet writing, writing for media, writing SOP's.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, cloze encounters, foreign phrases.

Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting, question Tags, direct and indirect speech, reporting for academic purposes.

Pronunciation: Contrastive Stress.

UNIT-V: Lesson: Stay Hungry–Stay Foolish from *Infotech English*, Maruthi Publications.

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts–with/without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.

Reading for Writing: Report writing, writing academic proposals- writing research articles: format



Estd:1980

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and style.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE 'Vocabulary (20 words, antonyms and synonyms, word applications, coherence, matching emotions.

Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement, parallel structures, phrases and clauses).

Pronunciation: Stress in compound words.

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1101	
Course Title: ENGLISH	
CO-1	Identify the context, topic and pieces of specific information by understanding and responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.



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Estd:1980

SYLLABUS: MATHEMATICS-I (B19BS1101)
(LINEAR ALGEBRA, DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS)
(Common to All Branches)

UNIT-I: Linear systems of equations: Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.

UNIT-II: Eigen values - Eigen vectors and Quadratic forms: Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.

UNIT-III: Differential equations of first order and first degree: Linear, Bernoulli, Exact, Reducible to exact types.

Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits. (R-L and R-C circuits only)

UNIT-IV: Linear differential equations of higher order: Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $x V(x)$. Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

UNIT-V: Laplace transformation: Laplace transforms of standard functions, properties, transforms of $tf(t)$, $f(t)/t$, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function; Inverse Laplace transforms, convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1101	
Course Title: MATHEMATICS – I	
CO-1	Solve a given system of linear algebraic equations
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform, inverse Laplace transform and solve linear ODE



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Estd:1980

SYLLABUS: MATHEMATICS – II (B19BS1102)

(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)

(Common to CSE, ECE & IT)

UNIT-I: Interpolation: Interpolation, forward differences, backward differences, Central differences and relations between the operators, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unequal intervals, Lagrange interpolation.

UNIT-II: Solution of Algebraic and Transcendental Equations & Numerical Integration and solution of Ordinary Differential equations: Introduction, Bisection method, Method of false position, Iteration method & Newton-Raphson method.

Trapezoidal rule, Simpson's 1/3 rule, Solution of ordinary differential equations by Taylor's method, Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method.

UNIT-III: Partial differentiation: Introduction, Homogeneous functions, Euler's theorem, Chain rule, Total derivative, Jacobians and their properties.

Applications: Taylor series expansion for a function of two variables, Maxima and Minima of functions of two variables with and without constraints, Lagrange's method. Leibnitz's rules for differentiation under integral sign.

UNIT-IV: First order and higher order partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of Lagrange linear equation. Solutions of Linear homogeneous and non-homogeneous partial differential equations with constant coefficients – source (RHS) terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

UNIT-V: Applications of partial differential equations: Method of separation of variables, One – dimensional wave equation, the D'Alembert's solution, one- dimensional heat equation



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Course Outcomes for First Year First Semester Course	
Course Code: B19BS1102	
Course Title: MATHEMATICS – II	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation



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Estd:1980

SYLLABUS: APPLIED CHEMISTRY (B19BS1105)

(Common to CSE, ECE & IT)

UNIT-I: High Polymers and Plastics; Rubbers & Elastomers: Polymerization Definition, Types of Polymerization, free radical Mechanism of addition polymerization, Plastics as engineering materials, Thermoplastics and Thermosetting plastics, Compounding of plastics, Fabrication of plastics (4 techniques); Preparation, Properties and applications of Polyethylene, PVC, Bakelite, Nylon - 6,6, Bullet Proof plastics - polycarbonate and Kelvar; Fiber reinforced plastics, conducting polymers, Biodegradable Polymers - PHBV, Nylon 2, Nylon 6. Natural rubber – Vulcanization – Compounding of Rubber; Preparation, properties and applications of Buna – S; Buna – N;

UNIT-II: Energy Sources and Applications: Nuclear Energy: Nuclear fission and Nuclear fusion – Nuclear Power reactor – Applications of radioactive materials Solar Photovoltaic cell- Thermal fuels – Introduction – Classification – Calorific value – HCV and LCV – Bomb calorimeter; Coal : Proximate and ultimate analysis of coal – Significance of the analysis – Manufacture of coke by OttoHoffman's by Product Process , Refining crude oil; Knocking; Chemical structure Knocking, Octane number of gasoline, Cetane number of diesel oil, synthetic Petrol; LPG,CNG

UNIT-III: Electrochemical cells and Corrosion: Galvanic cell, single electrode potential, Calomel electrode; Modern batteries: - Lead – Acid battery; Fuel cells- Hydrogen – Oxygen fuel cell, Lithium battery Theories of corrosion (i) dry Corrosion (ii) wet corrosion. Types of corrosion - differential aeration corrosion, pitting corrosion, galvanic corrosion, stress corrosion, Factors influencing corrosion, Protection from corrosion-material selection & design, cathodic protection, Protective coatings- metallic coatings – Galvanizing, Tinning, Electroplating; Electroless plating ; Paints.

UNIT-IV: Water technology: Sources of water – Hardness of water – Estimation of hardness of water by EDTA method; Boiler troubles – sludge and scale formation, Boiler corrosion, caustic embrittlement, Priming and foaming; Softening of water by Lime – Soda Process, Zeolite Process, Ion – Exchange Process; Municipal water treatment; Desalination of sea water by Electrodialysis and Reverse osmosis methods. Indian standards and WHO standards of drinking water. Design of drinking water plant.

UNIT-V: Chemistry of Engineering Materials& Advanced Engineering materials:Cement:- Manufacture of Portland cement, setting and hardening of cement, Deterioration of cement concrete.

Refractories: - Definition, Characteristics, classification, Properties and failure of refractories.

Solar Energy: - Construction and working of Photovoltaic cell, applications.

Solid State Materials: Crystal imperfections, Semi Conductors, Classification and chemistry of semi conductors:



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Intrinsic semiconductors; Extrinsic semiconductors; Defect semiconductors, Compound Semiconductors and Organic Semiconductors.

Liquid Crystals: - Definition – Classification with examples – Applications.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1105	
Course Title: APPLIED CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.



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SYLLABUS: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C (B19CS1101) (Common to CSE & IT)

UNIT-I: Introduction to Fundamentals of Computer Science & Visual Programming through Scratch and App Inventor, Flowchart design through Raptor

History of digital computers, types of computers, Computer Programming- Machine Language, Assembly language and high-level and low level languages, Assemblers, Compilers, and Interpreters, Types of memory.

Visual Programming through Scratch and App Inventor: Introduction to programming concepts with scratch, Scratch environment, sprites looks and motion, Angles and directions, repetition and variation, changing costumes, adding background, Input /Output, variables and operators. Working with sounds and sprite communication and creating stories, App Generation.

Flowchart design through Raptor: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, some structured programming concepts, documents.

UNIT-II: Introduction to 'C' language :Structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, Operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Input-output statements, statements and blocks, Conditional Statements and Loops.

UNIT-III: Functions and arrays: Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs. Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays.

UNIT-IV: Pointers and Structures: pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, Single Linked list, typedef, bitfields.

UNIT-V: Files: Input and output - concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.



Estd:1980

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Course Outcomes for First Year First Semester Course	
Course Code: B19CS1101	
Course Title: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C	
CO-1	The student will be able to develop Flow charts and write algorithms.
CO-2	The student will be able to develop efficient algorithms for solving a problem using the constructs of a programming language like conditional, iteration and recursion.
CO-3	The student will be able to write programs using functions and arrays
CO-4	The student will be able to write programs using Pointers and Structures
CO-5	The student will be able to write programs for Files



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SYLLABUS: APPLIED CHEMISTRY LAB (B19BS1108)
(Common to CSE, ECE & IT)

1. Introduction of Chemistry Laboratory.
2. Estimation of HCL using standard Sodium Hydroxide.
3. Determination of total hardness of water by EDTA method.
4. Estimation of Ferrous Iron by KMnO_4 .
5. Estimation of oxalic acid by KMnO_4 .
6. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
7. Estimation of Dissolved oxygen by Winkler's method.
8. Determination of pH by pH meter and universal indicator method.
9. Conductometric titration of strong acid Vs strong base.
10. Conductometric titration of strong acid Vs weak base.
11. Potentionmetric titration of strong acid Vs strong base.
12. Potentionmetric titration of strong acid Vs weak base.
13. Preparation of Phenol formaldehyde resin.
14. Determination of saponification value of oils.
15. Determination of pour and cloud points of lubricating oil.
16. Determination of Acid value of oil.

Demo:

1. Biodiesel from used cooking oil.
2. Construction of electrochemical cells.
3. Synthesis of semiconductors.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1108	
Course Title: APPLIED CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical Instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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SYLLABUS: ENGLISH LAB (B19HS1102)
(Common to All Branches)

UNIT-I: Pronunciation

Letters and Sounds
The Sounds of English
Phonetic Transcription

UNIT-II: Past tense markers

Word stress-di-syllabic words
Poly-syllabic words

UNIT-III: Rhythm & Intonation

UNIT-IV: Contrastive Stress (Homographs)

UNIT-V: Word Stress: Weak and Strong forms

Stress in compound words

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1102	
Course Title: ENGLISH LAB	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.



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SYLLABUS: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C LAB (B19CS1104)

(Common to CSE & IT)

Exercise 1:

1. Visual Programming through Scratch: Sprites looks and motion, Angles and directions, repetition and variation
2. Flowchart design through Raptor: Finding maximum of 3 numbers, Interest calculators, multiplication tables, GCD of 2 numbers, prime number generation.

Exercise 2:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.
4. Write a C program to calculate the distance between the two points.
5. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.
4. Write a program in C to display the n terms of even natural number and their sum.
5. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.

Exercise 4:

1. Write a C program to check whether a given number is an Armstrong number or not.
2. Write a program in C to print all unique elements in an array.
3. Write a program in C to separate odd and even integers in separate arrays.
4. Write a program in C to sort elements of array in ascending order.



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Exercise 5:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.
3. Write a program in C to search an element in a row wise and column wise sorted matrix.
4. Write a program in C to print individual characters of string in reverse order.

Exercise 6:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.
3. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
4. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 7:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.
3. Write a program in C to add numbers using call by reference.
4. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 8:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.
3. Write a program in C to show how a function returning pointer.
4. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 9:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.
3. Write a program in C to check whether a number is a prime number or not using the function.
4. Write a program in C to get the largest element of an array using the function.

Exercise 10:

1. Write a program in C to append multiple lines at the end of a text file.



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2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.
4. Write a program for CapsLock on/off, NumLock On/off, ScrollLock on/off, restart the system

Exercise 11: Assembling& Disassembling, OS Installation

1. System Assembling, Disassembling and identification of Parts / Peripherals.
2. Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

Exercise 12: MS-Office / Open Office

1. Word - Formatting, Page Borders, Reviewing, Equations, symbols
2. Spread Sheet-Organize data, usage of formula, graphs, charts.
3. PowerPoint - features of power point, guidelines for preparing an effective presentation.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1104	
Course Title: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C LAB	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able to design and develop of C problem solving skills.
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program
CO-6	Able to Identify various computer components, Installation of software



SYLLABUS: ENVIRONMENTAL SCIENCE (B10MC1101)
(Common to CSE, IT & ME)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;. Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid



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wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT-V: Social Issues and the Environment: Urban problems related to energy -Waterconservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.



Regulation: R19				I / IV - B.Tech. II - Semester					
COMPUTER SCIENCE AND ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS 1202	Mathematics-III	BS	3	3	-	-	25	75	100
B19 BS 1203	Applied Physics	BS	3	3	-	-	25	75	100
B19 CS 1202	Digital Logic Design	ES	3	3	-	-	25	75	100
B19 CS 1203	Basic Data Structures and Python Programming	ES	3	3	--	--	25	75	100
B19 ME 1201	Engineering Drawing	ES	2.5	1	--	3	25	75	100
B19 BS 1206	Applied Physics Lab	BS	1.5	--	--	3	20	30	50
B19 CS 1205	Basic Data Structures and Python Programming Lab	ES	1.5	--	--	3	20	30	50
B19 HS 1203	Communication Skills Lab	HS	2	--	1	2	20	30	50
B19 CS 1206	Engineering Exploration Project	PR	1	--	--	2	--	50	50
B19 MC 1202	Constitution of India	MC	--	3	--	--	--	--	--
TOTAL			20.5	16	1	13	185	515	700



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COMPUTER SCIENCE AND ENGINEERING

SYLLABUS : MATHEMATICS-III (B19BS1202)

(Multivariable Calculus and Fourier analysis)

(Common to CE, CSE, ECE, EEE & IT)

UNIT-I: Fourier Series: Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Complex form of Fourier integral, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms, Finite Fourier transforms, properties, inverse transforms, Parseval's Identities.

UNIT-III: Single and Multiple integrals: Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Applications: evaluation of improper integrals, error function and the complimentary error function.

Double and triple integrals, change of variables, Change of order of integration. Applications: Areas and volumes.

UNIT-IV: Vector Differentiation: Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.

UNIT-V: Vector Integration: Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux.

Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1202	
Course Title: MATHEMATICS-III	
CO-1	Determine Fourier series and half range series of functions.
CO-2	Find different Fourier transforms of non-periodic functions and also use them to evaluate integrals.
CO-3	Use the knowledge of Beta and Gamma functions in evaluating improper integrals.
CO-4	Evaluate double integrals, simple triple integrals & find areas and volume.
CO-5	Find the gradient of a scalar function, divergence and curl of a vector function. Determine scalar potential.
CO-6	Apply Green's, Stokes' and Gauss divergence theorems to solve problems.



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Estd:1980

SYLLABUS: APPLIED PHYSICS (B19BS1203) **(Common to CSE, ECE & IT)**

UNIT-I: WAVE OPTICS: Interference: Principle of super position. Interference of light, interference in thin films (reflected light) – Wedge film and Newton's rings – Applications

Diffraction: Types of diffraction, Fraunhofer diffraction at a single slit, Diffraction grating, grating spectrum. Missing order, Resolving power, Rayleigh's Criterion, Resolving power of Grating, Telescope, Microscope (qualitative treatment only)

UNIT-II: DIELECTRICS AND MAGNETICS: Dielectrics : Introduction to dielectrics, Electric Polarization, Dielectric polarizability, Susceptibility, Dielectric constant, Types of Polarization, Frequency dependence of Polarization, Internal field in a dielectric, Clausius and Mosotti equation, Applications of dielectrics.

Magnetics: Introduction to magnetism, Magnetic dipole moment, Magnetization, Magnetic susceptibility and Permeability, Origin of permanent magnetic moment, Classification of magnetic materials, Hysteresis – Weiss Domain theory – Ferrites, soft and hard magnetic materials, Magnetic device applications.

UNIT-III: LASERS AND FIBER OPTICS: Lasers: Introduction, Interaction of radiation with matter, condition for light amplification, Einstein's relations. Requirements of laser device Types of lasers, Design and working of Ruby and He – Ne lasers, Laser characteristics and applications.

Fiber Optics: Introduction to optical fibers, Principle of light propagation in fiber, Acceptance angle, Numerical aperture, Modes of propagation, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.

UNIT-IV: SEMICONDUCTORS: Introduction, intrinsic semi conductors, density of charge carriers, Fermi energy, Electrical conductivity – Extrinsic semi conductors – P-type and N-type, Density of charge carriers, dependence of Fermi energy on carrier concentration and temperature, direct and indirect band – gap semi conductors, Hall effect, Applications of Hall effect. Drift and diffusion currents, Continuity equation, applications of semi conductors.

UNIT-V: ULTRASONICS AND NANOMATERIALS: Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, detection of ultrasonics, acoustic grating, applications of ultrasonics.

Nanomaterials: Introduction, salient features of Nanomaterials, Synthesis methods – Ball milling, Condensation, Chemical vapour Deposition and Sol – Gel methods, Characterization techniques for Nano materials, Carbon nanotubes (CNTS), Applications of Nano materials.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1203	
Course Title: APPLIED PHYSICS	
CO-1	Interpret the behavior of light radiation in interference and diffraction Phenomena and their applications.
CO-2	Explain the properties of dielectric and magnetic materials suitable for engineering applications.
CO-3	Explain the important aspects of semiconductors and electrical conductivity in them.
CO-4	Understand the basics of modern technologies lasers, optical fibers and ultrasonics and their utility in various fields.
CO-5	Demonstrate the synthesis methods and applications of nano materials.



SYLLABUS: DIGITAL LOGIC DESIGN (B19CS1202)
(Common to CSE & IT)

UNIT-I: Binary Systems and Boolean algebra: Digital Systems. Binary Numbers. Number Base Conversions. Octal and Hexadecimal Numbers. Complements. Signed Binary Numbers. Binary Codes. Binary Storage and Registers. Binary Logic, Basic Definitions of Boolean algebra. Axiomatic Definition of Boolean Algebra. Basic Theorems and Properties of Boolean algebra, Boolean Functions.

UNIT-II: Logic Gates and Gate-Level Minimization: Canonical and Standard Forms. Logic Operations.. The Map Method. Four-Variable Map. Five-Variable Map. Product of Sums Simplification. Don't-Care Conditions. Digital Logic Gates. NAND and NOR Implementation. Other Two Level Implementations. Exclusive-OR Function

UNIT-III: Combinational Logic Design: Multiplier. Magnitude Analysis Procedure. Design Procedure. Binary Adder-Subtractor. Decimal Adder. Binary Comparator. Decoders. Encoders. Multiplexers. HDL Models of Combinational Circuits.

UNIT-IV: Sequential Logic design: Sequential Circuits. Latches. Flip-Flops. RS- Latch Using NAND and NOR Gates, Truth Tables. RS, JK, T and D Flip Flops, Truth and Excitation Tables, Conversion of Flip Flops. Analysis of Clocked Sequential Circuits. State Reduction and Assignment. Design Procedure. Registers. Shift Registers. Ripple Counters. Synchronous Counters. Other Counters.

UNIT-V: Memory and Programmable Logic: Introduction. Random-Access Memory. Memory Decoding, Error Detection and Correction. Read-Only Memory. Programmable Logic Array. Programmable Array Logic.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1202	
Course Title: DIGITAL LOGIC DESIGN	
CO-1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. The different Boolean algebra theorems and apply them for logic functions.
CO-2	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
CO-3	An ability to define the following combinational circuits: multiplexer, de-multiplexers encoders/decoders, comparators, arithmetic-logic units and to be able to build simple circuits.
CO-4	An ability to understand asynchronous and synchronous sequential circuits, like counters and shift registers.
CO-5	An ability to understand memories like RAM and ROM, Programmable Logic Array and Programmable Array Logic.



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SYLLABUS: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING (B19CS1203)
(Common to CSE & IT)

UNIT-I: Algorithms- Performance analysis, Searching and Sorting

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples.

Searching–Linear and binary search methods.

Sorting –Bubble sort, Insertion sort, Selection Sort, Quick sort, Merge sort, comparison of sorting methods.

Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT-II: Stacks and Queues

Stack and Queue ADTs, array and linked list representations, applications- infix to postfix, Postfix Evaluation, recursion, Circular queue-insertion and deletion, Dequeue ADT.

UNIT-III: Introduction to Python

Python – Numbers, Strings, Variables, operators, expressions, statements, String operations,

Math function calls, Input / Output statements, Conditional If, while and for loops, Userdefined Functions, parameters to functions, recursive functions, Turtle Graphics.

UNIT-IV: Data Structures and Idiomatic Programming in Python

Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful Idiomatic approach to solve programming problems.

UNIT-V: Event driven Programming

Turtle Bar Chart, Event Driven programming. Key press events, Mouse events, time events.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1203	
Course Title: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING	
CO-1	Ability to implement various searching and sorting techniques.
CO-2	Student will be able to write programs to implement stack and queues
CO-3	Proficiency in creating based applications using the Python Programming Language.
CO-4	To be able to understand the various data structures available in Python Programming language and apply them in solving computational problems.
CO-5	To be able to draw various kinds of plots using PyLab and Event driven Programming.



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SYLLABUS: ENGINEERING DRAWING (B19ME1201)

(Common to CSE, ECE & IT)

UNIT-I: Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general method (eccentricity method only), cycloids, involutes, tangents & normals for the curves.

UNIT-II: Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel to one of the reference planes (HP, VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III: Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME1201	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.



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SYLLABUS: APPLIED PHYSICS LAB (B19BS1206)

(Common to CSE, ECE & IT)

LIST OF EXPERIMENTS:

1. Determination of the Wavelength of light from a source – Diffraction Grating – Normal incidence.
2. Determination of radius of curvature of Plano convex lens – Newton's Rings.
3. Determination of the thickness of a thin spacer using interference – Air Wedge method.
4. Determination of Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Verification of Laws of series and parallel combinations of resistances – Carey Foster's bridge.
6. Determination of Temperature Coefficient of Resistance of a thermistor
7. Determination of resistivity of semiconductors by Four probe method.
8. Determination of dielectric Constant by charging and discharging method.
9. Resolving power of a grating.
10. Determination of the velocity of sound - Volume Resonator method.
11. Determination of the Rigidity modulus of elasticity of a material – Torsional pendulum.
12. Verification of the laws of vibrations in stretched strings - Sonometer.
13. Determination of Magnetic susceptibility by Quinke's method.
14. Study of variation of dielectric constant with temperature.
15. Determination of the frequency of the AC supply – AC Sonometer.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1206	
Course Title: APPLIED PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.



SYLLABUS: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING LAB
(B19CS1205)

(Common to CSE & IT)

LIST OF EXPERIMENTS

1. C program for sorting a list using Bubble sort and then apply binary search.
2. C program to implement the operations on stacks.
3. C program to implement the operations on circular queues.
4. C program for evaluating a given postfix expression using stack.
5. C program for converting a given infix expression to postfix form using stack.
6. C program for implementing the mazing problem.
7. C program for the representation of polynomials using linked list and for the addition of two such polynomials.
8. C program for quick sort .
9. C program for Merge sort.
10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 \leq YYYY \leq 9999$, $1 \leq MM \leq 12$, $1 \leq DD \leq 31$) following the leap year rules.
14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 \leq HH \leq 23$, $0 \leq MM \leq 59$, $0 \leq SS \leq 59$)
16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.
17. Design a Python Script to convert a given number to words
18. Design a Python Script to convert a given number to roman number.
19. Design a Python Script to generate the frequency count of words in a text file.
20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
21. Design a Python Script to implement Gaussian Elimination method.
22. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
23. Design a Python script using the Turtle graphics library to construct a turtle bar chart



Estd:1980

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representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1205	
Course Title: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING LAB	
CO-1	Student will be able to write programs to implement stack and queues
CO-2	Ability to implement various searching and sorting techniques.
CO-3	To develop proficiency in creating based applications using the Python Programming Language.
CO-4	To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
CO-5	To be able to do testing and debugging of code written in Python.
CO-6	To be able to draw various kinds of plots using PyLab.
CO-7	To be able to do text filtering with regular expressions in Python



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SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1203)
(Common to CSE & IT)

UNIT-I: JAM, Common Errors, Neutralizing accent

UNIT II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-III: Presentation Skills Public Speaking, Data Interpretation

UNIT-IV: Group Discussion, Do's and Don'ts

UNIT V: Curriculum Vitae Covering Letter Interview Skills, Mock Interviews, FAQ's

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1203	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



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SYLLABUS: ENGINEERING EXPLORATION PROJECT (B19CS1206)

(Computer Science & Engineering)

Apply Design thinking on the following Streams to

Project Stream 1:

Electronics, Robotics, IOT and Sensors

Project Stream 2:

Computer Science and IT Applications

Project Stream 3:

Mechanical and Electrical tools

Project Stream4:

Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.



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SYLLABUS: CONSTITUTION OF INDIA (B19MC1202)
(Common to CSE & IT)

UNIT-I: Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II: Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Learning outcomes:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV: Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning outcomes:-After completion of this unit student will

- Understand the local Administration

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- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT-V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

Course Outcomes for First Year First Semester Course	
Course Code: B19MC1202	
Course Title: CONSTITUTION OF INDIA	
CO-1	Understand historical background of the constitution making and its importance for building ademocratic India.
CO-2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self-government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO-6	<ol style="list-style-type: none"> 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Pachayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission



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Regulation: R19				II / IV - B.Tech. I - Semester					
COMPUTER SCIENCE AND ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 CS 2101	Mathematical Foundations of Computer Science	PC	4	3	1	--	25	75	100
B19 CS 2102	Software Engineering	PC	3	3	--	--	25	75	100
B19 CS 2103	Object Oriented Programming	PC	3	3	--	--	25	75	100
B19 CS 2104	Advanced Data Structures	PC	3	3	--	--	25	75	100
B19 CS 2105	Computer Organization	PC	3	3	--	--	25	75	100
B19 CE2105	Environmental Engineering-I	PC	3	3	--	--	25	75	100
B19 CS 2106	Object-oriented Programming Lab	PC	1.5	--	--	3	20	30	50
2107	Structures Lab	PC	1.5	--	--	3	20	30	50
B19MC 2101	Professional Ethicsand Human Values	MC	0	3	--	--	--	--	--
TOTAL			19	18	1	6	165	435	600



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COMPUTER SCIENCE AND ENGINEERING

SYLLABUS: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (B19CS2101)

UNIT-I : Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well-formed Formulae, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises.

Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus..

UNIT-II : Combinatorics: Basics of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Theorems, Binomial and Multinomial Coefficients, Principles of Inclusion–Exclusion.

UNIT-III: Relations and Algebraic Structures: Relations: Definition of Relation, Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

Algebraic Structures: Algebraic Systems, Semi Groups, Monoids, Groups, and Abelian Group, Homomorphism of Semi Groups, Monoids and Groups.

UNIT-IV: Recurrence Relations: Generating Functions, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT-V: Graph Theory: Basic Concepts of Graphs, Sub graphs, Isomorphism of Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Bipartite graphs, Planar Graphs, Euler's Formula.

Trees: Definition of Tree, properties of Trees, Different tree structures, Binary trees, Spanning trees, Minimal Spanning Trees, Kruskal's and Prim's Algorithms.

Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2101	
Course Title: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	
CO-1	Write and verify the arguments for their validity using propositional and predicate logic.
CO-2	Observe different counting methods and apply in their fields of study.
CO-3	Identify various types of relations and utilize their properties.
CO-4	Understand different Algebraic structures and their properties.
CO-5	Formulate and solve the recurrence relations.
CO-6	Utilize the concepts in graphs and trees to understand different data structures.



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SYLLABUS: SOFTWARE ENGINEERING (B19CS2102)

UNIT-I: Software and Software Engineering:

The nature of Software, Software Engineering, Software process, Software Engineering Practice, Software myths

Process models:

A Generic Process model, Process assessment and improvement, Prescriptive Process models, Specialized process models, The Unified Process

Agile Development:

Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process

UNIT-II: Software Requirement analysis and Specification:

Software Requirements, Problem analysis, Requirements specification, Functional specification with use cases, validation.

Software Architecture:

Role of Software Architecture, Architecture views, Component and Constructor views, Architecture styles for C&C Views.

UNIT-III: Function Oriented Design:

Design Principles, Module level concepts, Design notation and specifications, structured design methodology

Object Oriented Design:

Object Oriented Analysis and design, Object Oriented Concepts, Design Concepts, UML, A Design methodology

User Interface Design:

Interface analysis, Interface design steps.

UNIT-IV: Testing Conventional applications: Software testing fundamentals, Internal and external views of testing, White Box testing, Basis path testing, Control structure testing, Black-Box testing, Model based testing
Testing Object Oriented Applications: Testing OOA and OOD models, Object Oriented Testing strategies, Object Oriented Testing Methods, Testing methods applicable at class level.

UNIT-V: Planning a Software Project: Process Planning, Effort Estimation, Project Scheduling and Staffing
Software Configuration Management Plan, Quality Plan, Risk Management, Project Monitoring Plan



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Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2102	
Course Title: SOFTWARE ENGINEERING	
CO-1	Understand the different software process models and their significance.
CO-2	Distinguish various requirements gathering procedures and architectural views.
CO-3	Analyze various aspects of the system such as functionality, object and user interface.
CO-4	Identify the testing strategies for conventional and object oriented applications.
CO-5	Plan and implement various software project management activities.



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SYLLABUS: OBJECT ORIENTED PROGRAMMING (B19CS2103)

UNIT-I: Basics of Object Oriented Programming: Object Oriented Paradigm, Principles of OOP, benefits of OOP, data types, declarations, expressions and operator precedence, functions, scope of variables.

C++ Basics:

Classes and objects, Constructors & Destructors, constructor with dynamic allocation, Friend function, Friend Classes, Inline Function, Default Arguments, operator Overloading through Unary, Binary, Assignment and Stream operators & type conversions, Nested Classes, Local Classes, Static class members, Array of objects.

UNIT-II: Inheritance and Manipulating Strings: Derived classes, making private members inheritable, Inheritance and its Types, Virtual base Class, Creating String Objects, Manipulating String Objects, Relational Operations, and Accessing String Characteristics.

Polymorphism:

Pointers, pointers to objects, this pointer, pointers to derived classes, references, abstract classes, virtual and pure virtual functions, Dynamic polymorphism, Virtual destructor, Virtual Base Class, Dynamic Allocation Operators.

UNIT-III: Templates, Exception handling: Generic Functions, Generic Classes, Member function templates, using Default arguments with Template Classes, Exception Handling Fundamentals, catching class types, using multiple catch statements, Handling Derived class Exceptions.

Streams and Files in C++:

Stream Classes, Formatted and Unformatted I/O operations, managing output with manipulators, working with files, C-Based I/O Functions.

UNIT-IV: JAVA Basics: Introduction, Classes and Objects, Method Overloading, Method Overriding, Final Keyword, Inheritance, Abstract Classes and Interfaces, Arrays (1D & 2D), Strings (String Class and String Buffer Class) and Vectors

Exception Handling and Packages:

Exception types, usage of try, catch, throw, throws and finally keywords, built in exceptions and creating our own exception, Packages: Defining, creating, accessing a package, access protection of packages, importing packages and static import.

UNIT-V: Multi threading: Introduction on Thread, Life cycle of a Thread, Thread Priorities, Synchronization, Implementing the Runnable interface.

Managing I/O files in Java:

Stream Classes, Byte and Character Oriented Classes, Using File Classes, Handling primitive data types



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Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2103	
Course Title: OBJECT ORIENTED PROGRAMMING	
CO-1	Illustrate Object Oriented Concepts (OOP) through C++
CO-2	Apply Inheritance and polymorphism in C++
CO-3	Apply C++ Programming on File Manipulation, Generic modules and Exception handling
CO-4	Illustrate JAVA Programming basics and features
CO-5	Implement JAVA Programming on File and thread management.



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SYLLABUS: ADVANCED DATA STRUCTURES (B19CS2104)

UNIT-I: Linked Lists:

Definition and storage organization of Linked List, Singly Linked List and its Operations (Insert first, Insert end, Insert at a given position, Traversing, Reverse, Counting number of nodes, Searching for a particular element, Sort the elements in the list).

Doubly Linked Lists and its Operations, Circular Linked Lists and its Operations, Representing polynomials using linked lists, Polynomial Addition and Polynomial Multiplication.

UNIT-II: Trees and Priority Queues:

Definition of General Tree, Tree Terminology, Binary Tree Representation and Types of Binary Trees, Threaded Binary Tree, Binary Search Tree and its Operations (Insert, Delete, Search, Tree Traversals, Finding Height of a tree, Count number of nodes in the given tree). Priority Queue definition, Types of Priority Queue, Binary Heap, Implementation of Min

Priority Queue using Binary heap, Operations (Insertion into Min Heap, Deletion from Min Heap, Search for an element), Heap Sort.

UNIT-III: Advanced Trees:

Balanced Search Trees, AVL tree properties, implementation and its operations, Construction of red Black Trees, Splay Trees and 2-3 Trees. m-ary Search Trees, B-Tree Construction and its Operations, B+ Tree Construction and its Operations. Data Structures for Strings: Tries and Compressed Tries, Suffix Trees and Suffix Arrays.

UNIT-IV: Graphs

Graph ADT, Definition and Graph Terminology, Representation of Graphs, Elementary Graph Operations (Create, Insertion, Deletion), Graph Traversals- Depth First Search (DFS) and Breadth First Search (BFS).

Spanning Tree, Minimum cost Spanning Tree- Prim's Algorithm, Kruskal's Algorithm. Topological Sort, Applications of DFS for finding Bi Connectivity, Euler Circuits and Strong Components.

UNIT-V: Hashing, External Sorting and Pattern Matching:

Hashing, Hash Table Structure, Hash Function, Collision, Collision Resolution Techniques, Separate Chaining, Open Addressing or Closed Hashing, Rehashing, Extendible hashing.

Differences between Internal Sorting and External Sorting, External Sorting Algorithms: Simple Algorithm, Multi way Merge.

Pattern Matching, Naive Pattern Matching algorithm, Knuth-Morris-Pratt (KMP) algorithm, Rabin Karp algorithm.



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Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2104	
Course Title: ADVANCED DATA STRUCTURES	
CO-1	Identify an appropriate data Structure to solve the given problem.
CO-2	Apply the knowledge of trees to construct various types of tree structures for the given data.
CO-3	Apply Graph algorithms to solve network problems.
CO-4	Identify an appropriate collision resolution technique to handle collisions.
CO-5	Apply pattern matching algorithms to find the patterns in the given data.



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SYLLABUS: COMPUTER ORGANIZATION (B19CS2105)

UNIT-I: Digital Computers and Arithmetic: Historical perspective and von Neumann computers, Memory and Peripheral devices.

Fixed and floating-point representation of numbers, Addition and Subtraction, Multiplication and Division algorithms, Floating-point arithmetic operations.

UNIT-II: Instruction Set Architectures:

Stack Organization, Instruction Formats, Addressing Modes.

Computer Instructions, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), Instruction Cycle, Input-Output and Interrupt, Complete Computer Description.

UNIT-III: Basic Computer Organization and Design:

General Register Organization and Bus system, Timing and Control, Micro Operations and ALU, Design of Basic computer.

Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT-IV: Memory and I/O Organization:

Memory Accessing techniques, Memory Hierarchy, Cache Memory, and Virtual memory. I/O interface and data transfer, Modes of transfer, Priority interrupt, Direct memory access and IOP.

UNIT-V: Parallel Architectures:

Parallel Processing, Pipelining, Arithmetic and Instruction Pipelines, RISC Pipeline, Vector Processing, Array Processors.

Multiprocessors and Interconnection Networks, Symmetric multiprocessors, Cache coherence.

Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2105	
Course Title: COMPUTER ORGANIZATION	
CO-1	Identify basic building blocks of a computer.
CO-2	Design of computer functional blocks.
CO-3	Identify the parameters that enhance system performance.



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SYLLABUS: OBJECT ORIENTED PROGRAMMING LAB (B19CS2106)

List of C++ Programs

1. Program that implements Stack operations using classes and objects.
2. Program for performing complex number addition using friend functions.
3. Program to implement Function Overloading.
4. Program to implement Constructor Overloading.
5. Program that illustrates how objects are destroyed
6. Program to overload increment and decrement operators using Unary Operator.
7. Program for complex number addition and subtraction using binary operator overloading(use member function and friend function).
8. Program to overload stream operators
9. Program for writing and reading a class object to a file
10. Program to perform string operations by overloading operators.
11. Program to implement get(), getline() member functions of Stream Input.
12. Program for copying one file to another file using streams
13. Program to implement single inheritance.
14. Program on hierarchical inheritance showing public, private and protected inheritances.
15. Program for computation of students results using hybrid inheritance.
16. Program implementing bubble-sort using function templates.
17. Program to find scalar product of two vectors using class templates.
18. Program to implement member function template.
19. Write a C++ program that illustrates how runtime polymorphism run is achieved using virtual functions.
20. Program to implement Stream Manipulators

List of JAVA Programs

1. Program to implement Method overriding.
2. Program to implement Multiple Inheritance using Interfaces.
3. Program on hierarchical inheritance..
4. Program for Multiplication of TWO Matrices.
5. Program to convert character array to string.



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6. Program to perform various vector operation
7. Program to implement methods in
 - a) String Comparison
 - b) Searching Strings
 - c) Modifying a Strings
8. Program on packages.
9. Program to import from various classes and methods from multiple packages
10. Program for handling
 - a) ArrayIndexOutOfBoundsException.
 - b) Arithmetic Exception
 - c) ClassNotFoundException
 - d) NullPointerException
 - e) IOException
11. Program for Custom Exception Creation.
12. Program on multithreading showing how cpu time is shared among all threads.
13. Program to implement Runnable Interface.
14. Program to implement yield (), sleep(), stop() methods using Threads.
15. Program to set Priorities for various Threads.
16. Program to copy characters from one file to another file.
17. Program to copy bytes from one file to another file.
18. Program for WRAPPER Classes

Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2106	
Course Title : OBJECT ORIENTED PROGRAMMING LAB	
CO-1	Implement C++ programs for applying C++ object oriented features, File and exception handling. (K3)
CO-2	Develop Java applications using basic features, multi-threading and file I/O.



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SYLLABUS: ADVANCED DATA STRUCTURES LAB (B19CS2107)

LIST OF EXPERIMENTS:

1. Implementation of singly linked list
2. Implementation of doubly linked list
3. Program to reverse the nodes in a circular linked list
4. Program to perform operations on two polynomials using linked list
5. Implement traversal techniques in binary tree
6. Beginning with an empty binary search tree, construct binary search tree by inserting the values in the order given. After constructing a binary tree -
 - Insert new node
 - Find number of nodes in longest path
 - Minimum data value found in the tree
 - Change a tree so that the roles of the left and right pointers are swapped at every node.
 - Search a value
7. Write a program to perform the following operations
 - Insertion into an AVL-tree
 - Deletion from an AVL-tree
8. Program to implement priority queue using Heap
 - Inserting new element
 - Deletion of minimum element
9. Write a program to implement DFS and BFS traversals.
10. Write a program to find minimum spanning tree using Prim's Algorithm
11. Write a program to find minimum spanning tree using Kruskal's Algorithm
12. Write a program to implement topological sort
13. Write a program for creating an Open Addressing Hash Table with linear probing and quadratic probing.
14. Write a program to implement Naive Pattern Matching algorithm
15. Write a program to identify the desired patterns with Knuth-Morris-Pratt (KMP) algorithm
16. Write a program to implement Rabin Karp pattern matching algorithm.



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Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2107	
Course Title: ADVANCED DATA STRUCTURES LAB	
CO-1	Obtain linked list and Trees knowledge in practical applications using different languages.
CO-2	Implement graph algorithms to solve various real time applications
CO-3	Implement different Hash Tables and Pattern Matching Algorithms.



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SYLLABUS: PROFESSIONAL ETHICS AND HUMAN VALUES (B19MC2101)

UNIT-I: Human Values:

Morals, Values and Ethics-Integrity-Work Ethic-Service learning Civic Virtue Respect for others Living Peacefully Caring Sharing Honesty -Courage-Cooperation Commitment Empathy Self Confidence Character Spirituality.

UNIT-II: Engineering Ethics:

Senses of 'Engineering Ethics-Variety of moral issued- Types of inquiry Moral dilemmas Moral autonomy- Kohlberg's theory- Gilligan's theory-Consensus and controversy Models of professional roles-Theories about right action-Self-interest -Customs and religion Uses of Ethical theories Valuing time Cooperation Commitment.

UNIT-III: Engineering as Social Experimentation:

Engineering As Social Experimentation- Framing the problem- Determining the facts codes of Ethics- Clarifying Concepts- Application issues Common Ground -General Principles- Utilitarian thinking respect for persons.

UNIT-IV: Engineers Responsibility for Safety and Risk:

Safety and risk Assessment of safety and risk. Risk benefit analysis and reducing risk-Safety and the Engineer- Designing for the safety- Intellectual Property rights (IPR).

UNIT-V: Global Issues: Globalization- Cross-culture issues-Environmental Ethics- Computer Ethics Computers as the instrument of Unethical behavior Computers as the object of Unethical acts Autonomous Computers- Computer codes of Ethics- Weapons

Development -Ethics and Research Analyzing Ethical Problems in research.



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Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2101	
Course Title: PROFESSIONAL ETHICS AND HUMAN VALUES	
CO-1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships and field work.
CO-2	Identify the multiple ethical interests at stake in a real-world situation or practice and Articulate what makes a particular course of action ethically defensible.
CO-3	Assess their own ethical values and the social context of problems.
CO-4	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
CO-5	Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.



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Regulation: R19				II / IV - B.Tech. II - Semester					
COMPUTER SCIENCE AND ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
		BS	3	3	-	-	25	75	100
B19 CS 2201	Advanced Java Programming	PC	3	3	-	-	25	75	100
	Operating Systems	PC	3	3	-	-	25	75	100
B19 CS 2203	Data Base Management Systems	PC	3	3	--	--	25	75	100
B19 CS 2204	Design and Analysis of Algorithms	PC	3	3	--	--	25	75	100
B19 CS 2205	Advanced Java Programming Lab	ES	1.5	--	--	3	20	30	50
B19 CS 2206	UNIX OperatingSystems Lab	PC	1	--	--	2	20	30	50
B19 CS 2207	Data Base Management Systems Lab	PC	1.5	--	--	3	20	30	50
B19 CS 2208	Socially Relevant Project (15Hr/Sem)	PR	1	--	--	2	20	30	50
B19 MC 2201	Essence of Indian Traditional Knowledge	MC	0	3	--	--	--	--	--
TOTAL			20	18	0	10	205	495	700



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COMPUTER SCIENCE AND ENGINEERING

SYLLABUS: PROBABILITY AND STATISTICS (B19 BS 2202)

UNIT-I: Descriptive statistics and methods for data science:

Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variables: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread or variance), Skewness, Kurtosis

Correlation: Definition, Karl Pearson's Coefficient of Correlation, Limits for correlation coefficient, Rank Correlation, Spearman's formula for rank correlation coefficient (without proofs).

Regression Analysis: Regression Lines, Regression Coefficients and their properties (without proofs).

Curve fitting: Method of least Squares, fitting of a Straight line, Fitting of a Parabola.

UNIT-II: Random Variables and Probability functions:

Review of basic concepts of Probability (no questions will be set on review).

Definition of a random variable, Distribution function, Properties of Distribution Function,

Discrete Random Variable, Probability Mass Function, Discrete Distribution Function, Continuous Random Variable, Probability Density Function, Continuous Distribution Function. Introduction to Joint random variable and its Probability functions.

Mathematical Expectation: Mathematical Expectation of a Random Variable, Expected Value of function of a Random Variable, Addition Theorem and Multiplication Theorem of Expectation (without proofs), Statistical Measures like Mean, Variance, Moments and Covariance in terms of Expectations.

Generating functions: Moment generating Function, Characteristic Function and Probability generating Function of a Random Variable.

UNIT-III: Discrete and Continuous Distributions:

Discrete Distributions: Binomial distribution and Poisson distribution - Definition, Mean, Variance, moments, m.g.f., Characteristic function, p.g.f., Fitting of distributions.

Continuous Distributions: Normal Distribution - Definition, Standard Normal Variate, Mean, Variance, m.g.f., Characteristic function, Applications of Normal Distribution, Importance of Normal distribution. Exponential Distribution, Definition, Mean, Variance and Memory less property of Exponential distribution.

UNIT-IV: Sampling theory and Testing of Hypothesis:

Sampling Theory: Sample, population, statistic, parameter, Sampling distribution, standard error, point and interval estimation. Testing of Hypothesis: Formulation of Null hypothesis, Alternative hypothesis, Critical region, level of significance, Errors in sampling- Type-I- error, Type-II-error, One-tailed and Two-tailed tests Degrees of freedom.

Large Sample Theory: Test of significance of single sample proportion, Test of significance for difference of



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proportions.

Small Sample Theory: Student's-t-distribution: definition, t-test for single mean, t-test for difference of means,

Paired t-test for difference of means.

F-distribution: definition, F-test for equality of two population variances. Chi-square distribution: definition, Chi-square test for goodness of fit.

UNIT-V: Queuing Theory:

Queue description, Birth and Death Process, Distribution of Inter-arrival times, Distribution of service times, Kendall's representation of a queuing model, Operating characteristics of a

queuing model, steady-state solutions of $\{M/M/1: \infty/FCFS\}$ Model and $\{M/M/1; N/FCFS\}$ Model.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19 BS 2202	
Course Title: PROBABILITY AND STATISTICS	
CO-1	Understand the concepts of data science and fit a best suitable curve for the given data
CO-2	Identify the random variable as discrete/continuous and analyse it.
CO-3	Predict the discrete distribution suitable for the given data from its moments.
CO-4	Predict the continuous distribution suitable for the given data from its moments
CO-5	Decide the test applicable for giving inference about Population Parameter based on Sample statistic.
CO-6	Make business decisions about the resources needed to provide a service in day-to-day life applications including telecommunication, traffic engineering, computing and the design of factories, shops, offices and hospitals.



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SYLLABUS: ADVANCED JAVA PROGRAMMING (B19CS2201)

UNIT-I: Applet Programming and Basic AWT Components: Introduction to Applet, Applet Life Cycle, Passing parameters to Applet.

AWT: Basic AWT user interface controls: (Button, Checkbox, Checkbox Group, Scrollbars, Text Field, Text Area, Radio button and List box).

UNIT-II: Java Swings: Introduction to JSwings, Differences between AWT & Swings, Components and Containers, Exploring Swing (JFrame, JButtons, JTable, JPasswordField, JTabbedPane, JScrollPane, JTrees).

Event-handling and Layout Managers:

Handling events with classes and handling events by implementing interfaces, Organizing Windows with Layout Managers (Flow Layout, Border Layout, Card Layout, Grid Layout, Grid Bag Layout).

UNIT-III: SERVLETS: Introduction to Servlet, Servlet Life Cycle, Servlet Basics, Tomcat Web Server, Configuring Apache Tomcat, The Servlet API, The javax.servlet Package, Reading Servlet Parameters, The javax.servlet.http Package, Handling Client Request and Response, Handling Cookies, Session Tracking.

UNIT-IV: JSP: Introduction to JSP, JSP Elements(JSP Declaration, JSP Scripting, JSP Expression, JSP Comments), JSP Directives, implicit Objects, JSP Program for Database Access.

Database Access:

Structure of JDBC, JDBC Drivers, JDBC Architecture, JDBC API (java.sql.package), Connecting to the Database, JAVA Database connection program for MS Access, Oracle, MySQL.

UNIT-V: Network Programming: The Networking Classes and Interfaces, InetAddress, TCP/IP Client Sockets, URLConnection, Http URLConnection, TCP/IP Server Sockets, Datagram, Datagram Socket, Datagram Packet, Remote method invocation and MVC architecture.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19CS2201	
Course Title: ADVANCED JAVA PROGRAMMING	
CO-1	Design and develop window based applications with AWT/SWING components.
CO-2	Develop server side programs in the form of servlets.
CO-3	Design and develop web based applications with database access using JSP and JDBC.
CO-4	Develop client/server applications and TCP/IP socket programming.



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SYLLABUS: OPERATING SYSTEMS (B19CS2202)

UNIT-I: Evolution of OS, Overview of Operating Systems, Types of Operating Systems, Operating System Structures- Kernel, Shell,

General Structure of MSDOS, Windows 2000, Linux., Operating System Services, System Calls, Virtual Machines, Introduction to Distributed Systems,

UNIT-II: Processes: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication

Threads: Overview, Multicore Programming, Multithreading Models

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization, Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors

UNIT-III: Dead lock system model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Deadlock Recover

UNIT-IV: Logical versus Physical Address map, Swapping, contiguous memory allocation, segmentation, paging, structure of the page table, Virtual Memory, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files.

UNIT-V: I/O Hardware, Application I/O Interface, File Concept, Access Methods, File-System Structure & Implementation, Disk Structure & Implementation, Disk Scheduling & Management

Security & Protection: Principles of Protection, Domain of Protection, Access Matrix, The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool

Case Study of UNIX, MS-DOS and Windows

Course Outcomes for First Year First Semester Course	
Course Code: B19CS2202	
Course Title: OPERATING SYSTEMS	
CO-1	Outline the OS evaluation, its structure, concepts and services.
CO-2	Express process lifecycle, process scheduling, process synchronization and IPC.
CO-3	Explain the deadlock model characterization, its detection, prevention and recovery.
CO-4	Explain the memory hierarchy, allocation & de-allocation mechanism, virtual memory and segmentation concepts.
CO-5	Learn about the file system design, I/O principles and disk management implementation.



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SYLLABUS: DATA BASE MANAGEMENT SYSTEMS (B19CS2203)

UNIT-I: Introduction: What is DBMS, Database-System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Data Storage and Querying, Transaction Management, Database Architecture, Database Users and Administrators, History of Database Systems.

ER Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Entity- Relationship Diagrams, Entity-Relationship Design Issues, Extended E-R Features.

UNIT-II: Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

Relational Query Languages: The Relational Algebra, Tuple Relational Calculus, The Domain Relational Calculus

UNIT-III: SQL: Overview of the SQL, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Modification of the Database, Join Expressions, Views, Integrity Constraints,

SQL Data Types and Schemas, Authorization, JDBC, ODBC, Embedded SQL, Functions and Procedures, Triggers.

UNIT-IV: Storage strategies: Basics of Indexing and B+ trees, RAID

Query processing and optimization: Measures of Query Cost, Transformation of Relational Expressions.

Normalization: Introduction, Functional dependencies, Decomposition, First, Second, and third normal forms, Boyce/Codd normal form. Multi-valued dependencies and Fourth normal form, Join dependencies and Fifth normal form.

UNIT-V: Transaction Management: The ACID Properties, Transactions & Schedules, Concurrent Execution of Transactions. Concurrency Control: Serializability and Recoverability, Two Phase Locking protocol, Dealing with Deadlocks and Timestamp Ordering Protocol.

Crash Recovery: Shadow Paging, Log-based Recovery, The Log, The Write-Ahead Log Protocol, ARIES.



Estd:1980

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Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2203	
Course Title: DATA BASE MANAGEMENT SYSTEMS	
CO-1	Describe the fundamental concepts of DBMS and RDBMS.
CO-2	Design ER Models for simple application scenario.
CO-3	Apply Relational Query Languages on Relations.
CO-4	Apply SQL commands for defining, constructing and manipulating databases.
CO-5	Apply normalization techniques to improve the database design.
CO-6	Explain concurrency control and crash recovery techniques.



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SYLLABUS: DESIGN AND ANALYSIS OF ALGORITHMS (B19CS2204)

UNIT-I: INTRODUCTION:

Getting Started: Insertion sort, Analyzing algorithms, Designing algorithms, Growth of Functions: Asymptotic Notation, Standard notations and common functions, Master method for solving recurrences

DIVIDE AND CONQUER:

General method, Finding maximum and minimum, Merge sort, Quick sort, Performance Measurement, Selection Problem, A Worst-Case Optimal Algorithm, Strassen's matrix multiplication, Convex hull Problem- Quick Hull Algorithm

UNIT-II: Sets and Disjoint set union, Union and Find Operations

THE GREEDY METHOD: General method, Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees- Prim's algorithm, Kruskal's algorithm, Optimal storage on tapes, Optimal merge patterns, Huffman coding, Single source shortest paths.

UNIT-III: DYNAMIC PROGRAMMING: General method, Multistage graphs, All pairs shortest paths, Optimal binary search trees, String editing, 0/1 Knapsack, The travelling salesperson problem

UNIT-IV: BACKTRACKING: General method, 8-Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles

BRANCH AND BOUND: The method, Least Cost(LC) Search, The 15-puzzle problem, Control abstractions for LC- Search, FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack problem: LC Branch and Bound, FIFO Branch-and-Bound, Travelling sales person problem : LC Branch and Bound

UNIT-V: LOWER BOUND THEORY: The method, Comparison trees, Ordered Searching, Sorting, Selection, Oracles and adversary arguments, Merging, Largest and Second largest

NP-HARD AND NP-COMPLETE PROBLEMS: Basic concepts, Nondeterministic Algorithms, The Classes NP-hard and NP-complete Modular Arithmetic.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2204	
Course Title: DESIGN AND ANALYSIS OF ALGORITHMS	
CO-1	Apply mathematical analysis methods to analyse the algorithm running times using asymptotic notations
CO-2	Compare and understand how the choice of data structures impact the performance of various greedy algorithms
CO-3	Design algorithms using advanced design techniques such as dynamic programming for various computationally intensive problems
CO-4	Design algorithms using different paradigms like Divide and Conquer, Backtracking, Branch and Bound and explain the situations which call for usage of these paradigms
CO-5	Infer lower bounds for common problems like searching, sorting, merging, selection, Understand the concepts of P, NP classes and String matching



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SYLLABUS: ADVANCED JAVA PROGRAMMING LAB (B19CS2205)

CYCLE-1 Programs

1. Write an applet program to Pass a parameters to Applet
2. Write a java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes
3. Write a java program to demonstrate the key event handlers.
4. Write a java program to display the table using labels in grid layout and Flow layout.
5. Write a program to implement an application using AWT Components
6. Write a java program to implement JTree.
7. Write a java program to implement JTabbedPane
8. Write a java program to implement Jscrollpane
9. Write a Servlet Program to insert data into the database.
10. Write a Servlet Program to delete data from the database.
11. Write a Servlet Program to update data into the database.
12. Write a Servlet Program to retrieve data from the database.
13. Write JSP Program to validate user name and password on server side?
14. Write an online book purchase application using JSP. Consider a login validation page and one billing page for bill payment process. Assume any information if required.
15. Write JSP Program for Database Access.
16. Write a java program by using JDBC to execute a SQL query for a database and display the results.
17. Write a java program to display the Header information of the given URL
18. Write a java program to split the given URL.
19. Implementing one-one chat Application without thread
20. Write a java program for Datagram server and Client interaction as per given below.
 - i). A program to create Datagram server to send a message to client.
 - ii). A program to create Datagram client to receive the message sent by the server

CYCLE-2

Each batch (only two members) should develop one project out of this list.

Project has to develop by using HTML, CSS, JS, JSP, PHP and MYSQL

1. Design Airlines Ticket Reservation System
2. Online Shopping



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3. Design Library Information system.
4. Design Gram Panchayat Information system for House tax, water tax, wealth tax, Library tax collection, phone bill, Electricity bill collection.
5. Design student information system portal which maintain attendance, marks etc.
6. Design online examination system.
7. Event management System.
8. Car Rental System.
9. Cinema Booking System.
10. Hotel Management System
11. Complaint management System.
12. Online voting system.
13. Student Result System.
14. Car Comparison System Project
15. Selling your old stuff.
16. Aquaculture Updates
17. Timesheet using PHP
18. Online Help Desk using PHP
19. Online marriage beuro system
20. EAMCET web counseling

Final copy of Documentation has to submit by the batch as following:

1. Abstract
2. Modules
3. Software Requirement Specifications
4. Database Connectivity
5. Output
6. Code



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Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2205	
Course Title: ADVANCED JAVA PROGRAMMING LAB	
CO-1	Apply knowledge to improve exposure in applet programming and network programming.
CO-2	Design and develop desktop/window based applications with different AWT and SWING components.
CO-3	Design and develop web-based applications with database access using Servlets and JDBC.
CO-4	Design and develop web-based applications with database access using JSP and JDBC.



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SYLLABUS: UNIX OPERATING SYSTEMS LAB (B19CS2206)

LIST OF EXPERIMENTS

Module-1:

OS lab familiarization: Home Assignment on Unix commands, Vi editor

1. Simple C programs using command line arguments, system calls, library function calls, make utility
2. C programs using fork system call to create process and study parent, child process mechanism
3. C programs to create process chaining, spawning
4. C programs to handle errors using errno, perror() function
5. C programs to use pipe system call for inter process communication

Module II

Familiarization of Unix shell programming:

1. Simple shell programming exercises
2. Shell programming using decision making constructs
3. Shell programming using loop constructs
4. Shell programming for file and directory manipulation

Module III

1. C programs to study process scheduling: FCFS, Shortest Job First, and Round Robin
2. C programs to study page replacement: FIFO, Optimal, and LRU page replacement
3. C programs to study deadlock avoidance and detection
4. C Programs to simulate free space management

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2206	
Course Title: UNIX OPERATING SYSTEMS LAB	
CO-1	The student practices UNIX commands, Vi editor, shell commands.
CO-2	The student develops skill in writing C programs using system calls for process management; inter process communication and memory management aspects.
CO-3	The student learns shell programming and develops skill for writing scripts for batch level tasks.



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SYLLABUS: DATA BASE MANAGEMENT SYSTMS LAB (B19CS2207)

LIST OF EXPERIMENTS

Structured Query Language (SQL) used with the RDBMS including Features of two commercial RDBMS packages such as ORACLE, DB2, MS Access, MYSQL

I. SQL

- a. Query-structure
- b. DDL-create, alter, drop, rename and Truncate
- c. DML-select, insert, update, delete and lock
- d. DCL-grant and revoke
- e. TCL- Commit, save point, rollback and set transaction.
- f. Single line functions
- g. Set operations- union, intersection and except;
- h. Joins
- i. Aggregate Operations, group-by and having
- j. Nested sub-queries and views
- k. Indexes, Sequence and Synonyms
- l. Use of Forms and Reports

II. PL/SQL

- a. Block structure, variables, operators, data types, control structures
- b. Cursors - Implicit and Explicit
- c. Exception handling- Predefined and user-defined
- d. Stored procedures and functions
- e. Triggers- Data manipulation triggers

III. Some sample application development as a group project.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS2207	
Course Title: DATA BASE MANAGEMENT SYSTMS LAB	
CO-1	Write SQL commands for defining, constructing and manipulating databases.
CO-2	Write PL/SQL programs.
CO-3	Develop application for the given problem.



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SYLLABUS: SOCIALLY RELEVANT PROJECT (B19CS2208)

LIST OF EXPERIMENTS

The student can choose any one of the given below / any other socially relevant problem and work on it to produce a project document.

1. Water Conservation Related Works
2. Swatch Bharath (Internal External)
3. Helping police
4. Traffic monitoring
5. Teaching Rural Kids (Sarva siksha Abhiyan)
6. Street light monitoring
7. Electricity Conservation
8. Solar panel utilization
9. E- policing & cyber solution
10. Pollution
11. Any social related

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2208	
Course Title: SOCIALLY RELEVANT PROJECT	
CO-1	Use scientific reasoning to gather, evaluate, and interpret ideas
CO-2	Analyze and design solutions to solve the ideas
CO-3	Use one or more creative tools to complete the projects



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SYLLABUS: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (B19MC2201)

(Common to CSE & IT)

UNIT-I: Introduction to traditional knowledge-Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT-II: Protection of traditional knowledge - Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in globaleconomy, Role of Government to harness TK.

UNIT-III: Legal frame work and TK - A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT-IV: Traditional knowledge and intellectual property - Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-V: Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

Course Outcomes for First Year Second Semester Course	
Course Code: B19MC2201	
Course Title: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	
CO-1	Understand the concept of Traditional knowledge and its importance
CO-2	Know the need and importance of protecting traditional knowledge
CO-3	Know the various enactments related to the protection of traditional knowledge
CO-4	Understand the concepts of Intellectual property to protect the traditional knowledge



ELECTRONICS AND COMMUNICATIONS ENGINEERING



Estd:1980

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Regulation: R19				I / IV - B.Tech. I - Semester					
ELECTRONICS AND COMMUNICATION ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
B19 BS 1101	Mathematics-I	BS	3	3	--	--	25	75	100
B19 BS 1102	Mathematics-II	BS	3	3	--	--	25	75	100
B19 BS 1105	Applied Chemistry	BS	3	3	--	--	25	75	100
B19 CS 1102	Programming for Problem Solving	ES	3	3	--	--	25	75	100
B19 EC 1101	Basic Electronics	ES	3	3	--	--	25	75	100
B19 BS 1108	Applied Chemistry Lab	BS	1.5	--	--	3	20	30	50
B19 HS 1102	English Lab	HS	1.5	--	--	3	20	30	50
B19 CS 1105	Programming for Problem Solving using C Lab	ES	1.5	--	--	3	20	30	50
B19 MC 1102	Constitution of India	MC	--	3	--	--	--	--	--
TOTAL			19.5	18	0	9	185	465	650



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ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS: MATHEMATICS-I (B19BS1101)

(LINEAR ALGEBRA, DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS) (Common to All Branches)

UNIT-I Linear systems of equations: Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.

UNIT-II : Eigen values - Eigen vectors and Quadratic forms: Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.

UNIT-III: Differential equations of first order and first degree: Linear, Bernoulli, Exact, Reducible to exact types.

Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits. (R-L and R-C circuits only)

UNIT-IV: Linear differential equations of higher order: Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$, $x V(x)$. Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

UNIT-V: Laplace transformation: Laplace transforms of standard functions, properties, transforms of $tf(t)$, $f(t)/t$, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function, Inverse Laplace transforms, convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1101	
Course Title: MATHEMATICS-I	
CO-1	Solve a given system of linear algebraic equations
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve linear ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform and inverse Laplace transform and solve linear ODE.



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SYLLABUS: MATHEMATICS – II (B19BS1102)

(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)

(Common to CSE, ECE & IT)

UNIT-I: Interpolation: Interpolation, forward differences, backward differences, Central differences and relations between the operators, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unequal intervals, Lagrange interpolation.

UNIT-II: Solution of Algebraic and Transcendental Equations & Numerical Integration and solution of Ordinary Differential equations: Introduction, Bisection method, Method of false position, Iteration method & Newton-Raphson method.

Trapezoidal rule, Simpson's $1/3$ rule, Solution of ordinary differential equations by Taylor's method, Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method.

UNIT-III: Partial differentiation: Introduction, Homogeneous functions, Euler's theorem, Chain rule, Total derivative, Jacobians and their properties.

Applications: Taylor series expansion for a function of two variables, Maxima and Minima of functions of two variables with and without constraints, Lagrange's method. Leibnitz's rules for differentiation under integral sign.

UNIT-IV: First order and higher order partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of Lagrange linear equation. Solutions of Linear homogeneous and non-homogeneous partial differential equations with constant coefficients – source (RHS) terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

UNIT-V: Applications of partial differential equations: Method of separation of variables, One – dimensional wave equation, the D'Alembert's solution, one- dimensional heat equation



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Course Outcomes for First Year First Semester Course	
Course Code: B19BS1102	
Course Title: MATHEMATICS – II	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation



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SYLLABUS: APPLIED CHEMISTRY (B19BS1105)

(Common to CSE, ECE & IT)

UNIT-I: High Polymers and Plastics; Rubbers & Elastomers: Polymerization Definition, Types of Polymerization, free radical Mechanism of addition polymerization, Plastics as engineering materials, Thermoplastics and Thermosetting plastics, Compounding of plastics, Fabrication of plastics (4 techniques); Preparation, Properties and applications of Polyethylene, PVC, Bakelite, Nylon - 6,6, Bullet Proof plastics - polycarbonate and Kelvar; Fiber reinforced plastics, conducting polymers, Biodegradable Polymers - PHBV, Nylon 2, Nylon 6. Natural rubber – Vulcanization – Compounding of Rubber; Preparation, properties and applications of Buna – S; Buna – N;

UNIT-II: Energy Sources and Applications: Nuclear Energy: Nuclear fission and Nuclear fusion – Nuclear Power reactor – Applications of radioactive materials Solar Photovoltaic cell- Thermal fuels – Introduction – Classification – Calorific value – HCV and LCV – Bomb calorimeter; Coal : Proximate and ultimate analysis of coal – Significance of the analysis – Manufacture of coke by OttoHoffman's by Product Process, Refining crude oil; Knocking; Chemical structure Knocking, Octane number of gasoline, Cetane number of diesel oil, synthetic Petrol; LPG,CNG

UNIT-III: Electrochemical cells and Corrosion: Galvanic cell, single electrode potential, Calomel electrode; Modern batteries: - Lead – Acid battery; Fuel cells- Hydrogen – Oxygen fuel cell, Lithium battery Theories of corrosion (i) dry Corrosion (ii) wet corrosion. Types of corrosion - differential aeration corrosion, pitting corrosion, galvanic corrosion, stress corrosion, Factors influencing corrosion, Protection from corrosion-material selection & design, cathodic protection, Protective coatings- metallic coatings – Galvanizing, Tinning, Electroplating; Electroless plating; Paints.

UNIT-IV: Water technology: Sources of water – Hardness of water – Estimation of hardness of water by EDTA method; Boiler troubles – sludge and scale formation, Boiler corrosion, caustic embrittlement, Priming and foaming; Softening of water by Lime – Soda Process, Zeolite Process, Ion – Exchange Process; Municipal water treatment; Desalination of sea water by Electrodialysis and Reverse osmosis methods. Indian standards and WHO standards of drinking water. Design of drinking water plant.

UNIT-V: Chemistry of Engineering Materials& Advanced Engineering materials: Cement:- Manufacture of Portland cement, setting and hardening of cement, Deterioration of cement concrete.

Refractories: - Definition, Characteristics, classification, Properties and failure of refractories.

Solar Energy: - Construction and working of Photovoltaic cell, applications.

Solid State Materials: Crystal imperfections, Semi Conductors, Classification and chemistry of semi conductors:



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Intrinsic semiconductors; Extrinsic semiconductors; Defect semiconductors, Compound Semiconductors and Organic Semiconductors.

Liquid Crystals: - Definition – Classification with examples – Applications.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1105	
Course Title: APPLIED CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C (B19CS1102) **(Electronics & Communication Engineering)**

UNIT-I: Introduction to Computers: Computer Systems, Computing Environments, Computer languages, Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

UNIT-II: Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

UNIT-III: Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

UNIT-IV: Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application, **Processor Commands:** Processor Commands

UNIT-V: Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter- Function Communication, Standard Functions, Passing Array to Functions, Passing Pointer to Functions, Recursion

Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.



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ChinnaAmiram, Bhimavaram-534204. (AP)

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1102	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C	
CO-1	The student will learn about computer systems, computing environments, developing of a computer program and Structure of a C Program
CO-2	The student will learn to use different operators, data types and loops for developing C Programs.
CO-3	The student will able to write programs using Arrays and Strings
CO-4	To design and implement programs to analyze the different pointer applications
CO-5	To decompose a problem into functions and to develop modular reusable code



Estd:1980

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SYLLABUS: BASIC ELECTRONICS (B19EC1101)

(Electronics & Communications Engineering)

UNIT-I: Semiconductor Materials and Properties : Classification of Materials, Intrinsic and Extrinsic semiconductors, Conduction in semiconductors, Charge mobility, Charge densities, Diffusion current density, Drift current density, Hall effect.

UNIT-II: Passive Components and Basic Meters: Types of passive components, Types of resistors, Resistor color code, Capacitors, Concept of charging and discharging, Types of capacitances, Inductors, Mutual inductance, Inductance of two coils, KCL, KVL, Voltmeter, Ammeter, Multimeter, Basics of CRO.

UNIT-III: Fundamentals of Diodes and Special diodes: Elementary concepts, V-I characteristics and applications of PN junction diode, Varactor diode, Zener diode, LED, Photo diode, Rectifiers: Half Wave and Full Wave with and without Capacitor filters.

UNIT-IV: Fundamentals of Transistors and Integrated Circuits (IC): Transistor construction, Basic Operation, Input and Output characteristics, Transistor in three configurations and their comparison, Introduction to Integrated Circuits, Classification of ICs and fabrication of Monolithic ICs.

UNIT-V: Introduction to Number Systems and Boolean algebra. Number Systems: Binary, Decimal, Octal, Hexadecimal, Logic gates: AND, OR, NOT, XOR, NAND and NOR, Flip Flops - RS Flip Flop, JK Flip Flop, T Flip Flop, D Flip Flop and Latches.

Course Outcomes for First Year First Semester Course	
Course Code: B19EC1101	
Course Title: BASIC ELECTRONICS	
CO-1	Understand the basic concepts of charge carriers in semi conductors, drift and diffusion current densities.
CO-2	Identify various passive components and understand the concept of KVL and KCL.
CO-3	Understand the structure and operation of various diodes, rectifier circuits.
CO-4	Understand the characteristics of BJT in CE, CB, CC configurations and IC fabrication.
CO-5	Understand the concept of number systems, logic gates and flip flops.



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SYLLABUS: APPLIED CHEMISTRY LAB (B19BS1108)
(Common to CSE, ECE & IT)

1. Introduction of Chemistry Laboratory.
2. Estimation of HCL using standard Sodium Hydroxide.
3. Determination of total hardness of water by EDTA method.
4. Estimation of Ferrous Iron by KMnO_4 .
5. Estimation of oxalic acid by KMnO_4 .
6. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
7. Estimation of Dissolved oxygen by Winkler's method.
8. Determination of pH by pH meter and universal indicator method.
9. Conductometric titration of strong acid Vs strong base.
10. Conductometric titration of strong acid Vs weak base.
11. Potentionmetric titration of strong acid Vs strong base.
12. Potentionmetric titration of strong acid Vs weak base.
13. Preparation of Phenol formaldehyde resin.
14. Determination of saponification value of oils.
15. Determination of pour and cloud points of lubricating oil.
16. Determination of Acid value of oil.

Demo:

1. Biodiesel from used cooking oil.
2. Construction of electrochemical cells.
3. Synthesis of semiconductors.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1108	
Course Title: APPLIED CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical Instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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SYLLABUS: ENGLISH LAB (B19HS1102)

(Common to All Branches)

UNIT-I: Pronunciation

Letters and Sounds

The Sounds of English

Phonetic Transcription

UNIT-II: Past tense markers

Word stress-di-syllabic words

Poly-syllabic words

UNIT-III: Rhythm & Intonation

UNIT-IV: Contrastive Stress (Homographs)

UNIT-V: Word Stress: Weak and Strong forms

Stress in compound words

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1102	
Course Title: ENGLISH LAB	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C LAB (B19CS1105)

(Electronics & Communication Engineering)

LIST OF EXPERIMENTS

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.



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Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.
- 3.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.



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Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1105	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C LAB ()	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills.
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program



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SYLLABUS: CONSTITUTION OF INDIA (B19MC1102) **(Common to ECE & EEE)**

UNIT-I: Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -

Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II: Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes:- After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

Learning outcomes:- After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV: Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning outcomes:- After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance



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- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT-V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC andwomen

Course Outcomes for First Year First Semester Course	
Course Code: B19MC1102	
Course Title: CONSTITUTION OF INDIA	
CO-1	Understand historical background of the constitution making and its importance for building ademocratic India.
CO-2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self-government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, ElectionCommission and UPSC for sustaining democracy.
CO-6	<ol style="list-style-type: none"> 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and PachayatiRaj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission



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Regulation: R19				I / IV - B.Tech. II - Semester					
ELECTRONICS AND COMMUNICATION ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
B19 HS 1201	English	HS	3	3	- -	- -	25	75	100
B19 BS 1202	Mathematics-III	BS	3	3	- -	- -	25	75	100
B19 BS 1203	Applied Physics	BS	3	3	- -	- -	25	75	100
B19 EE 1202	Basic Electrical Engineering	ES	3	3	--	--	25	75	100
B19 ME 1201	Engineering Drawing	ES	2.5	1	--	3	25	75	100
B19 BS 1206	Applied Physics Lab	BS	1.5	--	--	3	20	30	50
B19 HS 1206	English Lab	HS	1.5	--	--	3	20	30	50
B19 EE 1204	Basic Electrical Engineering Lab	ES	1	--	--	2	20	30	50
B19 EC 1201	Electronics Workshop practice	ES	1	--	--	2	20	30	50
B19 EC 1202	Engineering Exploration Project	PR	1	--	--	2	--	50	50
B19 MC 1201	Mini Project	MC	0	3	--	--	--	--	--
TOTAL			20.5	16	--	15	205	545	750



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ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS : ENGLISH (B19HS1201)

(Electronics & Communication Engineering)

UNIT-I: Lesson: A Drawer full of happiness from *Infotech English*, Maruthi Publications.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self- introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.

Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.

Pronunciation: Vowels, consonants, plural markers and their realizations

UNIT-II: Lesson:- Nehru's letter to his daughter, Indira on her birthday from *Infotech English*, Maruthi Publications.

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (précis writing); avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.

Grammar: Articles, prepositions and use of antonyms.

Pronunciation: Past tense markers, word stress-di-syllabic words.

UNIT-III: Lesson: Stephen Hawking-Positivity 'Benchmark 'from *InfoTech English*, Maruthi Publications.

Listening: Listening for global comprehension and summarizing what is listened to both in



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speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.

Functional English: complaining and apologizing.

Reading: Reading a text in detail by making basic inferences -recognizing: and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Reading for Writing: Letter writing- types, format and principles of letter writing, E-mail etiquette, writing a Resume/CV and covering letter.

Vocabulary: Technical vocabulary from across technical branches (20 words.

GRE. Vocabulary 20 words), antonyms and synonyms, word applications, sequencing of words.

Grammar: Active and passive Voice, question Tags, direct and indirect speech, reporting for academic purposes.

Pronunciation: Word stress-poly-syllabic words.

UNIT-IV: Lesson: Liking a Tree Unbowed: Wangari Maathai- biography from Infotech English, Maruthi Publications.

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: asking for permissions, requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display Complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Pamphlet writing, writing for media, writing SOP's.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, close encounters, foreign phrases.

Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting; degrees of comparison.

Pronunciation: Contrastive Stress.

UNIT-V: Lesson: Stay Hungry–Stay Foolish from InfoTech English, Maruthi Publications.

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts – with/without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.



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Reading for Writing: Report writing, writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE 'Vocabulary (20 words, antonyms and synonyms, word applications, coherence, matching emotions.

Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement).

Pronunciation: Stress in compound words

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS1201	
Course Title: ENGLISH	
CO-1	Identify the context, topic and pieces of specific information by understanding and Responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text And locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Understand and apply the principles of writing to paragraphs, arguments, essays And formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.



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SYLLABUS: MATHEMATICS-III (B19BS1202)

(Multivariable Calculus and Fourier analysis)

(Common to CE, CSE, ECE, EEE & IT)

UNIT-I: Fourier Series: Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Complex form of Fourier integral, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms, Finite Fourier transforms, properties, inverse transforms, Parseval's Identities.

UNIT-III: Single and Multiple integrals: Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Applications: evaluation of improper integrals, error function and the complimentary error function.

Double and triple integrals, change of variables, Change of order of integration. Applications: Areas and volumes.

UNIT-IV: Vector Differentiation

Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.

UNIT-V: Vector Integration

Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux. Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1202	
Course Title: MATHEMATICS-III	
CO-1	Determine Fourier series and half range series of functions.
CO-2	Find different Fourier transforms of non-periodic functions and also use them to evaluate integrals.
CO-3	Use the knowledge of Beta and Gamma functions in evaluating improper integrals.
CO-4	Evaluate double integrals, simple triple integrals & find areas and volume.
CO-5	Find the gradient of a scalar function, divergence and curl of a vector function. Determine scalar potential.
CO-6	Apply Green's, Stokes' and Gauss divergence theorems to solve problems.



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SYLLABUS: APPLIED PHYSICS (B19BS1203)

(Common to CSE, ECE & IT)

UNIT-I: WAVE OPTICS: Interference: Principle of super position. Interference of light, interference in thin films (reflected light) – Wedge film and Newton's rings – Applications

Diffraction: Types of diffraction, Fraunhofer diffraction at a single slit, Diffraction grating, grating spectrum. Missing order, Resolving power, Rayleigh's Criterion, Resolving power of Grating, Telescope, Microscope (qualitative treatment only)

UNIT-II: DIELECTRICS AND MAGNETICS: Dielectrics : Introduction to dielectrics, Electric Polarization, Dielectric polarizability, Susceptibility, Dielectric constant, Types of Polarization, Frequency dependence of Polarization, Internal field in a dielectric, Clausius and Mosotti equation, Applications of dielectrics.

Magnetics: Introduction to magnetics, Magnetic dipole moment, Magnetization, Magnetic susceptibility and Permeability, Origin of permanent magnetic moment, Classification of magnetic materials, Hysteresis – Weiss Domain theory – Ferrites, soft and hard magnetic materials, Magnetic device applications.

UNIT-III: LASERS AND FIBER OPTICS: Lasers: Introduction, Interaction of radiation with matter, condition for light amplification, Einstein's relations. Requirements of lasers device Types of lasers, Design and working of Ruby and He – Ne lasers, Laser characteristics and applications.

Fiber Optics: Introduction to optical fibers, Principle of light propagation in fiber, Acceptance angle, Numerical aperture, Modes of propagation, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.

UNIT-IV: SEMICONDUCTORS: Introduction, intrinsic semi conductors, density of charge carriers, Fermi energy, Electrical conductivity – Extrinsic semi conductors – P-type and N-type, Density of charge carriers, dependence of Fermi energy on carrier concentration and temperature, direct and indirect band – gap semi conductors, Hall effect, Applications of Hall effect. Drift and diffusion currents, Continuity equation, applications of semi conductors.

UNIT-V: ULTRASONICS AND NANOMATERIALS: Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, detection of ultrasonics, acoustic grating, applications of ultrasonics.

Nanomaterials: Introduction, salient features of Nanomaterials, Synthesis methods – Ball milling, Condensation, Chemical vapour Deposition and Sol – Gel methods, Characterization techniques for Nano materials, Carbon nanotubes (CNTS), Applications of Nano materials.



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Course Outcomes for First Year First Semester Course	
Course Code: B19BS1203	
Course Title: APPLIED PHYSICS	
CO-1	Interpret the behavior of light radiation in interference and diffraction Phenomena and their applications.
CO-2	Explain the properties of dielectric and magnetic materials suitable for engineering applications.
CO-3	Explain the important aspects of semiconductors and electrical conductivity in them.
CO-4	Understand the basics of modern technologies lasers, optical fibers and Ultrasonic and their utility in various fields.
CO-5	Demonstrate the synthesis methods and applications of nano materials.



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ChinnaAmiram, Bhimavaram-534204. (AP)

SYLLABUS: BASIC ELECTRICAL ENGINEERING (B19EE1202)

(Electronics & Communication Engineering)

UNIT-I: DC CIRCUITS: Electrical circuit elements (R - L and C), Types of sources- Ohms Law-Kirchhoff laws –Network reduction techniques (series, parallel, series-parallel and Star-Delta Transformations), Source transformation, Mesh analysis and nodal analysis-Simple problems.

UNIT-II: AC CIRCUITS: Representation of sinusoidal waveforms - Peak, Average and RMS values- Phasor representation - power factor - Analysis of single-phase ac circuits consisting of pure resistor, pure inductor, pure capacitor, R-L, R-C, RLC series circuits-instantaneous power-real power - reactive power - apparent power.

UNIT-III: D.C MACHINES: Principle of operation of DC generator – emf equation – types of DC machines – OCC of DC shunt generator - Torque equation of DC motor- characteristics - applications –losses and efficiency - Brake test - Swinburne's test - speed control of d.c shunt motor- Simple Problems.

UNIT-IV: AC MACHINES: Principle and operation of Single-Phase Transformer –EMF equation-Equivalent circuit-OC and SC test on transformer. Principle and operation of Induction Motor-Torque equation-Slip-Torque characteristics-Brake test on Induction motor- Simple Problems.

UNIT-V: SPECIAL MACHINES: Construction and Principle of operation of Single-phase induction motor, Stepper motor, Universal motor, BLDC motor

Course Outcomes for First Year Second Semester Course	
Course Code: B19EE1202	
Course Title: BASIC ELECTRICAL ENGINEERING	
CO-1	Able to analyze the various Electrical networks
CO-2	Able to explain the operation of DC generator and analyze the characteristics of DC generator.
CO-3	Able to explain the principle of operation of DC motor and analyze their characteristics. Acquire the skills to analyze the speed control methods of DC motors.
CO-4	Able to explain the operation of single-phase transformer and choose correct rating of a transformer for a specific application.
CO-5	Ability to analyze the performance and speed – torque characteristics of a 3-phase induction motor.
CO-6	Able to explain the operation of special machines



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SYLLABUS: ENGINEERING DRAWING (B19ME1201)

(Common to CSE, ECE & IT)

UNIT-I: Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general method (eccentricity method only), cycloids, involutes, tangents & normals for the curves.

UNIT-II: Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel to one of the reference planes (HP, VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III: Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME1201	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.



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SYLLABUS: APPLIED PHYSICS LAB (B19BS1206)

(Common to CSE, ECE & IT)

LIST OF EXPERIMENTS:

1. Determination of the Wavelength of light from a source – Diffraction Grating – Normal incidence.
2. Determination of radius of curvature of Plano convex lens – Newton's Rings.
3. Determination of the thickness of a thin spacer using interference – Air Wedge method.
4. Determination of Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Verification of Laws of series and parallel combinations of resistances – Carey Foster's bridge.
6. Determination of Temperature Coefficient of Resistance of a thermistor
7. Determination of resistivity of semiconductors by Four probe method.
8. Determination of dielectric Constant by charging and discharging method.
9. Resolving power of a grating.
10. Determination of the velocity of sound - Volume Resonator method.
11. Determination of the Rigidity modulus of elasticity of a material – Torsional pendulum.
12. Verification of the laws of vibrations in stretched stings - Sonometer.
13. Determination of Magnetic susceptibility by Quinke's method.
14. Study of variation of dielectric constant with temperature.
15. Determination of the frequency of the AC supply – AC Sonometer.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1206	
Course Title: APPLIED PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.



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SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1203)
(Common to CSE & IT)

UNIT-I: JAM, Common Errors, Neutralizing accent

UNIT II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-III: Presentation Skills, Public Speaking, Data Interpretation

UNIT-IV: Group Discussion, Do's and Don'ts

UNIT V: Curriculum Vitae, Covering Letter, Interview Skills, Mock Interviews, FAQ's

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1203	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



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SYLLABUS: BASIC ELECTRICAL ENGINEERING LAB (B19EE1204)

(Electronics & Communication Engineering)

LIST OF EXPERIMENTS

1. Verification of ohms law
2. Verification of KCL and KVL.
3. Parameters of Iron core inductor.
4. Magnetization characteristics of D.C. Shunt generator.
5. Speed control of D.C. shunt motor.
6. Brake test on DC shunt motor.
7. Brake test on DC series motor.
8. Swinburne's test on DC machine.
9. Load test on DC shunt generator.
10. OC & SC tests on single-phase transformer.
11. Load test on single-phase transformer.
12. Brake test on three phase induction motor.

Course Outcomes for First Year First Semester Course	
Course Code: B19EE1204	
Course Title: BASIC ELECTRICAL ENGINEERING LAB	
CO-1	Understand ohms law and Kirchhoff's laws
CO-2	To determine the parameters of iron core inductor
CO-3	Predetermine the performance of DC machines and transformers.
CO-4	Make use of DC shunt machines for applications.
CO-5	Evaluate the performance of 1-phase transformer.
CO-6	Perform brake test on 3-phase induction motor.



SYLLABUS: ELECTRONICS WORKSHOP PRACTICE (B19EC1201)
(Electronics & Communication Engineering)

I. Identification and Testing of Components:

- a. Identify, Understand and draw the different circuit components & symbols used in Electronics labs.
- b. Resistance value using colour code.
- c. Bread-board and BNC Connectors.
- d. Study & Identification of different switches and relays.
- e. Classification of Active and Passive elements.

II. Laboratory Equipment:

- a. Study of Power Supplies, DMM, Function Generator and CRO
- b. Measurement of Voltage Amplitude & Frequency
- c. Measurement of Inductance and Capacitance.
- d. Measurement of Voltage & current with Series & Parallel connections.

III. Soldering Practice:

- a. Solder practice with different components available in lab
- b. A demo on PCB fabrication: (i) Artwork & printing of a simple PCB. (ii) Etching & drilling of PCB.

IV. Introduction to Technical Softwares & Documentation Tools:

- a. EDA Tools: PSPICE demo
- b. MATLAB Introduction: Demo, Signals & Plotting
- c. Google Docs, Sheets, Slides and Forms for Documentation & Collaboration

V. Hardware Boards & Personal Computer (PC) :

- a. Basics & Demonstration of Arduino & Raspberry Pi boards
- b. Study of PC Hardware
- c. PC Software installation (OS and Compilers)



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Course Outcomes for First Year First Semester Course	
Course Code: B19EC1201	
Course Title: ELECTRONICS WORKSHOP PRACTICE	
CO-1	Identify electronics components like resistors, capacitors, diodes, transistors etc. Assemble circuits on a breadboard, analyze the performance of the circuits, evaluate the results and confirm the validity of established concepts.
CO-2	Use measuring instruments like the multimeter and equipments such as Function generator, power supply & CRO.
CO-3	Solder and de-solder components on PCB. Understand PCB fabrication process and Fabricate PCBs .
CO-4	Gets familiar with technical softwares & Google documentation tools
CO-5	Gets familiar with electronics boards & PC hardware/software installation



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SYLLABUS: ENGINEERING EXPLORATION PROJECT (B19CS1206)

(Electronics & Communication Engineering)

Apply Design thinking on the following Streams to

Project Stream 1:

Electronics, Robotics, IOT and Sensors

Project Stream 2:

Computer Science and IT Applications

Project Stream 3:

Mechanical and Electrical tools

Project Stream4:

Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.



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SYLLABUS: ENVIRONMENTAL SCIENCE (B19MC1201)

(Common to CE, ECE & EEE)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;. Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification

- Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.



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UNIT-V: Social Issues and the Environment: Urban problems related to energy -Waterconservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.



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Regulation: R19			II / IV - B.Tech. I - Semester						
ELECTRONICS AND COMMUNICATION ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 EC 2101	Electronic Devices and Circuits	PC	3	3	--	--	25	75	100
B19 EC 2102	Switching Theory and Logic Design	PC	3	3	--	--	25	75	100
B19 EC 2103	Signals and Systems	PC	3	3	--	--	25	75	100
B19 EC 2104	Probability Theory and Random Processes	PC	3	3	--	--	25	75	100
B19 EE 2105	Network Analysis	ES	3	3	--	--	25	75	100
B19 CS 2108	Data Structures	ES	3	3	--	--	25	75	100
B19 EC 2105	Electronic Devices and Circuits - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
B19 EC 2106	Switching Theory and Logic Design - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
B19 MC 2102	Essence of Indian Traditional Knowledge	MC	0	3	--	--	--	--	--
TOTAL			21	21	--	6	190	510	700



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ELECTRONICS AND COMMUNICATION ENGINEERING
SYLLABUS: ELECTRONIC DEVICES AND CIRCUITS (B19EC2101)

UNIT-I: Semiconductor diode and its applications: Potential variation in graded semiconductors. Open circuited PN junction, current components in a PN diode, V-I characteristics and its temperature dependence, transition capacitance, charge control description of a diode, diffusion capacitance, junction diode switching times, characteristics of Tunnel diode and Zener diode. Half wave, Full wave and Bridge Rectifiers with and without filters, Ripple factor and regulation characteristics.

UNIT-II : Bipolar junction transistors: Operation of a transistor and transistor biasing for different operating conditions, transistor current components, transistor amplification factors: α, β, γ relation between α, β and γ early effect or base-width modulation, common base configuration and its input and output characteristics, common emitter configuration and its input and output characteristics, common collector configuration and its input and output characteristics, Comparison of CE, CB and CC Configurations, Break- down in transistors, Photo Transistor..

UNIT-III: Transistor Biasing Circuits: The operating point, Bias stability, different types of biasing techniques, stabilization against variation in I_{co} , V_{BE} , & β . Bias compensation, thermal runaway, thermal stability.

UNIT-IV: Field Effect transistors: JFET and its characteristics, pinch off voltage, FET small signal model, MOSFET and its characteristics, Biasing of FETs.

UNIT-V: Transistors at low and High frequencies: Transistor hybrid model, H-parameters, Analysis of transistor amplifier circuits using h- parameters, comparison of transistor amplifier configurations, analysis of single stage amplifier, effects of bypass and coupling capacitors, frequency response of CE amplifier, Emitter follower, High frequency model of transistor.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2101	
Course Title: ELECTRONIC DEVICES AND CIRCUITS	
CO-1	Analyze the characteristics and operation of Diode, BJT, JFET and MOSFET.
CO-2	Analyze the biasing circuits of BJT and JFET.
CO-3	Analyze the performance of small signal BJT and FET single stage amplifiers.
CO-4	Apply the gained knowledge in the design of simple Electronic circuits.



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SYLLABUS: SWITCHING THEORY AND LOGIC DESIGN (B19EC2102)

UNIT-I: Number Systems, Codes and Boolean Algebra: Number Systems, Base Conversion Methods, Complements of Numbers, 4 Bit Codes-BCD, Excess-3, 2421, 8421 codes. Even and Odd parity, Hamming code, Error detecting and Errorcorrecting codes. Fundamentals of Boolean Algebra and Logic Gates, Boolean theorems and proofs.

UNIT-II: Boolean Functions and Minimization: Boolean SOP and POS functions-Canonical and Standard. Realization with Universal Gates, Simplification of Boolean functions using Karnaugh Map (up to 6 variables) and Quine McClusky methods.

UNIT-III: Combinational Logic Circuits and Design: Logic Design of Combinational circuits – Binary Adder, Subtractor, Decoders, Encoders, Multiplexers, Demultiplexers, Code Convertors, Priority Encoders, Seven – segment Displays, 4-bit digital Comparators and realization of Boolean functions with PLDs.

UNIT-IV: Sequential Logic Circuits and Design: RS & SR latches, clocked RS, SR, JK, T & D Flip-flops with pre-set and clear inputs. Race around problem, MS-JK-FF, Excitation tables of all Flip- Flops and conversions from one type to another. Design of Shift Registers with SIPO, SISO, PIPO and PISO modes and universal shift register. Design of Ring counters and Johnson counters.

UNIT-V: Asynchronous and Synchronous Sequential Circuits: Design of Asynchronous counters (Ripple counters) for any modulus. Design of Synchronous counters using SR, JK, T and D-FFs. Analysis and Design of Synchronous Sequential Circuits with State Diagrams and State Reduction. Design of sequence detectors and generators. Basics of Asynchronous Sequential Circuits.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2102	
Course Title: SWITCHING THEORY AND LOGIC DESIGN	
CO-1	To convert one number system to another, analyze logic gates and Boolean theorems.
CO-2	To analyze digital circuits using different minimization techniques.
CO-3	To design various combinational and sequential circuits along with applications.
CO-4	To design counters and state machines by applying the knowledge of synchronous and asynchronous sequential circuits.



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SYLLABUS: SIGNALS AND SYSTEMS (B19EC2103)

UNIT-I: Introduction to Continuous –Time and Discrete –Time signals and systems: Continuous–Time and Discrete–Time signals, Signal Energy and Power, Periodic Signals, Even and odd Signals, Continuous–Time complex Exponential and Sinusoidal Signals, Discrete–Time complex Exponential and Sinusoidal Signals and their Periodicity, The Continuous–Time and Discrete–Time Unit Impulse and Unit step Functions, Continuous– Time and Discrete–Time Systems, Operations on signals, Interconnections of Systems, Basic System Properties, Continuous–Time and Discrete Time LTI Systems: The Graphical interpretation of Convolution Integral and The Convolution Sum, Causal LTISystems Described by Differential and Difference Equations, Singularity Functions.

MATLAB Demos (one or two examples for illustration purpose only)*.

UNIT-II: fourier series Representation of Periodic Signals:

Introduction, Fourier Series Representation of continuous time Periodic Signals (Complex Exponential and Trigonometric Fourier Series only), Convergence of the Fourier Series, Properties of continuous time Fourier Series, Fourier Series representation of discrete time periodic signals, Properties of discrete time Fourier Series (Elementary Level on DTFS).

UNIT-III: Continuous and Discrete time Fourier Transform

Introduction, Representation of Aperiodic signals, The continuous time Fourier Transform, The Fourier Transform for periodic signals, Properties of the continuous time Fourier Transform, Systems characterized by linear constant coefficient differential equations, Discrete time Fourier Transform, Properties of the Discrete time Fourier Transform, Systems characterized by linear constant coefficient difference equations (Elementary Level on DTFT). MATLAB Demos(one or two examples for illustration purpose only)*

UNIT-IV: Laplace Transform

Introduction, The Laplace Transform, Region of convergence for Laplace Transforms, The Inverse Laplace Transform, Properties of Laplace Transforms, the Initial and Final value theorems, Analysis and characterization of LTI systems using the Laplace Transforms.

UNIT-V: Sampling Theorem and Z-transform:

Introduction to Sampling Theorem, Statement of Sampling Theorem for Low pass and Band pass signals (Theorem Proof for Low Pass signals only), Reconstruction of a signal from its samples using interpolation, Discussion on Oversampling, Critical sampling and Under sampling (aliasing), The Z-Transform (Bilateral and unilateral), The Inverse Z-Transform, Properties of Z-Transform, Initial and Final Value theorems, Some common



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Z-transform pairs, Analysis and characterization of LTI discrete systems using the Z-Transforms. MATLAB Demos (one or two examples for illustration purpose only)*.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2103	
Course Title: SIGNALS AND SYSTEMS	
CO-1	Outline the basic concepts of signals and systems.
CO-2	Analyze the spectral characteristics of Continuous Time and Discrete Time periodic and a periodic signals using Fourier analysis.
CO-3	Analyze system properties based on impulse response and Fourier analysis.
CO-4	Apply Laplace- transforms for analyzing Continuous -time signals and systems.
CO-5	Apply Z- transforms for analyzing discrete-time signals and systems.
CO-6	Outline the process of sampling and the effects of under sampling.



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SYLLABUS: PROBABILITY THEORY AND RANDOM PROCESSES (B19EC2104)

UNIT-I: Probability Theory: Definitions of Probability, Axioms of Probability, Probability Spaces and Properties of Probabilities, Joint and Conditional Probabilities, Independent Events.

UNIT-II: Random Variables: Probability Distribution Function, Probability Density Function, Joint Distribution of Two Variables, Conditional Probability Distribution and Density, Independent Random Variables, Normal Distribution, Cauchy's distribution, Exponential Distribution, Binomial Distribution, Poisson distribution, Functions of Random Variables.

UNIT-III: Statistical Averages: Random Vectors, Statistical Averages, Characteristic Function of Random Variables, Inequalities of Chebyshev's and Schwartz, Convergence Concepts, Central Limit Theorem.

UNIT-IV: Random Processes: Introduction, Definitions, Stationary, Ergodicity, Covariance Function and their Properties, Spectral Representation, Wiener-Kinchine Theorem.

UNIT-V: Linear Systems and Random Noise Processes:

Classification of Linear systems, Response of Linear Systems to Random signals, Spectral characteristics of system Response, Gaussian processes, Poisson Processes, Low-pass and Band pass Noise Representation.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2104	
Course Title: PROBABILITY THEORY AND RANDOM PROCESSES	
CO-1	Demonstrate the axiomatic formulation of modern probability theory.
CO-2	Characterize Probability Models and functions of Random variables based on single and multiple random variables.
CO-3	Evaluate and apply moments and characteristic functions and acquire the concept of inequalities and probabilistic limits.
CO-4	Assimilate the concept of Random process and determine covariance and spectral density of stationary random processes.
CO-5	Identify specific applications to Poisson and Gaussian processes, and Analyze the response of random inputs to linear time invariant systems.



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SYLLABUS: NETWORK ANALYSIS (B19EE2105)

UNIT-I: Network Theorems: Review of Dc circuits, Superposition, Thevenin's, Norton's, Reciprocity, Max Power Transfer theorems.

UNIT-II: DC transients: Inductor, Capacitor, source free RL, RC and RLC response, Evaluation of Initial conditions, Application of unit-step function to RL, RC and RLC circuits, concepts of Natural, Forced and Complete response.

UNIT-III: Analysis of AC Networks: Review of ac circuits, Node and mesh analysis, Superposition, Thevenin's, Max Power Transfer theorems.

Resonance: Series and parallel resonance, selectivity, band width and Quality factor, locus diagram.

UNIT-IV: Two-port Networks: Introduction, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Relationship between various parameters, series, parallel & cascade connection of two port networks.

UNIT-V: Network Functions: Network functions for single port and two port, Calculation of Network functions for Ladder and General Networks, Poles and Zeroes, Restriction of Poles and Zeroes for Driving point and Transfer functions, Time Domain Behavior from Pole-Zero plot, Routh-Hurwitz criterion of stability of network function.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EE2105	
Course Title: NETWORK ANALYSIS	
CO-1	Apply network theorems to solve the DC electrical circuits.
CO-2	Analyze the transient behavior of circuits by applying first and second order Differential equations.
CO-3	Apply network theorems to solve AC circuits and calculate resonance parameters.
CO-4	Calculate two port network parameters for the given network.
CO-5	Determine the network functions for Ladder and General Networks and analyze Stability of electric circuits using Routh's Hurwitz criterion.



Estd:1980

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SYLLABUS: DATA STRUCTURES (B19 CS 2108)

UNIT-I: Linear Data Structures: Arrays, Stacks and Queues: Data Structures -Operations-Abstract Data Types-Complexity of Algorithms-Time and Space Arrays-Representation of Arrays-Linear Arrays-Insertion- Deletion and Traversal of a Linear Array-Array as an Abstract Data Type-Multi-Dimensional arrays-Strings- String Operations Storing Strings-String as an Abstract Data Type

Stack -Array Representation of Stack-Stack Abstract Data Type-Applications of Stacks: Prefix Infix and Postfix Arithmetic Expressions-Conversion-Evaluation of Postfix Expressions Recursion-Towers of Hanoi-Queues-Definition-Array Representation of Queue-The Queue Abstract Data Type-Circular Queues-Dequeues-Priority Queues.

UNIT-II: Linked Lists: Pointers-Pointer Arrays-Linked Lists-Node Representation-Single Linked List-Traversing and Searching a Single Linked List-Insertion into and Deletion from a Single Linked List- Header Linked Lists-Circularly Linked Lists-Doubly Linked Lists-Linked Stacks and Queues Polynomials-Polynomial Representation-Sparse Matrices.

UNIT-III: Trees: Terminology-Representation of Trees-Binary Trees-Properties of Binary Trees-Binary Tree Representations-Binary Tree Traversal-Preorder-Inorder and Postorder Traversal-Threads Thread Binary Trees-Balanced Binary Trees-Heaps-Max Heap-Insertion into and Deletion from a Max Heap-Binary Search Trees-Searching-Insertion and Deletion from a Binary Search Tree Height of Binary Search Tree, m-way Search Trees, B-Trees.

UNIT-IV: Graphs: Graph Theory Terminology-Graph Representation-Graph Operations-Depth First Search-Breadth First Search-Connected Components-Spanning Trees-Biconnected Components- Minimum Cost Spanning Trees-Kruskal's Algorithm-Prism's Algorithm-Shortest Paths- Transitive Closure-All Pairs Shortest Path-Warshall's Algorithm

UNIT-V: Searching and Sorting: Searching -Linear Search-Binary Search-Fibonacci Search-Hashing-Sorting-Definition- Bubble Sort-Insertion sort-Selection Sort-Quick Sort-Merging-Merge Sort-Iterative and Recursive Merge Sort-Shell Sort-Radix Sort-Heap Sort.



Estd:1980

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Course Outcomes for Second Year First Semester Course	
Course Code: B19EE2105	
Course Title: NETWORK ANALYSIS	
CO-1	Apply advanced data structure strategies for exploring complex data structures and implement data structures like stacks, queues
CO-2	Implement & perform operations on dynamic linear data structures like linked lists.
CO-3	Apply different operations on trees and graphs.
CO-4	Implement & analyze various searching & sorting algorithms



Estd:1980

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SYLLABUS: ELECTRONIC DEVICES & CIRCUITS - LAB (WITH SIMULATION) **(B19EC2105)**

(Common to ECE & EEE)

LIST OF EXPERIMENTS

1. Study and Analyze V-I Characteristics of Semiconductor Diode (Ge & Si), LED and Zener Diode.
2. Determination of Ripple Factor and Regulation Characteristics of Half Wave and Full Wave Rectifier With and Without Filter.
3. Study and Analyze The Characteristics of BJT in CE Configuration and determination of h- parameters.
4. Study and Analyze The JFET Characteristics.
5. Design of Biasing Circuits for BJT and FET.
6. Design of simple amplifier circuits using BJT.
7. Design of electronic circuits using FET.

LIST OF SIMULATION EXPERIMENTS

1. Simulation of V-I Characteristics of Semiconductor Diode, LED and Zener Diode.
2. Simulation of Regulation Characteristics of Zener Diode.
3. Simulation of CC Amplifier.
4. Simulation of JFET Characteristics.
5. Simulation of BJT Characteristics in CB Configuration.
6. Simulation of JFET Amplifier.
7. Simulation of Characteristics of Tunnel Diode.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2105	
Course Title : ELECTRONIC DEVICES & CIRCUITS - LAB (WITH SIMULATION)	
CO-1	Apply the concepts of different electronic devices to verify their characteristics and measure the important parameters.
CO-2	Analyze the performance of rectifier circuits with and without filters.
CO-3	Analyze the performance of BJT and FET amplifier circuits.
CO-4	Simulation and Design of small electronic circuits using BJT and FET.



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SYLLABUS: SWITCHING THEORY AND LOGIC DESIGN - LAB (WITH SIMULATION) (B19EC2106)

LIST OF EXPERIMENTS:

1. Verify the operation of the following using basic logic gate ICs.
 - a. Full adder.
 - b. Full subtractor.
2. Verify the logic functions of 8:1 Multiplexer using IC 74151 and 1:16 Demultiplexer using IC 74154.
 - a. Implement the given function using 8:1 Multiplexer.
 - b. Convert 1:16 Demultiplexer into a 4:16 Decoder and implement the given function.
3. Verify the given code convertors using digital trainer kit
 - a. Implement BCD to Seven segment decoder driver using IC 74147 and Seven segment Display.
 - b. 8 to 3 Priority encoder using IC 74148.
4. Verify the operation of following flip-flops using Digital Trainer Kit
 - a. SR-latch & RS-latch.
 - b. JK- flip flop using IC 7476 along with direct inputs.
 - c. D- flip flop.
 - d. T- flip flop.
5. Design and verify the following counters using Digital Trainer Kit
 - a. Mod-16 Ripple counter using IC7493.
 - b. Mod-8 Synchronous counter using 7476 and 7408 ICs.
 - c. Decade (Mod-10) counter using IC7493.
6. Verify the functioning of 5 bit shift register IC7496 using Digital Trainer Kit.

SOFTWARE:

7. Verify the operation of following digital components using Vivado Simulator
 - a. Full adder
 - b. Full subtractor.
8. Verify the operation of 8:1 multiplexer and 8:3 priority encoder using Vivado Simulator.
9. Design 4-bit ALU and verify some arithmetic and logical operations using Vivado Simulator.
10. Design Mod-16 ripple and Mod-8 synchronous counters using Vivado Simulator.



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Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2106	
Course Title: SWITCHING THEORY AND LOGIC DESIGN - LAB (WITH SIMULATION)	
CO-1	Analyze and design basic combinational logic circuits using Digital IC's and HDL Programming.
CO-2	Implement basic sequential logic circuits using Digital IC's and HDL Programming.



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SYLLABUS: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (B19MC2102)

(Common to ECE & EEE)

UNIT-I: Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT-II: Protection of traditional knowledge: Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT-III: Legal frame work and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT-IV: Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-V: Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2102	
Course Title: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	
CO-1	Understand the concept of Traditional knowledge and its importance.
CO-2	Know the need and importance of protecting traditional knowledge.
CO-3	Know the various enactments related to the protection of traditional knowledge.
CO-4	Understand the concepts of Intellectual property to protect the traditional knowledge .



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Regulation: R19				II / IV - B.Tech. II - Semester					
ELECTRONICS AND COMMUNICATION ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Categor y	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
B19 EC 2201		PC	3	3	--	--	25	75	100
B19 EC 2202	Electromagnetic Waves and Transmission Lines	PC	3	3	--	--	25	75	100
B19 EC 2203	Analog Communications	PC	3	3	--	--	25	75	100
B19 EC 2204	Computer Architecture and Organization	PC	3	3	--	--	25	75	100
B19 CS 2209	OOPs through JAVA	ES	3	3	--	--	25	75	100
B19 HS 2201	Management and Organizational Behavior	HS	3	3	--	--	25	75	100
B19 EC 2205	Electronic Circuit Analysis - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
B19 EC 2206	Analog Communications - Lab (with Simulation)	PC	1.5	--	--	3	20	30	50
TOTAL			21	18	0	6	190	510	700



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ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS: ELECTRONIC CIRCUIT ANALYSIS (B19 EC 2201)

UNIT-I: Multistage Amplifiers: Transistor at high frequencies, CE short circuit current gain and concept of Gain Bandwidth product. BJT and FET RC coupled amplifiers at low and high frequencies. Frequency response and calculation of Bandwidth of Multistage Amplifiers.

UNIT-II: Feedback Amplifiers: Concept of Feedback Amplifiers - Effect of Negative Feedback on the amplifier characteristics. Four feedback topologies, Method of analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers.

UNIT-III: Sinusoidal Oscillators: Condition for oscillations and types of Oscillators – RC Oscillators: RC Phase Shift and Wien bridge Oscillators. LC Oscillators: Hartley, Colpitts, Clapp, Tuned Collector and Crystal Oscillators.

UNIT-IV: Power Amplifiers: Classification of Power Amplifiers. Series fed, Transformer coupled class-A and class-B power amplifiers. Push Pull Class-A, Class-B and Class-AB Power Amplifiers. Cross-over Distortion in Pure Class-B Power Amplifier and Class-AB Power Amplifier- Trickle Bias, Derating Factor and Heat Sinks – Complementary Push Pull Amplifier.

Tuned Voltage Amplifiers: Analysis of Single tuned, Double tuned and Stagger Tuned Amplifiers with gain and Bandwidth Calculations.

UNIT-V: Operational Amplifiers: Concept of Differential Amplifier. Differential Amplifier supplied with a constant current source. Calculation of common mode rejection ratio. Block diagram and Ideal characteristics of an Op-Amp. Applications of Op-Amp: Inverting and Non-Inverting amplifiers, Integrator, Differentiator, Summing, Subtracting and Logarithmic Amplifiers. Definition and Measurement of OP-Amp Parameters.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19 EC 2201	
Course Title: ELECTRONIC CIRCUIT ANALYSIS	
CO-1	Outline the concepts of multistage amplifiers, feedback amplifiers, power amplifiers, tuned amplifiers, operational amplifiers and oscillators.
CO-2	Apply the concepts in the realization of practical circuits.
CO-3	Analyze and design practical electronic circuits using amplifiers, oscillators and Operational amplifiers.



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SYLLABUS: ELECTROMAGNETIC WAVES & TRANSMISSION LINES (B19EC2202)

UNIT-I: Electrostatics: Introduction, Coulomb's law and electric field intensity, electric field due to different types of charge distributions, Field due to infinite line charge and finite line charge, Field due to infinite sheet charge, Electric flux density, Gauss's law and applications, Energy and potential, Electric field in terms of potential gradient, Electric dipole, Stored energy in static electric field and Energy density, Convection and Conduction currents, Continuity equation, conductors in electric field, Relaxation time, Dielectrics in electric field,

Laplace's and Poisson's equations, Uniqueness theorem, Boundary conditions on E & D at the interface between two media, Related Problems.

UNIT-II: Magnetostatics: Introduction, Biot-savar's law, Ampere's circuital law, Applications of Ampere's circuital law, Point form of Ampere's circuital law, Magnetic flux density, Gauss's law for magnetic fields, scalar and vector magnetic potentials, Forces due to magnetic fields, Magnetization in materials, Boundary conditions on H & B at the interface between two media, Related problems.

UNIT-III: Time varying fields and Maxwell's equations: Introduction, Faraday's law of electromagnetic induction, Maxwell's equations in integral and differential forms, Maxwell's equations using phasor notation, Boundary conditions on E , D , H & B at the interface between two media, Retarded Potentials, Related problems.

UNIT-IV: Electromagnetic Waves: Introduction, Wave equations for free space and for a conductive medium, uniform plane waves, Properties of uniform plane waves, Relation between E and H in uniform plane wave, Wave propagation in lossless and lossy media, Propagation in good conductors and good dielectrics, Depth of penetration, Polarization, Reflection of plane waves by a perfect conductor for normal incidences, Reflection of plane waves by a perfect dielectric for normal incidences, Brewster angle and critical angle, Poyntin's theorem, Related Problems.

UNIT-V: Transmission lines and Rectangular Waveguides: Transmission lines - Introduction, types of transmission lines, Equivalent circuit of transmission line, Primary and secondary constants of the line, Transmission line equations, Characteristic impedance and expression for characteristic impedance, Reflection coefficient, Standing wave ratio, Lossless line, Distortion less line, Input impedance of transmission line, shorted and open circuited lines, Construction of smith chart, applications of smith chart, Single stub matching, Related problems.

Rectangular Waveguides - Introduction, TM modes in rectangular waveguides, TE modes in rectangular waveguides, Impossibility of TEM mode in waveguides, Characteristics of TE and TM modes, Cutoff frequency,



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Cutoff wavelength, Phase and group velocities, Characteristic wave impedance, Dominant mode, Related problems.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19EC2202	
Course Title: ELECTROMAGNETIC WAVES & TRANSMISSION LINES	
CO-1	Illustrate the behaviour of static electric and magnetic fields in different media for different charge and current distributions.
CO-2	Apply Maxwell's equations to describe the behaviour of time varying electromagnetic fields.
CO-3	Apply Maxwell's equations to describe the EM wave propagation in free space and across different media.
CO-4	Compute different transmission line and waveguide parameters.



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SYLLABUS: ANALOG COMMUNICATIONS (B19EC2203)

UNIT-I: AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, Single tone modulation, Power relations in AM waves, Generation of AM waves, Square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT-II: DSB & SSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSB-SC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial sideband modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems, FDM.

UNIT-III: ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop. Comparison of FM & AM.

UNIT-IV: TRANSMITTERS & RECEIVERS: Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Communication Receivers, extensions of super heterodyne principle and additional circuits.

UNIT-V: NOISE: Review of noise and noise sources, noise figure, Noise in Analog communication Systems Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing, TDM Vs FDM.



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Course Outcomes for First Year First Semester Course	
Course Code: B19EC2203	
Course Title: ANALOG COMMUNICATIONS	
CO-1	Differentiate various Analog modulation and demodulation schemes.
CO-2	Analyze the concepts of analog modulation techniques in time and frequency domains.
CO-3	Identify the functional blocks of transmitters and receivers.
CO-4	Analyze and compare the performance of various analog modulation techniques in the presence of noise.
CO-5	Differentiate various Pulse modulation and demodulation techniques.



Estd:1980

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SYLLABUS: COMPUTER ARCHITECTURE AND ORGANIZATION (B19EC2204)

UNIT-I: Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logical Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

UNIT-II: Basic Computer Organization: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input - Output and Interrupt, Complete Computer Description.

UNIT-III: Micro programmed Control & CPU Organization: Micro programmed Control: Control Memory, Address Sequencing, Microinstruction Formats, Micro program Example, Design of Control Unit.
CPU Organization: Introduction, General Register Organization, Stack Organization
Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).

UNIT-IV: Input – Output Organization: Peripheral Devices, Input - Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input- Output processor, CPU-IOP communication.

UNIT-V: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Course Outcomes for First Year Second Semester Course	
Course Code: B19EC2204	
Course Title: COMPUTER ARCHITECTURE AND ORGANIZATION	
CO-1	Analyze how computers represent and manipulates data.
CO-2	Develop the general architecture design of a digital computer.
CO-3	Acquiring the knowledge of designing microprograms for few basic instructions
CO-4	Develop independent learning skills to interface main memory & I/O.



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SYLLABUS: OOPS THROUGH JAVA (B19CS2209)

(Common to ECE & EEE)

UNIT-I: INTRODUCTION TO JAVA: Introduction to OOP, procedural programming language and object-oriented language, Principles of OOP, Applications of OOP, History of java, java features, JVM, Program structure. Variables, Primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II: OBJECTS AND CLASSES: Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III: INHERITANCE: Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java. Lang package. Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions.

UNIT-IV: MULTITHREADING: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V: APPLETS AND AWT CLASSES: Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes. AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2209	
Course Title: OOPS THROUGH JAVA	
CO-1	Apply object-oriented programming principles and various java programming constructs and develop java programs.
CO-2	Apply the concepts of Inheritance, Polymorphism and String handling methods in developing java programs
CO-3	Apply the concepts like interfaces, packages, exception handling and multithreading in programming to develop error free programs.
CO-4	Develop the GUI applications for the end users using applets with event handling.



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SYLLABUS: MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR (B19HS2201) (Common to ECE & EEE)

UNIT-I: Introduction to Management: Management: Concept, Nature and importance of Management, Functions of management, Evolution of Management thought, Taylor's Scientific Management, Fayol's principles of Management, Social Responsibility of Business.

UNIT-II: Functional Management: Human Resource Management (HRM): Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Compensation & Performance Appraisal.

Marketing Management: Concept, Functions of marketing; Marketing Mix - Product, Price, Place & Promotion; Marketing strategies based on Product life cycle, Channels of distribution.

UNIT-III: Strategic Management: Vision, Mission, Goal, Objective, Policy, Strategy. Elements of Corporate planning process; Environmental scanning; SWOT analysis; steps in Strategy formulation, implementation, evaluation & control; Bench Marking; Balanced Score Card.

UNIT-IV: Organizational Behavior: Individual Behavior: Perception-Perceptual process; Attitude- Attitudinal change, Organizational Change, Factors Influencing Change, Types of Change.

Motivation: Meaning, Theories of Motivation - Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation.

UNIT-V: Group Dynamics: Types of Groups, Stages of Group development; **Organizational conflicts** - Reasons for Conflicts, Consequences of Conflicts in Organization, Types of Conflicts, Strategies for Managing Conflicts, Stress - Causes and effects, coping strategies of stress.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS2201	
Course Title: MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR	
CO-1	Explain management functions and principles.
CO-2	Will be able to describe the concepts of functional management that is HRM and Marketing functions.
CO-3	Will be able to get discuss about vision, mission, goal, objective and a strategy based on which the corporate planning depends.
CO-4	The learner is able to recognize strategically contemporary management practices and describe corporate planning process.
CO-5	The learner can discuss about individual behavior and motivational theories.
CO-6	The student can explain about ways in managing conflicts and stress.



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SYLLABUS: ELECTRONIC CIRCUIT ANALYSIS LAB (WITH SIMULATION) (B19EC2205)

LIST OF EXPERIMENTS (HARDWARE)

1. Frequency Response of RC Coupled Amplifier.
2. Frequency Response of Negative Feedback Amplifier.
3. Colpitts Oscillator.
4. RC Phase Shift Oscillator.
5. Wein Bridge Oscillator.
6. Hartley Oscillator.
7. Basic Applications of Operational Amplifier.
8. Tuned Voltage Amplifier.

SOFTWARE:

1. Frequency Response of RC Coupled Amplifier.
2. Frequency Response of Negative Feedback Amplifier.
3. Colpitts Oscillator.
4. RC Phase Shift Oscillator.
5. Wein Bridge Oscillator.
6. Hartley Oscillator.
7. Basic Applications of Operational Amplifier.
8. Tuned Voltage Amplifier.

Course Outcomes for First Year Second Semester Course	
Course Code: B19EC2205	
Course Title: ELECTRONIC CIRCUIT ANALYSIS LAB(WITH SIMULATION) ()	
CO-1	Apply the concepts of amplifier analysis to verify their characteristics and measure the important parameters.
CO-2	Analyze the performance of power amplifiers.
CO-3	Analyze the frequency response and characteristics of operational amplifiers.
CO-4	Simulation and Design of different amplifiers and oscillator circuits.



Estd:1980

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SYLLABUS: ANALOG COMMUNICATIONS - LAB (WITH SIMULATION) (B19EC2206)

LIST OF EXPERIMENTS

1. Amplitude Modulation and Demodulation.
(Hardware implementation, MATLAB simulation)
2. Frequency Modulation and Demodulation.
(MATLAB and Multisim simulation)
3. Balanced Modulator.
(Hardware implementation, MATLAB simulation)
4. Harmonic Generator.
(Hardware implementation)
5. Pre-Emphasis and De-Emphasis.
(Hardware implementation)
6. RF Amplifier.
(Hardware implementation)
7. Design Of Active Low Pass and High Pass Filter.
(Hardware implementation)
8. Design Of Twin-T Network.
(Hardware implementation)
9. Pulse Modulation Techniques.
(Hardware implementation, MATLAB simulation)
10. Spectrum Analysis of AM & FM Signals.
(MATLAB simulation)
11. Frequency Division Multiplexing.
(MATLAB simulation)
12. Simulation of AWGN Channel.
(MATLAB simulation)

Course Outcomes for First Year First Semester Course	
Course Code: B19EC2206	
Course Title: ANALOG COMMUNICATIONS - LAB (WITH SIMULATION)	
CO-1	Design and implement modulation and demodulation circuits for amplitude modulation and frequency modulation techniques.
CO-2	Design second order active filters for various frequency bands.
CO-3	Construct the circuit and study the characteristics of different transmitter and receiver circuits such as Harmonic generator, RF Amplifier, pre-emphasis and de-emphasis.



ELECTRICAL AND ELECTRONICS ENGINEERING



Estd:1980

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Regulation: R19				I / IV - B.Tech. I - Semester					
ELECTRICAL AND ELECTRONICS ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
B19 HS1101	English	HS	3	3	--	--	25	75	100
B19 BS1101	Mathematics-I	BS	3	3	--	--	25	75	100
B19 BS1104	Applied Physics	BS	3	3	--	--	25	75	100
	Environmental Science	ES	3	3	--	--	25	75	100
B19 ME1101	Engineering Drawing	ES	2.5	1	--	3	25	75	100
B19BS1107	Applied Physics Lab	BS	1.5	--	--	3	20	30	50
B19 HS1102	English Lab	HS	1.5	--	--	3	20	30	50
B19 CE 1102	Electrical Engineering Workshop	ES	2	--	1	2	20	30	50
B19MC1102	Constitution of India	MC	--	3	--	--	--	--	--
TOTAL			19.5	16	1	11	185	465	650



Estd:1980

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ELECTRICAL AND ELECTRONICS ENGINEERING

SYLLABUS: ENGLISH (B19HS1101)

(Common to CE, CSE, EEE, IT & ME)

UNIT-I: Lesson: A Drawer full of happiness from *Infotech English*, Maruthi Publications.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self- introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.

Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.

Pronunciation: Vowels, consonants, plural markers and their realizations

UNIT-II : Lesson:-: Nehru's letter to his daughter, Indira on her birthday from *Infotech English*, Maruthi Publications.

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (précis writing); avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.

Grammar: Articles, prepositions and use of antonyms.

Pronunciation: Past tense markers, word stress-di-syllabic words.

UNIT-III: Lesson: Stephen Hawking-Positivity' Benchmark' from *Infotech English*, Maruthi Publications.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.



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Functional English: complaining and apologizing.

Reading: Reading a text in detail by making basic inferences -recognizing: and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Reading for Writing: Letter writing- types, format and principles of letterwriting, E-mail etiquette, writing a Resume/CV and covering letter.

Vocabulary: Technical vocabulary from across technical branches (20 words. GRE. Vocabulary 20 words), Idioms & Phrasal verbs, Homonyms, word applications, sequencing of words.

Grammar: Sentence Structures, Transformation of sentences (Active and passive Voice, Degrees of comparison, Simple, Compound and Complex).

Pronunciation: Word stress-poly-syllabic words.

UNIT-IV: Lesson: Liking a Tree, Unbowed: Wangari Maathai biography from *Infotech English*, Maruthi Publications.

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: asking for permissions, requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Pamphlet writing, writing for media, writing SOP's.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, cloze encounters, foreign phrases.

Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting, question Tags, direct and indirect speech, reporting for academic purposes.

Pronunciation: Contrastive Stress.

UNIT-V: Lesson: Stay Hungry–Stay Foolish from *Infotech English*, Maruthi Publications.

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts–with/without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.

Reading for Writing: Report writing, writing academic proposals- writing research articles: format



Estd:1980

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and style.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE 'Vocabulary (20 words, antonyms and synonyms, word applications, coherence, matching emotions.

Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement, parallel structures, phrases and clauses).

Pronunciation: Stress in compound words.

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1101	
Course Title: ENGLISH	
CO-1	Identify the context, topic and pieces of specific information by understanding and responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Understand and apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.



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SYLLABUS: MATHEMATICS-I (B19BS1101)
(LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)
(Common to All Branches)

UNIT-I: Linear systems of equations: Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.

UNIT-II: Eigen values - Eigen vectors and Quadratic forms: Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.

UNIT-III: Differential equations of first order and first degree: Linear, Bernoulli, Exact, Reducible to exact types.

Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits. (R-L and R-C circuits only)

UNIT-IV: Linear differential equations of higher order: Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $x V(x)$. Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

UNIT-V: Laplace transformation: Laplace transforms of standard functions, properties, transforms of $tf(t)$, $f(t)/t$, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function, Inverse Laplace transforms, convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1101	
Course Title: MATHEMATICS – I	
CO-1	Solve a given system of linear algebraic equations
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve linear ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform and inverse Laplace transform and solve linear ODE.



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Estd:1980

SYLLABUS: APPLIED PHYSICS (B19 BS1104)

(Electrical and Electronics Engineering)

UNIT-I: WAVE OPTICS Interference: Principle of super position. Interference of light, interference in thin films(reflected light) – Wedge film and Newton`s rings – Applications

Diffraction: Types of diffraction, Fraunhofer diffraction at a single slit, Diffraction grating, grating spectrum. Missing order, Resolving power, Rayleigh`s Criterion, Resolving power of Grating, Telescope, Microscope (qualitative treatment only)

UNIT-II: DIELECTRICS AND MAGNETICS: Dielectrics : Introduction to dielectrics, Electric Polarization, Dielectric polarizability, Susceptibility, Dielectric constant, Types of Polarization, Frequency dependence of Polarization, Internal field in a dielectric, Clausius and Mosotti equation, Applications of dielectrics.

Magnetics: Introduction to magnetism, Magnetic dipole moment , Magnetization, Magnetic susceptibility and Permeability, Origin of permanent magnetic moment, Classification of magnetic materials, Hysteresis – Weiss Domain theory – Ferrites, soft and hard magnetic materials, Magnetic device applications.

UNIT-III: LASERS AND FIBER OPTICS: Lasers: Introduction, Interaction of radiation with matter, condition for light amplification, Einstein`s relations. Requirements of laser device Types of lasers, Design and working of Ruby and He – Ne lasers, Laser characteristics and applications.

Fiber Optics: Introduction to optical fibers, Principle of light propagation in fiber, Acceptance angle, Numerical aperture, Modes of propagation, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.

UNIT-IV: SEMICONDUCTORS: Introduction, intrinsic semi conductors, density of charge carriers, Fermi energy, Electrical conductivity – Extrinsic semi conductors – P-type and N-type, Density of charge carriers, dependence of Fermi energy on carrier concentration and temperature, direct and indirect band – gap semi conductors, Hall effect, Applications of Hall effect. Drift and diffusion currents, Continuity equation, applications of semi conductors.

UNIT-V: ULTRASONICS AND NANOMATERIALS: Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, detection of ultrasonics, acoustic grating, applications of ultrasonics. Nanomaterials: Introduction, salient features of Nanomaterials, Synthesis methods – Ball milling, Condensation, Chemical vapour Deposition and Sol – Gel methods, Characterization techniques for Nano materials, Carbon nanotubes (CNTS), Applications of Nano materials.



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Estd:1980

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1104	
Course Title: APPLIED PHYSICS	
CO-1	Interpret the behavior of light radiation in interference and diffraction Phenomena and their applications.
CO-2	Explain the properties of dielectric and magnetic materials suitable for engineering applications.
CO-3	Explain the important aspects of semiconductors and electrical conductivity in them.
CO-4	Understand the basics of modern technologies lasers, optical fibers and ultrasonics and their utility in various fields.
CO-5	Demonstrate the synthesis methods and applications of nano materials.



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Estd:1980

SYLLABUS: FUNDAMENTALS OF COMPUTERS (B19CS1103)

(Electrical and Electronics Engineering)

UNIT-I: Introduction: History of digital computers, types of computers, block diagram of digital computers, various parts of a digital computer, Computer Programming- Machine Language, Assembly language and high-level Language Programming.

UNIT-II: Number System: Binary, Octal, Decimal and Hexa decimal numbers systems, Conversion of numbers from one system to other system, fixed and floating-point representation of numbers, addition and subtraction, multiplication algorithms, division algorithms, floating-point Arithmetic operations.

UNIT-III: Memory and Peripherals: Memories: Need for memory, Types of Computer Memories-magnetic, Dynamic and static memories, Ram, ROM, EPROM and EEPROM Memories, Cache memory, Concept of Virtual memory.

Peripheral Devices: Working of Keyboard and Mouse, Types of Printers and its working, IO ports, Addressing I/o devices-Programmed I/O, interrupt I/O, DMA.

UNIT-IV: Computer Organization: Organization of a processor-Registers, ALU and Control unit, Register transfer language, micro operations, instruction codes, Computer instruction formats, Instruction cycle, Memory Reference Instructions, Input-Output instructions, Control Memory, Address sequencing, Design of control unit-micro programmed control, hardwired control.

UNIT-V: Applications: Various applications of Computer, Networking of Computers-LAN, WAN, MAN, Internet, Internet of things (IoT) applications to electrical engineering.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1103	
Course Title: FUNDAMENTALS OF COMPUTERS	
CO-1	The student will be understood functioning of computers
CO-2	The student will convert numbers from one type to other type of system.
CO-3	The student will distinguish between different types of memories and learn the mapping of I/O devices
CO-4	The student will demonstrate the internal organization of digital
CO-5	Apply digital computer for storing electrical engineering problems



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SYLLABUS: ENGINEERING DRAWING (B19ME1101)
(Common to CE, EEE & ME)

UNIT-I: Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general method (eccentricity method only), cycloids, involutes, tangents & normals for the curves.

UNIT-II: Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to one of the reference planes (HP, VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III: Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes for First Year First Semester Course	
Course Code: B19ME1101	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.



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SYLLABUS: APPLIED PHYSICS LAB (B19BS1107)
(Electrical and Electronics Engineering)

1. Determination of the Wavelength of light from a source – Diffraction Grating – Normal incidence.
2. Determination of radius of curvature of Plano convex lens – Newton's Rings.
3. Determination of the thickness of a thin spacer using interference – Air Wedge method.
4. Determination of Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Verification of Laws of series and parallel combinations of resistances – Carey Foster's bridge.
6. Determination of Temperature Coefficient of Resistance of a thermistor
7. Determination of resistivity of semiconductors by Four probe method.
8. Determination of dielectric Constant by charging and discharging method.
9. Resolving power of a grating.
10. Determination of the velocity of sound - Volume Resonator method.
11. Determination of the Rigidity modulus of elasticity of a material – Torsional pendulum.
12. Verification of the laws of vibrations in stretched strings - Sonometer.
13. Determination of Magnetic susceptibility by Quinke's method.
14. Study of variation of dielectric constant with temperature.
15. Determination of the frequency of the AC supply – AC Sonometer.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1107	
Course Title: APPLIED PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.



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SYLLABUS: ENGLISH LAB (B19HS1102)

(Common to All Branches)

UNIT-I: Pronunciation

Letters and Sounds

The Sounds of English

Phonetic Transcription

UNIT-II: Past tense markers

Word stress-di-syllabic words

Poly-syllabic words

UNIT-III: Rhythm & Intonation

UNIT-IV: Contrastive Stress (Homographs)

UNIT-V: Word Stress: Weak and Strong forms

Stress in compound words

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1102	
Course Title: ENGLISH LAB	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.



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Estd:1980

SYLLABUS: ELECTRICAL ENGINEERING WORKSHOP (B19EE1102)

(Electrical and Electronics Engineering)

1. To study the various electrical tools, symbols and abbreviations.
2. To identify the different types of cables/wires and switches, Fuses, & fuse carriers, MCB and ELCB, MCCB with ratings and usage.
3. To study of electrical safety and precautions.
4. Identification of terminals of various semi conducting devices
5. Measurement of resistance for a given resistor using the color-coding method.
6. Electrical wiring connection for fluorescent lamp.
7. Two lamps control using two individual switches.
8. One lamp control using 1-way switch
9. One lamp control using 2-way switches (Staircase wiring).
10. Wiring of power distribution using single phase MCB distribution board with ELCB, main switch and single-phase energy meter.
11. Wiring of backup power supply, including inverter, battery and load for domestic installation.
12. Verification of logic gates (OR, AND, OR, NOT, NAND, EX-OR).

Course Outcomes for First Year First Semester Course	
Course Code: B19EE1102	
Course Title: ELECTRICAL ENGINEERING WORKSHOP	
CO-1	Explain the limitations, tolerances, safety aspects of electrical systems and wiring.
CO-2	Select wires/cables and other accessories used in different types of wiring.
CO-3	Make simple lighting and power circuits.



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Estd:1980

SYLLABUS: CONSTITUTION OF INDIA (B19MC1102)

(Common to ECE & EEE)

UNIT-I: Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -

Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II: Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-IV: Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

UNIT-V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Course Outcomes for First Year First Semester Course	
Course Code: B19MC1102	
Course Title: CONSTITUTION OF INDIA	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self-government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO-6	<ol style="list-style-type: none"> 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Pachayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission



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Regulation: R19				I / IV - B.Tech. II - Semester					
CIVIL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS 1201	Mathematics-II	BS	3	3	--	--	25	75	100
B19 BS 1202	Mathematics-III	BS	3	3	--	--	25	75	100
B19 BS 1205	Applied Chemistry	BS	3	3	--	--	25	75	100
B19 CS 1201	Programming for Problem Solving using C	ES	3	3	--	--	25	75	100
B19 EE 1201	Circuit Theory	ES	3	3	--	--	25	75	100
B19 BS 1208	Applied Chemistry Lab	BS	1.5	--	--	3	20	30	50
B19 HS 1202	Communication Skills Lab	HS	1.5	--	--	3	20	30	50
B19 CS 1204	Programming for Problem Solving Using C Lab	ES	1.5	--	--	3	20	30	50
B19 EE 1205	Engineering Exploration Project	PR	1	--	--	2	--	50	50
B19 MC 1203	Environmental Science	MC	0	3	--	--	--	--	--
TOTAL			20.5	18	--	11	185	515	700



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Estd:1980

CIVIL ENGINEERING

SYLLABUS: MATHEMATICS – II (B19BS1201)

(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)

(Common to CE, EEE, & ME)

UNIT-I: Interpolation: Interpolation, forward differences, backward differences, Central differences and relations between the operators, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unequal intervals, Lagrange interpolation.

UNIT-II: Solution of Algebraic and Transcendental Equations & Numerical Integration and solution of Ordinary Differential equations: Introduction, Bisection method, Method of false position, Iteration method & Newton-Raphson method.

Trapezoidal rule, Simpson's $1/3$ rule, Solution of ordinary differential equations by Taylor's method, Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method.

UNIT-III: Partial differentiation: Introduction, Homogeneous functions, Euler's theorem, Chain rule, Total derivative, Jacobians and their properties.

Applications: Taylor series expansion for a function of two variables, Maxima and Minima of functions of two variables with and without constraints, Lagrange's method. Leibnitz's rules for differentiation under integral sign.

UNIT-IV: First order and higher order partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of Lagrange linear equation. Solutions of Linear homogeneous and non-homogeneous partial differential equations with constant coefficients – source (RHS) terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

UNIT-V: Applications of partial differential equations: Method of separation of variables, One – dimensional wave equation, the D'Alembert's solution, one- dimensional heat equation



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Estd:1980

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1201	
Course Title: MATHEMATICS-II	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation



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SYLLABUS: MATHEMATICS-III (B19BS1202)

(Multivariable Calculus and Fourier analysis)

(Common to CE, CSE, ECE, EEE & IT)

UNIT-I: Fourier Series: Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Complex form of Fourier integral, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms, Finite Fourier transforms, properties, inverse transforms, Parseval's Identities.

UNIT-III: Single and Multiple integrals: Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Applications: evaluation of improper integrals, error function and the complimentary error function.

Double and triple integrals, change of variables, Change of order of integration. Applications: Areas and volumes.

UNIT-IV: Vector Differentiation: Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.

UNIT-V: Vector Integration: Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux. Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1202	
Course Title: MATHEMATICS-III	
CO-1	Determine Fourier series and half range series of functions.
CO-2	Find different Fourier transforms of non-periodic functions and also use them to evaluate integrals.
CO-3	Use the knowledge of Beta and Gamma functions in evaluating improper integrals.
CO-4	Evaluate double integrals, simple triple integrals & find areas and volume.
CO-5	Find the gradient of a scalar function, divergence and curl of a vector function. Determine scalar potential.
CO-6	Apply Green's, Stokes' and Gauss divergence theorems to solve problems.



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SYLLABUS: APPLIED CHEMISTRY (B19BS1205)

(Electrical and Electronics Engineering)

UNIT-I: High Polymers and Plastics; Rubbers & Elastomers: Polymerization Definition, Types of Polymerization, free radical Mechanism of addition polymerization, Plastics as engineering materials, Thermoplastics and Thermosetting plastics, Compounding of plastics, Fabrication of plastics (4 techniques); Preparation, Properties and applications of Polyethylene, PVC, Bakelite, Nylon - 6,6, Bullet Proof plastics - polycarbonate and Kelvar; Fiber reinforced plastics, conducting polymers, Biodegradable Polymers - PHBV, Nylon 2, Nylon 6. Natural rubber – Vulcanization – Compounding of Rubber; Preparation, properties and applications of Buna – S; Buna – N;

UNIT-II: Energy Sources and Applications: Nuclear Energy: Nuclear fission and Nuclear fusion – Nuclear Power reactor – Applications of radioactive materials Solar Photovoltaic cell- Thermal fuels – Introduction – Classification – Calorific value – HCV and LCV – Bomb calorimeter; Coal : Proximate and ultimate analysis of coal – Significance of the analysis – Manufacture of coke by Otto Hoffman's by Product Process, Refining crude oil; Knocking; Chemical structure Knocking, Octane number of gasoline, Cetane number of diesel oil, synthetic Petrol; LPG, CNG

UNIT-III: Electrochemical cells and Corrosion: Galvanic cell, single electrode potential, Calomel electrode; Modern batteries: - Lead – Acid battery; Fuel cells- Hydrogen – Oxygen fuel cell, Lithium battery Theories of corrosion (i) dry Corrosion (ii) wet corrosion. Types of corrosion - differential aeration corrosion, pitting corrosion, galvanic corrosion, stress corrosion, Factors influencing corrosion, Protection from corrosion-material selection & design, cathodic protection, Protective coatings- metallic coatings – Galvanizing, Tinning, Electroplating; Electroless plating; Paints.

UNIT-IV: Water technology: Sources of water – Hardness of water – Estimation of hardness of water by EDTA method; Boiler troubles – sludge and scale formation, Boiler corrosion, caustic embrittlement, Priming and foaming; Softening of water by Lime – Soda Process, Zeolite Process, Ion – Exchange Process; Municipal water treatment; Desalination of sea water by Electrodialysis and Reverse osmosis methods. Indian standards and WHO standards of drinking water. Design of drinking water plant.

UNIT-V: Chemistry of Engineering Materials& Advanced Engineering materials: Cement:- Manufacture of Portland cement, setting and hardening of cement, Deterioration of cement concrete.
Refractories: - Definition, Characteristics, classification, Properties and failure of refractories.



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Solar Energy: - Construction and working of Photovoltaic cell, applications.

Solid State Materials: Crystal imperfections, Semi Conductors, Classification and chemistry of semi conductors:

Intrinsic semiconductors; Extrinsic semiconductors; Defect semiconductors, Compound Semiconductors and Organic Semiconductors.

Liquid Crystals: - Definition – Classification with examples – Applications.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1205	
Course Title: APPLIED CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C (B19CS1201)
(For CE,EEE & ME)

UNIT-I: Introduction to Computers: Computer Systems, Computing Environments, Computer languages, Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

UNIT-II: Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

UNIT-III: Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application.

UNIT-IV: Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application

Processor Commands: Processor Commands

UNIT-V: Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter- Function Communication, Standard Functions, Passing Array to Functions, Passing Pointersto Functions, Recursion

Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1201	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C	
CO-1	Students will learn about computer systems, computing environments, developing of a computer program and Structure of a C Program
CO-2	Students will learn to use different operators, data types and loops for developing C Programs.
CO-3	Students will able to write programs using Arrays ,Strings, enumerated types, Structure and Union
CO-4	Students will able to design and implement programs to analyze the different pointer applications
CO-5	Students will able to decompose a problem into functions and to develop modular reusable code



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Estd:1980

SYLLABUS: CIRCUIT THEORY (B19EE1201)

(Electrical & Electronics Engineering)

UNIT-I: Introduction to Electrical Circuits: Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchhoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources.

UNIT-II: Magnetic Circuits: Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT-III: Single Phase A.C Systems: Periodic waveforms (determination of rms, average value and form factor), concept of phase angle and phase difference – waveforms and phasor diagrams for lagging, leading networks, complex and polar forms of representations. Steady state analysis of R, L and C circuits, power factor and its significance, real, reactive and apparent power, waveform of instantaneous power and complex power.

UNIT-IV: Analysis of AC Networks: Extension of node and mesh analysis to AC networks, series and parallel resonance, selectivity, band width and Quality factor, locus diagram.

UNIT-V: Network theorems (DC & AC Excitations): Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem

Course Outcomes for First Year Second Semester Course	
Course Code: B19EE1201	
Course Title: CIRCUIT THEORY	
CO-1	Able to analyze various electrical networks in presence of active and passive elements.
CO-2	Able to understand the principles of Magnetic circuits and dot convention.
CO-3	Able to Solve R, L and C networks with sinusoidal excitation.
CO-4	Able to evaluate the frequency response of RLC networks.
CO-5	Able to apply various network theorems to Electrical networks.



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SYLLABUS: APPLIED CHEMISTRY LAB (B19BS1208)
(Electrical & Electronics Engineering)

LIST OF EXPERIMENTS:

1. Introduction of Chemistry Laboratory.
2. Estimation of HCL using standard Sodium Hydroxide.
3. Determination of total hardness of water by EDTA method.
4. Estimation of Ferrous Iron by KMnO_4 .
5. Estimation of oxalic acid by KMnO_4 .
6. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
7. Estimation of Dissolved oxygen by Winkler's method.
8. Determination of pH by pH meter and universal indicator method.
9. Conductometric titration of strong acid Vs strong base.
10. Conductometric titration of strong acid Vs weak base.
11. Potentionmetric titration of strong acid Vs strong base.
12. Potentionmetric titration of strong acid Vs weak base.
13. Preparation of Phenol formaldehyde resin.
14. Determination of saponification value of oils.
15. Determination of pour and cloud points of lubricating oil.
16. Determination of Acid value of oil.Demo:
17. Biodiesel from used cooking oil.
18. Construction of electrochemical cells.
19. Synthesis of semiconductors.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1208	
Course Title: APPLIED CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1202)
(Common to CE, ECE, EEE & ME)

UNIT-I: JAM, Common Errors Neutralizing accent

UNIT-II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-III: Presentation Skills Public Speaking Data Interpretation

UNIT-IV: Group Discussion Do's and Don'ts

UNIT-V: Curriculum Vitae Covering Letter Interview Skills Mock Interviews, FAQ's.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS1202	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



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SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C LAB (B19CS1204)

(Common to CE, EEE & ME)

1. Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.
3. Write a C program to display multiple variables.

2. Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

3. Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

4. Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

5. Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

6. Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

7. Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

8. Exercise 8:

1. Write a program in C to compare two strings without using string library functions.



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2. Write a program in C to copy one string to another string.

9. Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

10. Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers

11. Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation

12. Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

13. Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function

14. Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two program.
2. Write a program in C to convert decimal number to binary number using the function.

15. Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using the function.
2. Write a program in C to get the largest element of an array using the function.

16. Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name.
3. Write a program in C to remove a file from the disk.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1204	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C LAB	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills .
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program.



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SYLLABUS: ENGINEERING EXPLORATION PROJECT (B19EE1205)
(Electrical & Electronics Engineering)

Apply Design Thinking on the following Streams to

Project Stream 1: Electronics, Robotics, IOT and Sensors

Project Stream 2: Computer Science and IT Applications

Project Stream 3: Mechanical and Electrical tools

Project Stream 4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.



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SYLLABUS: ENVIRONMENTAL SCIENCE (B19MC1201)
(Common to CE, ECE & EEE)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e- waste management.



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UNIT-V: Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.



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Regulation: R19				II / IV - B.Tech. I - Semester					
ELECTRICAL & ELECTRONICS ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19EC2101	Electronic Devices and Circuits	ES	3	3	--	--	25	75	100
B19BS2102	Mathematics-IV	BS	3	3	--	--	25	75	100
B19EE2101	Electrical Measurements and Instrumentation	PC	3	3	--	--	25	75	100
B19EE2102	Network Analysis and Synthesis	PC	3	3	--	--	25	75	100
B19EE2103	Electro Magnetic Field Theory	PC	3	3	--	--	25	75	100
B19CS2108	Data Structures	ES	3	3	--	--	25	75	100
B19EE2104	Networks Lab	PC	1.5	--	--	3	20	30	50
B19EC2105	Electronic Devices and Circuits Lab (with Simulation)	ES	1.5	--	--	3	20	30	50
B19MC2102	Essence of Indian Traditional Knowledge	MC	0	3	--	--	--	--	--
TOTAL			21	21	0	6	190	510	700



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ELECTRICAL AND ELECTRONICS ENGINEERING
SYLLABUS: ELECTRONIC DEVICES AND CIRCUITS (B19EC2101)
(Common to ECE & EEE)

UNIT-I : Semiconductor diode and its applications: Potential variation in graded semiconductors. Open circuited PN junction, current components in a PN diode, V-I characteristics and its temperature dependence, transition capacitance, charge control description of a diode, diffusion capacitance, junction diode switching times, characteristics of Tunnel diode and Zener diode. Half wave, Full wave and Bridge Rectifiers with and without filters, Ripple factor and regulation characteristics.

UNIT-II : Bipolar junction transistors: Operation of a transistor and transistor biasing for different operating conditions, transistor current components, transistor amplification factors: α, β, γ relation between α and β, γ early effect or base-width modulation, common base configuration and its input and output characteristics, common emitter configuration and its input and output characteristics, common collector configuration and its input and output characteristics, Comparison of CE, CB and CC Configurations, Break-down in transistors, Photo Transistor.

UNIT-III: Transistor Biasing Circuits: The operating point, Bias stability, different types of biasing techniques, stabilization against variation in I_{co} , V_{BE} , & β . Bias compensation, thermal runaway, thermal stability.

UNIT-IV: Field Effect transistors: JFET and its characteristics, pinch off voltage, FET small signal model, MOSFET and its characteristics, Biasing of FETs.

UNIT-V: Transistors at low and High frequencies: Transistor hybrid model, H-parameters, Analysis of transistor amplifier circuits using h- parameters, comparison of transistor amplifier configurations, analysis of single stage amplifier, effects of bypass and coupling capacitors, frequency response of CE amplifier, Emitter follower, High frequency model of transistor.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EC2101	
Course Title: ELECTRONIC DEVICES AND CIRCUITS	
CO-1	Analyze the characteristics and operation of Diode, BJT, JFET and MOSFET.
CO-2	Analyze the biasing circuits of BJT and JFET.
CO-3	Analyze the performance of small signal BJT and FET single stage amplifiers.
CO-4	Apply the gained knowledge in the design of simple Electronic circuits.



Estd:1980

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ChinnaAmiram, Bhimavaram-534204. (AP)

SYLLABUS: MATHEMATICS IV (B19BS2102)

(Complex Variables & Statistical Methods)

(Common to CE & EEE)

UNIT-I: Functions of a Complex Variable: Review- Cartesian form and polar form of a complex variable, Real and imaginary parts of z^n , e^z , $\sin z$, $\sinh z$ and $\log z$ (**no questions may be set on the review portion**). Limit and continuity of a function of a complex variable, derivative, analytic function, entire function, Cauchy- Riemann equations, determine an analytic function based on the knowledge of its real and imaginary parts, Milne-Thomson method, Applications of analytic function to flow problems, and in Electrostatics. Conformal mapping: the transformations defined by $w = z+c$, $w = cz$, $w = 1/z$. The Bilinear transformation.

UNIT-II: Complex Integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula. Expansion of a function in a Taylor series, McLaren series and Laurent series. Types of singularities, Residues, Cauchy's residue theorem. Evaluation of real definite integrals –integration around unit circle (Theorems without proofs).

UNIT-III: Difference equations and Z-transforms : Formation of a difference equation, Rules for finding complementary function and particular integral for linear difference equations.

Definition of Z- transform, some standard Z- transforms, properties, transform of a function multiplied by n , initial value theorem and final value theorem (without proof), evaluation of inverse Z- transforms, convolution theorem (without proof), solution of linear difference equations by the use of Z- transforms.

UNIT-IV: Probability Distributions : A brief review of random variables, Binomial, Poisson and Normal distributions, definitions of pmf/ pdf, notation, mean, variance, moment generating function. Fitting of Binomial or Poisson distributions for a given frequency distribution.

UNIT-V: Sampling theory and Testing of Hypothesis: Sampling theory: Introduction, population and samples, Sampling distribution, standard error, central limit theorem (without proof), level of significance, procedure of testing of hypothesis.

Large samples: Testing of hypothesis for single proportion and two proportions.

Small samples: Degrees of freedom, Student's t - distribution, t -test for single mean, two means; Chi- squared distribution, test for goodness of a fit.

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Course Outcomes for Second Year First Semester Course	
Course Code: B19BS2102	
Course Title: MATHEMATICS IV	
CO-1	Comprehend the concept of Analytic function and apply in Electrostatics and Fluid dynamics
CO-2	Determine Laurent series of functions about isolated singularities, and determine residues. Use the residue theorem to evaluate certain real definite integrals.
CO-3	Formulate and solve linear difference equations.
CO-4	Use Z-transforms to solve linear difference equations with constant coefficients.
CO-5	Identify a random variable as discrete/continuous, find its expected value and also fit a probability distribution for a given frequency distribution.
CO-6	Decide the test applicable and apply it for giving inference about Population Parameter based on sample statistic for some large samples and small samples.



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SYLLABUS: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION (B19EE2101)

UNIT-I: Measuring Instruments: Classification, Error Analysis, Deflecting, Controlling and Damping torques, Moving Coil, Moving iron type instruments, Expression for the torque, Errors, and compensations. Extension of range using shunts and Multipliers, Introduction to CT & PT, Errors and compensation, Applications, comparison between C.T. and P.T.

UNIT-II: Measurement of Power and Energy: Dynamometer type wattmeter – Torque expression, Errors. Energy meters, Calibration of energy meters. Measurement of power using Instrument Transformers, Power factor meter.

UNIT-III: AC & DC Bridges: Methods of Measuring Low, Medium, and High Resistance, Kelvin's Double Bridge, Wheat Stone's Bridge, Loss of Charge Method, Methods of Measuring Inductance, Capacitance, and Frequency-Maxwell's Bridges, Anderson's Bridge, Hay's Bridge, Owen's Bridge, Schering Bridge, Wein's Bridge.

UNIT-IV: Measurement of Non-Electrical Quantities: Transducers – Classifications, Principle of operation of Resistance, Inductive and capacitive Transducers, LVDT, Strain Gauge, and Piezo-Electric Transducers. Measurement of Pressure and Displacement, Measurement of Temperature -Thermocouple.

UNIT-V: Digital Measurement and CRO: Digital Voltmeter –Dual Slope Type, Successive Approximation Type. CRO- Calibration, Measurement of Different Quantities, Lissajous Patterns. ADC- Flash Type, DAC- R2R ladder, Weighted Resistor Type.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EE2101	
Course Title: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	
CO-1	Examine the operation of different meters for measuring electrical quantities with their applications.
CO-2	Apply the knowledge of instrument transformers to use them for accurate measurements.
CO-3	Analyse the usage of different bridges for the measurement of Resistance, Capacitance, Inductance and Frequency.
CO-4	Examine the operation of different transducers for measuring non-electrical quantities with their applications.
CO-5	Interpret the usage of CRO, ADC, DAC & Digital Voltmeters.



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SYLLABUS: NETWORK ANALYSIS AND SYNTHESIS (B19EE2102)

UNIT-I: THREE-PHASE CIRCUITS: Advantages of Three Phase Circuits, Relation between Line and Phase Quantities in Star and delta connected circuits, Analysis of Balanced & Unbalanced Three Phase Circuits, Three-Phase Power Measurements (2-Wattmeter method)

UNIT-II: DC Transients: Inductor, Capacitor, Source free RL, RC and RLC Response, Evaluation of Initial conditions, application of Unit-step Function to RL, RC and RLC Circuits (Differential equations), Concepts of Natural, Forced and Complete Response.

UNIT-III: Laplace Transform Techniques: Transforms of Typical Signals, Response of Simple Circuits to Unit – Step, sinusoidal and other signal waveforms, Initial and Final Value Theorem.

UNIT-IV: Network Functions & Two Port Network Parameters: Network functions, Concept of Poles and Zeroes, Restriction of Poles and Zeroes for Driving point and transfer function.

Two port network parameters – Z, Y, ABCD and Hybrid parameters and Interrelationship between different parameters, and Interconnections of various networks.

UNIT-V: Network Synthesis: Hurwitz Polynomial. Positive real function - basic synthesis procedure - Foster and Cauer forms of LC, RC and RL networks.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EE2102	
Course Title: NETWORK ANALYSIS AND SYNTHESIS	
CO-1	Explain three-phase balanced and unbalanced electric circuits.
CO-2	Analyze the transient behavior of circuits by applying first and second order differential equations.
CO-3	Apply Laplace transform techniques to electrical circuits.
CO-4	Analyze and model two port network based on its parameters.
CO-5	Synthesize an electrical network from a given impedance/admittance function.



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SYLLABUS: ELECTRO MAGNETIC FIELD THEORY (B19EE2103)

UNIT-I: Electrostatics: Rectangular, cylindrical and spherical coordinate systems, Coulomb's law and superposition principle, different types of charge configurations, electric flux, electric field intensity and electric flux density, electric field intensity and electric flux density due to different charge configurations, Gauss's law in integral form and point form in terms of D, applications of Gauss' law, Divergence theorem

UNIT-II: Electric potential, Energy & Dielectrics: Electric potential, calculation of electric potential for given charge configuration, electrostatic energy, Electrostatic boundary conditions, basic properties of conductors in electrostatic fields, capacitance, Poissons and Laplace's equations, solutions of Laplace's equations for single variables, uniqueness theorem, electric dipoles, polarization of dielectrics.

UNIT-III: Magneto statics: Biot-savart's law, determination of magnetic field intensity and magnetic flux density due to various steady current configurations, continuity equation, curl of H, Ampere's circuits law in integral and differential form, applications of Ampere's law, Stokes theorem

UNIT-IV: Magnetic Potential & Energy: Calculation of scalar and vector magnetic potential, magnetostatics boundary conditions. The magnetic dipole, magnetization, bound current, inductance and energy in magnetic fields, Lorentz force equation.

UNIT-V: Time varying fields & Electromagnetic waves: Faraday's laws, Lenz's law, Maxwell's equations, modification of ampere's circuital law for time varying fields – displacement current and current density, the uniform plane wave, plane wave propagation, skin depth, the pointing vector, poynting theorem and power considerations.

Course Outcomes for Second Year First Semester Course	
Course Code: B19EE2103	
Course Title: ELECTRO MAGNETIC FIELD THEORY	
CO-1	Apply vector calculus to find the electrostatic and magneto static fields for given charge/ current configurations.
CO-2	Apply basic principles/ theorems/ laws to estimate the effect of electric and magnetic fields.
CO-3	Analyze the boundary conditions, calculate parameters like energy, Inductance, Capacitance, forces
CO-4	Analyze the Maxwell's equations for both static and time varying fields.
CO-5	Analyze the EM wave in different domains and compute average power density



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SYLLABUS: DATA STRUCTURES (B19CS2108)

(Common to ECE & EEE)

UNIT-I: Linear Data Structures: Arrays, Stacks and Queues: Data Structures -Operations-Abstract Data Types-Complexity of Algorithms-Time and Space Arrays-Representation of Arrays-Linear Arrays-Insertion- Deletion and Traversal of a Linear Array-Array as an Abstract Data Type-Multi-Dimensional arrays-Strings- String Operations Storing Strings-String as an Abstract Data Type

Stack -Array Representation of Stack-Stack Abstract Data Type-Applications of Stacks: PrefixInfix and Postfix Arithmetic Expressions-Conversion-Evaluation of Postfix Expressions Recursion-Towers of Hanoi-Queues-Definition-Array Representation of Queue- The Queue Abstract Data Type-Circular Queues-Dequeues-Priority Queues.

UNIT-II: Linked Lists: Pointers-Pointer Arrays-Linked Lists-Node Representation-Single Linked List-Traversing and Searching a Single Linked List-Insertion into and Deletion from a Single Linked List-Header Linked Lists-Circularly Linked Lists-Doubly Linked Lists-Linked Stacks and Queues Polynomials-Polynomial Representation-Sparse Matrices.

UNIT-III: Trees: Terminology-Representation of Trees-Binary Trees-Properties of Binary Trees-Binary Tree Representations-Binary Tree Traversal-Preorder-Inorder and Postorder Traversal- Threads Thread Binary Trees-Balanced Binary Trees-Heaps-Max Heap-Insertion into and Deletion from a Max Heap-Binary Search Trees-Searching-Insertion and Deletion from a Binary Search Tree Height of Binary Search Tree, m-way Search Trees, B-Trees.

UNIT-IV: Graphs: Graph Theory Terminology-Graph Representation-Graph Operations-Depth First Search-Breadth First Search-Connected Components-Spanning Trees-Biconnected Components- Minimum Cost Spanning Trees-Kruskal's Algorithm-Prism's Algorithm-Shortest Paths- Transitive Closure-AllPairs Shortest Path-Warshall's Algorithm

UNIT-V: Searching And Sorting: Searching -Linear Search-Binary Search-Fibonacci Search-Hashing-Sorting-Definition- BubbleSort-Insertion sort-Selection Sort-Quick Sort-Merging-Merge Sort-Iterative and Recursive Merge Sort-Shell Sort-Radix Sort-Heap Sort.

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Course Outcomes for Second Year First Semester Course	
Course Code: B19CS2108	
Course Title : DATA STRUCTURES	
CO-1	Apply advanced data structure strategies for exploring complex data structures and implement data structures like stacks, queues
CO-2	Implement & perform operations on dynamic linear data structures like linked lists.
CO-3	Apply different operations on trees and graphs.
CO-4	Implement & analyze various searching & sorting algorithms



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SYLLABUS: NETWORKS LAB (B19EE2104)

LIST OF EXPERIMENTS:

1. Kirchhoff's Laws.
2. Verification of Ohms Law and Resistance of a filament Lamp.
3. Maximum Power Transfer Theorem.
4. Superposition Theorem.
5. Thevenin's Theorem.
6. Verification of Norton's Theorem
7. Two Port Network Parameters.
8. Series Resonance.
9. Parameters of choke coil.
10. Measurement of power using 2-wattmeter method
11. Locus Diagrams of RL and RC SeriesCircuits

Course Outcomes for Second Year First Semester Course	
Course Code: B19EE2104	
Course Title: NETWORKS LAB	
CO-1	Inspect Maximum power transfer, superposition, Thevinins & Nortons Theorems
CO-2	Analyze resonance condition in R-L-C series circuit and draw locus diagrams for RL,RC series circuits.
CO-3	Examine power in 3- phase circuits in 3-phase balanced load.
CO-4	Verify the Ohm's law, Kirchhoff's current's law, Kirchhoff's voltage's law.
CO-5	Evaluate Two port network parameters and parameters of choke coil



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SYLLABUS: ELECTRONIC DEVICES & CIRCUITS - LAB (WITH SIMULATION)

(B19EC2105)

(Common to ECE & EEE)

LIST OF EXPERIMENTS:

1. Study and Analyze V-I Characteristics of Semiconductor Diode (Ge & Si), LED and Zener Diode.
2. Determination of Ripple Factor and Regulation Characteristics of Half Wave and Full Wave
3. Rectifier With and Without Filter.
4. Study and Analyze The Characteristics of BJT in CE Configuration and determination of h- parameters.
5. Study and Analyze The JFET Characteristics.
6. Design of Biasing Circuits for BJT and FET.
7. Design of simple amplifier circuits using BJT.
8. Design of electronic circuits using FET.

LIST OF SIMULATION EXPERIMENTS

1. Simulation of V-I Characteristics of Semiconductor Diode, LED and Zener Diode.
2. Simulation of Regulation Characteristics of Zener Diode.
3. Simulation of CC Amplifier.
4. Simulation of JFET Characteristics.
5. Simulation of BJT Characteristics in CB Configuration.
6. Simulation of JFET Amplifier.
7. Simulation of Characteristics of Tunnel Diode.

Course Outcomes for Second Year First Semester Course	
Course Code: (B19EC2105)	
Course Title: ELECTRONIC DEVICES & CIRCUITS - LAB (WITH SIMULATION)	
CO-1	Apply the concepts of different electronic devices to verify their characteristics and measure the important parameters.
CO-2	Analyze the performance of rectifier circuits with and without filters.
CO-3	Analyze the performance of BJT and FET amplifier circuits.
CO-4	Simulation and Design of small electronic circuits using BJT and FET.



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SYLLABUS: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (B19MC2102)

UNIT-I: Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT-II: Protection of traditional knowledge: Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

UNIT-III: Legal frame work and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT-IV: Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT-V: Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2102	
Course Title: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	
CO-1	Understand the concept of Traditional knowledge and its importance.
CO-2	Know the need and importance of protecting traditional knowledge.
CO-3	Know the various enactments related to the protection of traditional knowledge.
CO-4	Understand the concepts of Intellectual property to protect the traditional knowledge .



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Regulation: R19				II / IV - B.Tech. II - Semester					
ELECTRICAL & ELECTRONICS ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
	I	PC	3	3	--	--	25	75	100
B19 EE 2202	Digital Electronics and Logic Design	PC	3	3	--	--	25	75	100
B19 EE 2203	Signals and Systems	PC	3	3	--	--	25	75	100
B19 ME 2207		ES	3	3	--	--	25	75	100
B19 CS 2209		ES	3	3	--	--	25	75	100
B19 HS 2201	Management and Organizational Behavior	HS	1.5	--	--	--	20	30	50
B19 EE 2204	Electrical Measurements and Instrumentation Lab	PC	1.5	--	--	3	20	30	50
B19 ME2208	Thermal Prime movers Lab	ES	1.5	--	--	3	20	30	50
B19 MC 2202	Professional Ethics and Human Values	MC	0	3	--	--	--	--	--
TOTAL			21	21	0	06	190	510	700



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ELECTRICAL & ELECTRONICS ENGINEERING

SYLLABUS: ELECTRICAL MACHINES-I (B19EE2201)

UNIT-I: Electromechanical energy conversion: Basic principles of energy, force and torque in singly and multiply excited systems. Construction and working principle of DC machines and methods of excitation.

UNIT-II: D.C. Machines: D.C generators-emf equation, armature reaction, commutation. Compensating winding, characteristics of various types of generators, applications. D.C. motors- torque equation, D.C. shunt, series and compound motors— characteristics & applications

UNIT-III: Starting & Speed control: Starting methods and speed control of D.C. shunt and series motors testing of D.C motors - direct and regenerative methods to test D.C. machines. Swinburne's test, field's test and separation of losses.

UNIT-IV: Transformers: Principle, construction and operation of single-phase transformers, phasor diagram, equivalent circuit, voltage regulation, losses and efficiency. Testing- open & short circuit tests, Sumpner's test. Autotransformers- construction, principle, applications and comparison with two winding transformer.

UNIT-V: Three phase transformers: Construction, various types of connection and their comparative features. Parallel operation of single phase and three phase transformers. Three phase transformer connections. Scott connection, Cooling methods of transformers.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19EE2201	
Course Title: ELECTRICAL MACHINES-I	
CO-1	Identify the concepts of electromechanical energy conversion. Describe the concepts of construction, operating principle of DC machines.
CO-2	Discriminate different types of DC machines and transformers, efficiency on DC machine and parallel operation of DC generators and transformers.
CO-3	Interpret the characteristics of DC machines
CO-4	Discriminate different types of speed control methods of DC motors and different types of transformer connections
CO-5	Examine the performance of DC machines and transformers by different testing methods.



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SYLLABUS: DIGITAL ELECTRONICS AND LOGIC DESIGN (B19EE2202)

UNIT-I: NUMBERING SYSTEMS, CODES AND BOOLEAN ALGEBRA: Number Systems, Base Conversion Methods, Complements of Numbers, Binary arithmetic, Signed Binary numbers, Binary Codes-BCD, Excess-3, 2421, 8421 codes. Even and Odd parity, Gray code, Hamming code, Error detecting and Error correcting codes. Fundamentals of Boolean algebra, Basic theorem and Properties, Simplification of Boolean functions using Boolean theorems.

UNIT-II: LOGIC GATES AND GATE-LEVEL MINIMIZATION: Fundamentals of Logic Gates – AND, OR, NOT, NAND, NOR and XOR and its truth tables. SOP & POS Simplifications for Boolean expression, Canonical and Standard Forms, Karnaugh map (K-map) with maximum of 4 variables, Don't Care Conditions. Function Implementation using AND-OR logic, NAND and NOR Logic diagram.

UNIT-III: COMBINATIONAL LOGIC CIRCUITS AND DESIGN: Logic Design of Combinational circuits – Binary Additions, Subtractions, Multiplexers, Demultiplexers, Decoders, Encoders, Code Conversion, PLDs.

UNIT-IV: SEQUENTIAL LOGIC CIRCUITS AND DESIGN: The Flip-flops: SR, RS and JK Flip-Flops, Race around problem, MSJK, T and D-Flip-flops. Flip Flops with preset and clear inputs. Excitation tables of all Flip-Flops and conversions from one type to another. Operations of Shift Registers and universal shift register. Digital Counters-Ripple Counter design, Synchronous Counter design with T, D and J.K. Flip-flops.

UNIT-V: REALIZATION OF LOGIC GATES USING DIODES & TRANSISTORS: AND, OR and NOT Gates using Diodes and Transistors, RTL, DTL, TTL and CML Logic Families and its comparison.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19EE2202	
Course Title: DIGITAL ELECTRONICS AND LOGIC DESIGN	
CO-1	Apply the concepts of Boolean Algebra for the analysis and minimization of Boolean expressions and apply the knowledge of number systems to perform arithmetic operations and error corrections.
CO-2	Deduce the Boolean expressions by K-maps and implement logic circuits using logic gates.
CO-3	Design and analyze the combinational logic circuits.
CO-4	Design and analyze the sequential logic circuits.
CO-5	Design and analyze the logic gates using diodes and transistors.



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SYLLABUS: SIGNALS AND SYSTEMS (B19EE2203)

UNIT-I: Introduction to Continuous –Time and Discrete –Time signals and systems: Basic continuous time and discrete time signals, Signal Energy and Power, Transformations of the independent variable, Periodic Signals, Even and odd Signals, Complex Exponential signals, The Unit Impulse and Unit step Functions, Classification of systems, Basic system properties.

UNIT-II: Linear Time – Invariant (LTI) Systems: Representation of signals in terms of impulses, Convolution sum and Convolution integral. Systems described by differential and difference equations. Block diagram representation of LTI systems, Singularity functions.

Analogy between vectors and signals, Approximation of a function by a set of mutually orthogonal functions.

UNIT-III: Fourier Series Representation of Periodic Signals: Response of LTI systems to Complex Exponentials – the Continuous time and Discrete time Fourier series, Trigonometric and Exponential Fourier series, Convergence of Fourier series, Properties of Fourier Series

UNIT-IV: Continuous and Discrete time Fourier Transform: Fourier transform of continuous time and discrete time Aperiodic signals and periodic signals, properties of continuous time and discrete time Fourier transforms. Frequency response characterized by linear constant coefficient differential and difference equations. First order and Second order systems.

UNIT-V: Sampling and Z-transform: Representation of a CT signal by its samples, The Sampling theorem, Reconstruction of a signal from its samples, Effect of Under sampling, Discrete time processing of continuous time signals.

The Z-transform, Region of Convergence, relation between Z-transform and Fourier transform, Properties of z-transform, Inverse z-transform, determination of transfer function and impulse response of an LTI system, poles and zeros, system stability.

Course Outcomes for First Year First Semester Course	
Course Code: B19EE2203	
Course Title: SIGNALS AND SYSTEMS	
CO-1	Apply the properties of continuous time and discrete time signals and systems to classify them.
CO-2	Apply convolution to analyze CT and DT systems in the Time domain.
CO-3	Analyze the spectral characteristics of periodic and aperiodic signal using Fourier analysis.
CO-4	Apply sampling theorem for signal conversion.
CO-5	Analyze DT signals and systems using Z Transform.



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SYLLABUS: PRIME MOVERS AND PUMPS (B19ME2207)

UNIT-I: I.C Engines: Classification, working principles – valve and port timing diagrams – air standard cycles :Otto, Diesel-P-V and T-S diagram ,thermal efficiency– Engine systems line fuel injection, carburetion, ignition, cooling. Engine performance evaluation.

UNIT-II: Generation of steam: Dryness fraction and properties of steam, function of boilers, working principle of Lancashire boiler, Babcock and Wilcox boiler, boiler mounting and accessories. Steam engines: Rankine and Modified Rankine cycle for steam engines.

UNIT-III: Steam turbines: Classification of steam turbines, compounding of steam turbines, pressure compounding, velocity compounding, and pressure-velocity compounding.

Gas turbine: Classification of gas turbine-constant pressure combustion cycle, closed cycle and constant volume combustion gas turbine plants.

UNIT-IV: Fluid Mechanics: Newtonian and Non-Newtonian Fluids, viscosity, types of fluid flows, continuity, momentum and energy equations, Bernoulli's equation and its applications, laminar and turbulent flows, Reynolds number and its significance.

Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, multistage pumps, Performance and characteristic curve.

UNIT-V: Hydraulic Turbines: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME2207	
Course Title: PRIME MOVERS AND PUMPS	
CO-1	Compute the performance parameters of Internal combustion engines
CO-2	Compute the efficiencies of steam & gas power plants to improve their performance.
CO-3	Apply the concepts of mechanics to solve the hydrodynamic force of jets.
CO-4	Apply the concepts of fluid mechanics to solve the performance parameters of turbines and pumps



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ChinnaAmiram, Bhimavaram-534204. (AP)

SYLLABUS: OOPS THROUGH JAVA (B19CS2209)

(Common to ECE & EEE)

UNIT-I: INTRODUCTION TO JAVA: Introduction to OOP, procedural programming language and object-oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II: OBJECTS AND CLASSES: Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III: INHERITANCE: Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class.

Interfaces, creating the packages, using packages, importance of CLASSPATH and java. Lang package. Exception handling, importance of try, catch, throw, throws and finally block, user defined exceptions, Assertions.

UNIT-IV: MULTITHREADING: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file.

UNIT-V: APPLETS AND AWT CLASSES: Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes. AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS2209	
Course Title: OOPS THROUGH JAVA	
CO-1	Apply object-oriented programming principles and various java programming constructs and develop java programs.
CO-2	Apply the concepts of Inheritance, Polymorphism and String handling methods in developing java programs
CO-3	Apply the concepts like interfaces, packages, exception handling and multithreading in programming to develop error free programs.
CO-4	Develop the GUI applications for the end users using applets with event handling.



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SYLLABUS: MANAGEMENT AND ORGANIZATIONAL BEHAVIOR (B19HS2201)

(Common to ECE & EEE)

UNIT-I: Introduction to Management: Management: Concept, Nature and importance of Management, Functions of management, Evolution of Management thought, Taylor's Scientific Management, Fayol's principles of Management, Social Responsibility of Business.

UNIT-II: Functional Management: Human Resource Management (HRM): Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Compensation & Performance Appraisal.

Marketing Management: Concept, Functions of marketing; Marketing Mix - Product, Price, Place & Promotion; Marketing strategies based on Product life cycle, Channels of distribution.

UNIT-III: Strategic Management: Vision, Mission, Goal, Objective, Policy, Strategy. Elements of Corporate planning process; Environmental scanning; SWOT analysis; steps in Strategy formulation, implementation, evaluation & control; Bench Marking; Balanced Score Card.

UNIT-IV: Organizational Behavior: Individual Behavior: Perception-Perceptual process; Attitude-Attitudinal change, Organizational Change, Factors Influencing Change, Types of Change. **Motivation:** Meaning, Theories of Motivation - Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation.

UNIT-V: Group Dynamics: Types of Groups, Stages of Group development; **Organizational conflicts** - Reasons for Conflicts, Consequences of Conflicts in Organization, Types of Conflicts, Strategies for Managing Conflicts, Stress - Causes and effects, coping strategies of stress.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS2201	
Course Title: MANAGEMENT AND ORGANIZATIONAL BEHAVIOR	
CO-1	Explain management functions and principles
CO-2	Will be able to describe the concepts of functional management that is HR and Marketing functions
CO-3	Will be able to get discuss about vision, mission, goal, objective and a strategy based on which the corporate planning depends
CO-4	The learner is able to recognise strategically contemporary management practices and describe corporate planning process
CO-5	The learner can discuss about individual behaviour and motivational theories
CO-6	The student can explain about ways in managing conflicts and stress



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**SYLLABUS: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB
(B19EE2204)**

LIST OF EXPERIMENTS.

1. Measurement of Parameters of Iron Core Inductor.
2. Measurement of Power By 3-Voltmeter Method.
3. Measurement of Power Using 3-Ammeter Method.
4. Measurement of Low Resistance using Kelvin Double bridge.
5. Measurement of Inductance using Anderson bridge.
6. Measurement of Inductance using Maxwell bridge.
7. Measurement of Capacitance using Schering bridge.
8. Calibration of Single-Phase Wattmeter.
9. Calibration of Single-Phase Energy Meter using Phantom Loading.
10. Measurement of Power using Two Wattmeter Method.
11. Measurement of Power using Three Wattmeter Method.
12. Testing of Dielectric Strength of Oil.
13. Study of LVDT and Capacitance Pickup-Characteristics and Calibration.
14. Resistance Strain Gauge-Strain Measurement and Calibration.

Course Outcomes for First Year Second Semester Course	
Course Code: B19EE2204	
Course Title: ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LAB	
CO-1	Calibrate Wattmeter and Energy Meter.
CO-2	Select the suitable method for measurement of active, reactive powers and energy.
CO-3	Apply various transducers used for the measurement of various physical quantities.
CO-4	Apply the suitable method for measurement of resistance, inductance, and capacitance.
CO-5	Test the dielectric strength of oil



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SYLLABUS: THERMAL PRIME MOVERS LAB (B19ME2208)

LIST OF EXPERIMENTS

1. Drawing of VTD for four-stroke and PTD of two-stroke engines.
2. Determination of flash and fire points.
3. Determination of the kinematic and absolute viscosity of the given sample oils.
4. Load test and smoke test on I.C. engines.
5. Morse test on multi-cylinder engine.
6. Heat balance sheet on I.C. engines.
7. Study of multi-cylinder engines and determination of its firing order.
8. Economical speed test on IC engines.
9. Study on impulse and reaction turbines.
10. Study on reciprocating and centrifugal pumps.

Course Outcomes for First Year First Semester Course	
Course Code: B19ME2208	
Course Title: THERMAL PRIME MOVERS LAB	
CO-1	Assess the environmental, societal safety and health issue through determining the flash & fire point of various lubricating oils as well as fuels, engine performance characteristics, along with computing the viscosity of lubricating oils.
CO-2	Functioning and communicating as an individual in a team to write and prepare effective reports on experiments conducted in the laboratory.



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SYLLABUS: PROFESSIONAL ETHICS AND HUMAN VALUES (B19MC2202)

(Common to CE & EEE)

UNIT-I: Human Values: Morals, Values and Ethics-Integrity-Work Ethic-Service learning Civic Virtue Respect for others Living Peacefully Caring Sharing Honesty -Courage-Cooperation Commitment Empathy Self Confidence Character Spirituality.

UNIT-II: Engineering Ethics: Senses of 'Engineering Ethics-Variety of moral issued- Types of inquiry Moral dilemmasMoral autonomy- Kohlberg's theory- Gilligan's theory-Consensus and controversy Models of professional roles-Theories about right action-Self-interest -Customs and religion Uses of Ethical theories Valuing time Cooperation Commitment.

UNIT-III: Engineering as Social Experimentation: Engineering As Social Experimentation- Framing the problem- Determining the facts codes of Ethics- Clarifying Concepts- Application issues Common Ground - General Principles- Utilitarian thinking respect for persons.

UNIT-IV: Engineers Responsibility for Safety and Risk: Safety and risk Assessment of safety and risk. Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety- Intellectual Property rights(IPR).

UNIT-V: Global Issues: Globalization- Cross-culture issues-Environmental Ethics- Computer Ethics Computers as the instrument of Unethical behavior Computers as the object of Unethical acts Autonomous Computers- Computer codes of Ethics- Weapons Development -Ethics and Research Analyzing Ethical Problems in research.

Course Outcomes for First Year Second Semester Course	
Course Code: B19MC2202	
Course Title: PROFESSIONAL ETHICS AND HUMAN VALUES	
CO-1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships and field work.
CO-2	Identify the multiple ethical interests at stake in a real-world situation or practice and Articulate what makes a particular course of action ethically defensible.
CO-3	Assess their own ethical values and the social context of problems.
CO-4	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
CO-5	Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.



INFORMATION TECHNOLOGY



Estd:1980

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Regulation: R19				I / IV - B.Tech. I - Semester					
INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 HS1101	English	HS	3	3	--	--	25	75	100
B19 BS1101	Mathematics-I	BS	3	3	--	--	25	75	100
B19 BS1102	Mathematics-II	BS	3	3	--	--	25	75	100
B19 BS1105	Applied Chemistry	BS	3	3	--	--	25	75	100
B19 CS1101	Computer Fundamentals & Problem Solving Using C	ES	3	3	--	--	25	75	100
B19BS1108	Applied Chemistry Lab	BS	1.5	--	--	3	20	30	50
B19 HS1102	English Lab	HS	1.5	--	--	3	20	30	50
B19 CS 1104	Computer Fundamentals & Problem Solving Using C Lab	ES	1.5	--	--	3	20	30	50
B19MC1101	Environmental Science	MC	0	3	--	--	--	--	--
TOTAL			19.5	18	0	9	185	465	650



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INFORMATION TECHNOLOGY

SYLLABUS: ENGLISH (B19HS1101)

(Common to CE, CSE, EEE, IT & ME)

UNIT-I: Lesson: A Drawer full of happiness from *Infotech English*, Maruthi Publications.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self- introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.

Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.

Pronunciation: Vowels, consonants, plural markers and their realizations

UNIT-II: Lesson:- Nehru's letter to his daughter, Indira on her birthday from *Infotech English*, Maruthi Publications.

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (precis writing); avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.

Grammar: Articles, prepositions and use of antonyms.

Pronunciation: Past tense markers, word stress-di-syllabic words.

UNIT-III: Lesson: Stephen Hawking-Positivity' Benchmark' from *Infotech English*, Maruthi Publications.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.

Functional English: complaining and apologizing.



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Reading: Reading a text in detail by making basic inferences -recognizing: and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Reading for Writing: Letter writing- types, format and principles of letterwriting, E-mail etiquette, writing a Resume/CV and covering letter.

Vocabulary: Technical vocabulary from across technical branches (20 words. GRE. Vocabulary 20 words), Idioms & Phrasal verbs, Homonyms, word applications, sequencing of words.

Grammar: Sentence Structures, Transformation of sentences (Active and passive Voice, Degrees of comparison, Simple, Compound and Complex).

Pronunciation: Word stress-poly-syllabic words.

UNIT-IV: Lesson: Liking a Tree, Unbowed: Wangari Maathai biography from *Infotech English*, Maruthi Publications.

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Functional English:** asking for permissions, requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Pamphlet writing, writing for media, writing SOP's.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, cloze encounters, foreign phrases.

Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting, question Tags, direct and indirect speech, reporting for academic purposes.

Pronunciation: Contrastive Stress.

UNIT-V: Lesson: Stay Hungry–Stay Foolish from *Infotech English*, Maruthi Publications.

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts—with/without the use of PPT slides. **Functional English:** Suggesting/Opinion giving.

Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.

Reading for Writing: Report writing, writing academic proposals- writing research articles: format and style.



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Vocabulary: Technical vocabulary from across technical branches (20 words GRE 'Vocabulary' (20 words, antonyms and synonyms, word applications, coherence, matching emotions).

Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement, parallel structures, phrases and clauses).

Pronunciation: Stress in compound words.

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1101	
Course Title: ENGLISH	
CO-1	Identify the context, topic and pieces of specific information by understanding and responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Understand and apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.



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SYLLABUS: MATHEMATICS-I (B19BS1101)
(LINEAR ALGEBRA, DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS)
(Common to All Branches)

UNIT-I: Linear systems of equations: Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.

UNIT-II: Eigen values - Eigen vectors and Quadratic forms: Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.

UNIT-III: Differential equations of first order and first degree: Linear, Bernoulli, Exact, Reducible to exact types.

Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits. (R-L and R-C circuits only)

UNIT-IV: Linear differential equations of higher order: Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $x V(x)$. Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

UNIT-V: Laplace transformation: Laplace transforms of standard functions, properties, transforms of $tf(t)$, $f(t)/t$, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function, Inverse Laplace transforms, convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1101	
Course Title: MATHEMATICS – I	
CO-1	Solve a given system of linear algebraic equations
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve linear ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform and inverse Laplace transform and solve linear ODE.



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Estd:1980

SYLLABUS: MATHEMATICS – II (B19 BS1102)
(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)
 (Common to CSE, ECE & IT)

UNIT-I: Interpolation: Interpolation, forward differences, backward differences, Central differences and relations between the operators, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unequal intervals, Lagrange interpolation.

UNIT-II: Solution of Algebraic and Transcendental Equations & Numerical Integration and solution of Ordinary Differential equations: Introduction, Bisection method, Method of false position, Iteration method & Newton-Raphson method. Trapezoidal rule, Simpson's $1/3$ rule, Solution of ordinary differential equations by Taylor's method, Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method..

UNIT-III: Partial differentiation: Introduction, Homogeneous functions, Euler's theorem, Chain rule, Total derivative, Jacobians and their properties.
 Applications: Taylor series expansion for a function of two variables, Maxima and Minima of functions of two variables with and without constraints, Lagrange's method. Leibnitz's rules for differentiation under integral sign.

UNIT-IV: First order and higher order partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of Lagrange linear equation. Solutions of Linear homogeneous and non-homogeneous partial differential equations with constant coefficients –source (RHS) terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

UNIT-V: Applications of partial differential equations: Method of separation of variables, One – dimensional wave equation, the D'Alembert's solution, one- dimensional heat equation

Course Outcomes for First Year First Semester Course	
Course Code: B19 BS 1102	
Course Title: MATHEMATICS – II	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation



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SYLLABUS: APPLIED CHEMISTRY (B19BS1105)

(Common to CSE, ECE & IT)

UNIT-I: High Polymers and Plastics; Rubbers & Elastomers: Polymerization Definition, Types of Polymerization, free radical Mechanism of addition polymerization, Plastics as engineering materials, Thermoplastics and Thermosetting plastics, Compounding of plastics, Fabrication of plastics (4 techniques); Preparation, Properties and applications of Polyethylene, PVC, Bakelite, Nylon - 6,6, Bullet Proof plastics - polycarbonate and Kelvar; Fiber reinforced plastics, conducting polymers, Biodegradable Polymers - PHBV, Nylon 2, Nylon 6.

Natural rubber – Vulcanization – Compounding of Rubber; Preparation, properties and applications of Buna – S; Buna – N;

UNIT-II: Energy Sources and Applications: Nuclear Energy: Nuclear fission and Nuclear fusion – Nuclear Power reactor – Applications of radioactive materials Solar Photovoltaic cell- Thermal fuels – Introduction – Classification – Calorific value – HCV and LCV – Bomb calorimeter; Coal : Proximate and ultimate analysis of coal – Significance of the analysis – Manufacture of coke by Otto Hoffman's by Product Process , Refining crude oil; Knocking; Chemical structure Knocking, Octane number of gasoline, Cetane number of diesel oil, synthetic Petrol; LPG, CNG

UNIT-III: Electrochemical cells and Corrosion: Galvanic cell, single electrode potential, Calomel electrode; Modern batteries: - Lead – Acid battery; Fuel cells- Hydrogen – Oxygen fuel cell, Lithium battery Theories of corrosion (i) dry Corrosion (ii) wet corrosion. Types of corrosion - differential aeration corrosion, pitting corrosion, galvanic corrosion, stress corrosion, Factors influencing corrosion, Protection from corrosion-material selection & design, cathodic protection, Protective coatings- metallic coatings – Galvanizing, Tinning, Electroplating; Electroless plating ; Paints.

UNIT-IV: Water technology: Sources of water – Hardness of water – Estimation of hardness of water by EDTA method; Boiler troubles – sludge and scale formation, Boiler corrosion, caustic embrittlement, Priming and foaming; Softening of water by Lime – Soda Process, Zeolite Process, Ion – Exchange Process; Municipal water treatment; Desalination of sea water by Electrodialysis and Reverse osmosis methods. Indian standards and WHO standards of drinking water. Design of drinking water plant.

UNIT-V: Chemistry of Engineering Materials& Advanced Engineering materials: Cement:- Manufacture of Portland cement, setting and hardening of cement, Deterioration of cement concrete.

Refractories: - Definition, Characteristics, classification, Properties and failure of refractories.

Solar Energy: - Construction and working of Photovoltaic cell, applications.

Solid State Materials: Crystal imperfections, Semi Conductors, Classification and chemistry of semi conductors: Intrinsic semiconductors; Extrinsic semiconductors; Defect semiconductors, Compound Semiconductors and Organic Semiconductors.

Liquid Crystals: - Definition – Classification with examples – Applications.



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Course Outcomes for First Year First Semester Course	
Course Code: B19BS1105	
Course Title: APPLIED CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.



SYLLABUS: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C (B19CS1101)
(Common to CSE & IT)

UNIT-I: Introduction to Fundamentals of Computer Science & Visual Programming through Scratch and App Inventor, Flowchart design through Raptor: History of digital computers, types of computers, Computer Programming- Machine Language, Assembly language and high-level and low level languages, Assemblers, Compilers, and Interpreters, Types of memory.

Visual Programming through Scratch and App Inventor: Introduction to programming concepts with scratch, Scratch environment, sprites looks and motion, Angles and directions, repetition and variation, changing costumes, adding background, Input /Output, variables and operators. Working with sounds and sprite communication and creating stories, App Generation.

Flowchart design through Raptor: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, some structured programming concepts, documents.

UNIT-II: Introduction to 'C' language: Structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, Operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Input-output statements, statements and blocks, Conditional Statements and Loops.

UNIT-III: Functions and arrays: Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs. Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two-dimensional and multi-dimensional arrays, applications of arrays.

UNIT-IV: Pointers and Structures: pointers- concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, Single Linked list, typedef, bit fields.

UNIT-V: Files: Input and output - concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.



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Course Outcomes for First Year First Semester Course	
Course Code: B19CS1101	
Course Title: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C	
CO-1	The student will be able to develop Flow charts and write algorithms.
CO-2	The student will be able to develop efficient algorithms for solving a problem using the constructs of a programming language like conditional, iteration and recursion.
CO-3	The student will be able to write programs using functions and arrays
CO-4	The student will be able to write programs using Pointers and Structures
CO-5	The student will be able to write programs for Files



Estd:1980

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SYLLABUS: APPLIED CHEMISTRY LAB (B19BS1108)

(Common to CSE, ECE & IT)

LIST OF EXPERIMENTS

1. Introduction of Chemistry Laboratory.
2. Estimation of HCL using standard Sodium Hydroxide.
3. Determination of total hardness of water by EDTA method.
4. Estimation of Ferrous Iron by KMnO_4 .
5. Estimation of oxalic acid by KMnO_4 .
6. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
7. Estimation of Dissolved oxygen by Winkler's method.
8. Determination of pH by pH meter and universal indicator method.
9. Conductometric titration of strong acid Vs strong base.
10. Conductometric titration of strong acid Vs weak base.
11. Potentionmetric titration of strong acid Vs strong base.
12. Potentionmetric titration of strong acid Vs weak base.
13. Preparation of Phenol formaldehyde resin.
14. Determination of saponification value of oils.
15. Determination of pour and cloud points of lubricating oil.
16. Determination of Acid value of oil.

Demo:

1. Biodiesel from used cooking oil.
2. Construction of electrochemical cells.
3. Synthesis of semiconductors.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1108	
Course Title: APPLIED CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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SYLLABUS: ENGLISH LAB (B19HS1102)

(Common to All Branches)

UNIT-I: Pronunciation

Letters and Sounds
The Sounds of English
Phonetic Transcription

UNIT-II: Past tense markers

Word stress-di-syllabic words
Poly-syllabic words

UNIT-III: Rhythm & Intonation

UNIT-IV: Contrastive Stress (Homographs)

UNIT-V: Word Stress: Weak and Strong forms

Stress in compound words

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1102	
Course Title: ENGLISH LAB	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.



Estd:1980

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SYLLABUS: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C LAB
(B19CS1104)

(Common to CSE & IT)

Exercise 1:

Visual Programming through Scratch: Sprites looks and motion, Angles and directions, repetition and variation
Flowchart design through Raptor: Finding maximum of 3 numbers, Interest calculators, multiplication tables,
GCD of 2 numbers, prime number generation.

Exercise 2:

Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.

Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.

Write a C program to display multiple variables.

Write a C program to calculate the distance between the two points.

Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

Write a C program to convert a string to a long integer.

Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

Write a C program to calculate the factorial of a given number.

Write a program in C to display the n terms of even natural number and their sum.

Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.

Exercise 4:

Write a C program to check whether a given number is an Armstrong number or not.

Write a program in C to print all unique elements in an array.

Write a program in C to separate odd and even integers in separate arrays.

Write a program in C to sort elements of array in ascending order.

Exercise 5:

Write a program in C for multiplication of two square Matrices.

Write a program in C to find transpose of a given matrix.



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Write a program in C to search an element in a row wise and column wise sorted matrix.

Write a program in C to print individual characters of string in reverse order.

Exercise 6:

Write a program in C to compare two strings without using string library functions.

Write a program in C to copy one string to another string.

Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 7:

Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

Write a program in C to add two numbers using pointers.

Write a program in C to add numbers using call by reference.

Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 8:

Write a program in C to swap elements using call by reference.

Write a program in C to count the number of vowels and consonants in a string using a pointer.

Write a program in C to show how a function returning pointer.

Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 9:

Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc() function. Understand the difference between the above two programs

Write a program in C to convert decimal number to binary number using the function.

Write a program in C to check whether a number is a prime number or not using the function.

Write a program in C to get the largest element of an array using the function.

Exercise 10:

Write a program in C to append multiple lines at the end of a text file.

Write a program in C to copy a file in another name.

Write a program in C to remove a file from the disk.

Write a program for CapsLock on/off, NumLock On/off, ScrollLock on/off, restart the system



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Exercise 11: Assembling & Disassembling, OS Installation

System Assembling, Disassembling and identification of Parts / Peripherals.

Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

Exercise 12: MS-Office / Open Office

Word - Formatting, Page Borders, Reviewing, Equations, symbols

Spread Sheet-Organize data, usage of formula, graphs, charts.

PowerPoint - features of power point, guidelines for preparing an effective presentation.

Note:

All the Programs must be executed in the Linux Environment. (Mandatory)

The Lab record must be a print of the LATEX (.tex) Format.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1104	
Course Title: COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C LAB (B19CS1104)	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able to design and develop of C problem solving skills.
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program
CO-6	Able to Identify various computer components, Installation of software



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SYLLABUS: ENVIRONMENTAL SCIENCE (B19MC1101)

(Common to CSE, IT & ME)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems: Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Man and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e- waste management.



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UNIT-V: Social Issues and the Environment: Urban problems related to energy -Waterconservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics. The student should Visit an Industry / Ecosystem and submit a report individually on any issuesrelated to Environmental Studies course and make a power point presentation.



Regulation: R19				I / IV - B.Tech. II - Semester					
INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS 1202	Mathematics-III	BS	3	3	--	--	25	75	100
B19 BS 1203	Applied Physics	BS	3	3	--	--	25	75	100
B19 CS 1202	Digital Logic Design	ES	3	3	--	--	25	75	100
B19 CS 1203	Basic Data Structures and Python Programming	ES	3	3	--	--	25	75	100
B19 ME 1201		ES	2.5	1	--	3	25	75	100
B19 BS 1206	Applied Physics Lab	BS	1.5	--	--	3	20	30	50
B19 CS 1205	Basic Data Structures and Python Programming Lab	ES	1.5	--	--	3	20	30	50
B19 HS 1203		HS	2	--	1	2	20	30	50
B19 IT 1201	Engineering Exploration Project	PR	1	--	--	2	--	50	50
B19 MC 1202	Constitution of India	MC	--	3	--	--	--	--	--
TOTAL			20.5	16	1	13	185	515	700



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Estd:1980

INFORMATION TECHNOLOGY

SYLLABUS: MATHEMATICS – III (B19BS1202)

(Multivariable Calculus and Fourier analysis)

(Common to CE, CSE, ECE, EEE & IT)

UNIT-I: Fourier Series: Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

UNIT-II: Fourier Transforms: Fourier integral theorem (without proof), Complex form of Fourier integral, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms, Finite Fourier transforms, properties, inverse transforms, Parseval's Identities.

UNIT-III: Single and Multiple integrals: Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Applications: evaluation of improper integrals, error function and the complimentary error function.

Double and triple integrals, change of variables, Change of order of integration. Applications: Areas and volumes.

UNIT-IV: Vector Differentiation: Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.

UNIT-V: Vector Integration: Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux. Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1202	
Course Title: MATHEMATICS–III	
CO-1	Determine Fourier series and half range series of functions.
CO-2	Find different Fourier transforms of non-periodic functions and also use them to evaluate integrals.
CO-3	Use the knowledge of Beta and Gamma functions in evaluating improper integrals.
CO-4	Evaluate double integrals, simple triple integrals & find areas and volume.
CO-5	Find the gradient of a scalar function, divergence and curl of a vector function. Determine scalar potential.
CO-6	Apply Green's, Stokes' and Gauss divergence theorems to solve problems.



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SYLLABUS: APPLIED PHYSICS (B19BS1203)

(Common to CE, CSE, ECE, EEE & IT)

UNIT-I: WAVE OPTICS: Interference: Principle of super position. Interference of light, interference in thin films (reflected light) – Wedge film and Newton's rings – Applications

Diffraction: Types of diffraction, Fraunhofer diffraction at a single slit, Diffraction grating, grating spectrum. Missing order, Resolving power, Rayleigh's Criterion, Resolving power of Grating, Telescope, Microscope (qualitative treatment only)

UNIT-II: DIELECTRICS AND MAGNETICS: Dielectrics : Introduction to dielectrics, Electric Polarization, Dielectric polarizability, Susceptibility, Dielectric constant, Types of Polarization, Frequency dependence of Polarization, Internal field in a dielectric, Clausius and Mosotti equation, Applications of dielectrics.

Magnetics: Introduction to magnetism, Magnetic dipole moment, Magnetization, Magnetic susceptibility and Permeability, Origin of permanent magnetic moment, Classification of magnetic materials, Hysteresis – Weiss Domain theory – Ferrites, soft and hard magnetic materials, Magnetic device applications.

UNIT-III: LASERS AND FIBER OPTICS: Lasers: Introduction, Interaction of radiation with matter, condition for light amplification, Einstein's relations. Requirements of laser device Types of lasers, Design and working of Ruby and He – Ne lasers, Laser characteristics and applications.

Fiber Optics: Introduction to optical fibers, Principle of light propagation in fiber, Acceptance angle, Numerical aperture, Modes of propagation, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.

UNIT-IV: SEMICONDUCTORS: Introduction, intrinsic semi conductors, density of charge carriers, Fermi energy, Electrical conductivity – Extrinsic semi conductors – P-type and N-type, Density of charge carriers, dependence of Fermi energy on carrier concentration and temperature, direct and indirect band – gap semi conductors, Hall effect, Applications of Hall effect. Drift and diffusion currents, Continuity equation, applications of semi conductors.

UNIT-V: ULTRASONICS AND NANOMATERIALS: Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, detection of ultrasonics, acoustic grating, applications of ultrasonics.

Nanomaterials: Introduction, salient features of Nanomaterials, Synthesis methods – Ball milling, Condensation, Chemical vapour Deposition and Sol – Gel methods, Characterization techniques for Nano materials, Carbon nanotubes (CNTS), Applications of Nano materials.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1203	
Course Title: APPLIED PHYSICS	
CO-1	Interpret the behavior of light radiation in interference and diffraction Phenomena and their applications.
CO-2	Explain the properties of dielectric and magnetic materials suitable for engineering applications.
CO-3	Explain the important aspects of semiconductors and electrical conductivity in them.
CO-4	Understand the basics of modern technologies lasers, optical fibers and ultrasonics and their utility in various fields.
CO-5	Demonstrate the synthesis methods and applications of nano materials.



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SYLLABUS: DIGITAL LOGIC DESIGN (B19CS1202)

(Common to CSE & IT)

UNIT-I: Binary Systems and Boolean Algebra: Digital Systems. Binary Numbers. Number Base Conversions. Octal and Hexadecimal Numbers. Complements. Signed Binary Numbers. Binary Codes. Binary Storage and Registers. Binary Logic, Basic Definitions of Boolean algebra. Axiomatic Definition of Boolean Algebra. Basic Theorems and Properties of Boolean Algebra, Boolean Functions.

UNIT-II: Logic Gates and Gate-Level Minimization: Canonical and Standard Forms. Logic Operations.. The Map Method. Four-Variable Map. Five-Variable Map. Product of Sums Simplification. Don't-Care Conditions. Digital Logic Gates. NAND and NOR Implementation. Other TwoLevel Implementations. Exclusive-OR Function

UNIT-III: Combinational Logic Design: Multiplier. Magnitude Analysis Procedure. Design Procedure. Binary Adder-Subtractor. Decimal Adder. Binary Comparator. Decoders. Encoders. Multiplexers. HDL Models of Combinational Circuits.

UNIT-IV: Sequential Logic design: Sequential Circuits. Latches. Flip-Flops. RS- Latch Using NAND and NOR Gates, Truth Tables. RS, JK, T and D Flip Flops, Truth and Excitation Tables, Conversion of Flip Flops. Analysis of Clocked Sequential Circuits. State Reduction and Assignment. Designs Procedure. Registers. Shift Registers. Ripple Counters. Synchronous Counters. Other Counters.

UNIT-V: Memory and Programmable Logic: Introduction. Random-Access Memory. Memory Decoding, Error Detection and Correction. Read-Only Memory. Programmable Logic Array. Programmable Array Logic.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1202	
Course Title: DIGITAL LOGIC DESIGN	
CO-1	An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation. The different Boolean algebra theorems and apply them for logic functions.
CO-2	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
CO-3	An ability to define the following combinational circuits: multiplexer, de-multiplexers encoders/decoders, comparators, arithmetic-logic units and to be able to build simple circuits.
CO-4	An ability to understand asynchronous and synchronous sequential circuits, like counters and shift registers.
CO-5	An ability to understand memories like RAM and ROM, Programmable Logic Array and Programmable Array Logic.



SYLLABUS: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING (B19CS1203)
 (Common to CSE & IT)

UNIT-I: Algorithms- Performance analysis, Searching and Sorting: Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples.

Searching–Linear and binary search methods.

Sorting –Bubble sort, Insertion sort, Selection Sort, Quick sort, Merge sort, comparison of sorting methods.

Representation of single, two dimensional arrays, Sparse matrices and their representation.

UNIT-II: Stacks and Queues: Stack and Queue ADTs, array and linked list representations, applications- infix to postfix, Postfix Evaluation, recursion, Circular queue-insertion and deletion, Dequeue ADT.

UNIT-III: Introduction to Python: Python – Numbers, Strings, Variables, operators, expressions, statements, String operations, Math function calls, Input / Output statements, Conditional If, while and for loops, User defined Functions, parameters to functions, recursive functions, Turtle Graphics.

UNIT-IV: Data Structures and Idiomatic Programming in Python: Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful Idiomatic approach to solve programming problems.

UNIT-V: Event driven Programming: Turtle Bar Chart, Event Driven programming. Key press events, Mouse events, timer events.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1203	
Course Title: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING	
CO-1	Ability to implement various searching and sorting techniques.
CO-2	Student will be able to write programs to implement stack and queues
CO-3	Proficiency in creating based applications using the Python Programming Language.
CO-4	To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
CO-5	To be able to draw various kinds of plots using PyLab and Event driven Programming.



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SYLLABUS: ENGINEERING DRAWING (B19ME1201)

(Common to CSE, ECE & IT)

UNIT-I: Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general method (eccentricity method only), cycloids, involutes, tangents & normals for the curves.

UNIT-II: Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel to one of the reference planes (HP, VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III: Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME1201	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.



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SYLLABUS: APPLIED PHYSICS LAB (B19BS1206)

(Common to CSE, ECE & IT)

LIST OF EXPERIMENTS:

1. Determination of the Wavelength of light from a source – Diffraction Grating – Normal incidence.
2. Determination of radius of curvature of Plano convex lens – Newton's Rings.
3. Determination of the thickness of a thin spacer using interference – Air Wedge method.
4. Determination of Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
5. Verification of Laws of series and parallel combinations of resistances – Carey Foster's bridge.
6. Determination of Temperature Coefficient of Resistance of a thermistor
7. Determination of resistivity of semiconductors by Four probe method.
8. Determination of dielectric Constant by charging and discharging method.
9. Resolving power of a grating.
10. Determination of the velocity of sound - Volume Resonator method.
11. Determination of the Rigidity modulus of elasticity of a material – Torsional pendulum.
12. Verification of the laws of vibrations in stretched stings - Sonometer.
13. Determination of Magnetic susceptibility by Quinke's method.
14. Study of variation of dielectric constant with temperature.
15. Determination of the frequency of the AC supply – AC Sonometer.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1206	
Course Title: APPLIED PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.



Estd:1980

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SYLLABUS: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING LAB
(B19CS1205)

(Common to CSE & IT)

1. C program for sorting a list using Bubble sort and then apply binary search.
2. C program to implement the operations on stacks.
3. C program to implement the operations on circular queues.
4. C program for evaluating a given postfix expression using stack.
5. C program for converting a given infix expression to postfix form using stack.
6. C program for implementing the mazing problem.
7. C program for the representation of polynomials using linked list and for the addition of two such polynomials.
8. C program for quick sort .
9. C program for Merge sort.
10. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
11. Design a Python script to determine if a given string is a Palindrome using recursion
12. Design a Python script to sort numbers specified in a text file using lists.
13. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format($0 \leq YYYY \leq 9999$, $1 \leq MM \leq 12$, $1 \leq DD \leq 31$) following the leap year rules.
14. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
15. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.($0 \leq HH \leq 23$, $0 \leq MM \leq 59$, $0 \leq SS \leq 59$)
16. Design a Python Script to find the value of (Sine, Cosine, Log, PI, e) of a given number using infinite series of the function.
17. Design a Python Script to convert a given number to words
18. Design a Python Script to convert a given number to roman number.
19. Design a Python Script to generate the frequency count of words in a text file.
20. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
21. Design a Python Script to implement Gaussian Elimination method.
22. Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.
23. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class,
24. second class, third class and failed.



Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1205	
Course Title: BASIC DATA STRUCTURES AND PYTHON PROGRAMMING LAB	
CO-1	Student will be able to write programs to implement stack and queues
CO-2	Ability to implement various searching and sorting techniques.
CO-3	To develop proficiency in creating based applications using the Python Programming Language.
CO-4	To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
CO-5	To be able to do testing and debugging of code written in Python.
CO-6	To be able to draw various kinds of plots using PyLab.
CO-7	To be able to do text filtering with regular expressions in Python

SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1203)

(Common to CSE& IT)

UNIT-I: JAM, Common Errors Neutralizing accent

UNIT-II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-II: Presentation Skills Public Speaking

Data Interpretation

UNIT-IV: Group Discussion

Do's and Don'ts

UNIT-V: Curriculum Vitae

Covering Letter

Interview Skills

Mock Interviews, FAQ's

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1203	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



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SYLLABUS: ENGINEERING EXPLORATION PROJECT (B19IT1201)

(Information Technology)

Apply Design Thinking on the following Streams to

Project Stream 1: Electronics, Robotics, IOT and Sensors

Project Stream 2: Computer Science and IT Applications

Project Stream 3: Mechanical and Electrical tools

Project Stream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.



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SYLLABUS: CONSTITUTION OF INDIA (B19MC1202)

(Common to CSE & IT)

UNIT-I: Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT-II: Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes:-After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Learning outcomes:-After completion of this unit student will

- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV: Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Panchayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning outcomes:-After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration role and importance



- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

UNIT-V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission; Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes:-After completion of this unit student will

- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

Course Outcomes for First Year First Semester Course	
Course Code: B19MC1202	
Course Title: CONSTITUTION OF INDIA	
CO-1	Understand historical background of the constitution making and its importance for building ademocratic India.
CO-2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self-government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO-6	<ol style="list-style-type: none"> 1. Know the sources, features and principles of Indian Constitution. 2. Learn about Union Government, State government and its administration. 3. Get acquainted with Local administration and Pachayati Raj. 4. Be aware of basic concepts and developments of Human Rights. 5. Gain knowledge on roles and functioning of Election Commission



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Regulation: R19			II / IV - B.Tech. I - Semester						
INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
	Structures	PC	3	3	--	--	25	75	100
B19IT2102	Principles of Software engineering	PC	3	3	--	--	25	75	100
B19IT2103	Micro Processor	PC	3	3	--	--	25	75	100
B19IT2104	Advanced Data Structures	PC	3	3	--	--	25	75	100
B19IT2105	Computer Organization	PC	3	3	--	--	25	75	100
B19IT2106	Object Oriented Programming through C++	PC	3	3	--	--	25	75	100
B19IT2107	Advanced Data Structures Lab	PC	1.5	--	--	3	20	30	50
B19IT2108	Object Oriented Programming through C++ Lab	PC	1.5	--	--	3	20	30	50
B19MC 2101	Professional Ethics & Human Values	MC	0	3	--	--	--	--	--
TOTAL			21	21	0	6	190	510	700



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INFORMATION TECHNOLOGY

SYLLABUS: DISCRETE MATHEMATICAL STRUCTURES (B19IT2101)

UNIT-I : Mathematical Logic: Propositional Calculus: Statements and Notations, Connectives, Well-formed Formulae, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises.

Predicate Calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT-II : Combinatorics: Basics of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Theorems, Binomial and Multinomial Coefficients, Principles of Inclusion–Exclusion.

UNIT-III: Relations and Algebraic Structures: Relations: Definition of Relation, Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

Algebraic Structures: Algebraic Systems, Semi Groups, Monoids, Groups, and Abelian Group, Homomorphism of Semi Groups, Monoids and Groups.

UNIT-IV: Recurrence Relations : Generating Functions, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

UNIT-V: Graph Theory: Basic Concepts of Graphs, Sub graphs, Isomorphism of Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Bipartite graphs, Planar Graphs, Euler's Formula.

Trees: Definition of Tree, properties of Trees, Different tree structures, Binary trees, Spanning trees, Minimal Spanning Trees, Kruskal's and Prim's Algorithm

Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2101	
Course Title: DISCRETE MATHEMATICAL STRUCTURES (B19IT2101)	
CO-1	Write and verify the arguments for their validity using propositional and predicate logic.
CO-2	Observe different counting methods and apply in their fields of study.
CO-3	Identify various types of relations and utilize their properties.
CO-4	Understand different Algebraic structures and their properties.
CO-5	Formulate and solve the recurrence relations.
CO-6	Utilize the concepts in graphs and trees to understand different data structures.



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SYLLABUS: PRINCIPLES OF SOFTWARE ENGINEERING (B19IT2102)

UNIT-I: The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths, How It All Starts. A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology.

UNIT-II: Agility, Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, A Tool Set for the Agile Process, Software Engineering Knowledge, Core Principles, Principles That Guide Each Framework Activity, Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

UNIT-III: Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling, Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modelling, Requirements Modeling for WebApps.

UNIT-IV: Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model, Software Architecture, Architectural Genres, Architectural Styles, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow, What Is a Component?, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps, Designing Traditional Components, Component-Based Development.

UNIT-V: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation, Elements of Software Quality Assurance, SQA Tasks, Goals & Metrics, Statistical SQA, Software Reliability, A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging, Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing



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Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2102	
Course Title: PRINCIPLES OF SOFTWARE ENGINEERING	
CO-1	Apply software engineering concepts to define a problem and perform requirements engineering.
CO-2	Design UML diagrams for the requirements gathered
CO-3	Implement the designed problem in object oriented programming language
CO-4	Test whether all the requirements specified have been achieved or not



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SYLLABUS: MICRO PROCESSOR (B19IT2103)

UNIT-I: Introduction to 8085 microprocessor: Internal Architecture functional/signal description of 8085 microprocessor, Instruction set, Addressing modes and programming in 8085.

UNIT-II: Programming techniques: Timing diagram, counters and delays, stacks and subroutines and Interrupts in 8085

UNIT-III: Memory and I/O: Classification and interfacing semiconductor memories with 8085 MPU. Interfacing characteristics of IO devices, IO device addressing methods.

UNIT-IV: Peripheral devices and interfacing with 8085: Interfacing peripherals to INTEL 8085: Parallel IO interface-8255-Block diagram and its control word, Timer Interface-8253-Block diagram and programming of 8253/54.

Interfacing peripherals to INTEL 8085: Block diagram of programmable Interrupt controller Interface-8259A Its functions and interrupt operation.

UNIT-V: Introduction to 8086 microprocessor and programming

The 8086 Microprocessor architecture, Internal Architecture & functional /signal description of 8086, segmented memory, Maximum 7 Minimum mode of 8086. Introduction set and programming the 8086: Addressing modes, Instruction set.

Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2103	
Course Title: MICRO PROCESSOR (B19IT2103)	
CO-1	Student will be able to apply the knowledge of 8085 architecture and instruction set.
CO-2	Student will be able to apply the knowledge of microprocessor for counter designing and interrupts signaling.
CO-3	Students will be able to design interfacing circuits between 8085 with different peripheral and memory components.
CO-4	Student will be able to apply the knowledge of 8086 architecture and instruction set.



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SYLLABUS: ADVANCED DATA STRUCTURES (B19IT2104)

UNIT-I: Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT-II: Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort.

UNIT-III: Advanced and Efficient Binary Search Trees: Optimal Binary Search Trees, AVL Trees- rotations, insertion, deletion operations, Red-Black Trees, Definition, Representation of a Red-Black Tree, Searching a Red-Black Tree, Inserting into a Red Black Tree, Deletion from a Red-Black Tree, Joining Red-Black Trees, Splitting a Red-Black tree.

UNIT-IV: Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prim's & Kruskal's Algorithm, Dijkstra's shortest path, Transitive closure. Warshall's Algorithm,

UNIT-V: Sorting: Medians and order statistics, External Sorting, Introduction, K-way Merging, Buffer Handling for parallel Operation, Run Generation, Optimal Merging of Runs.

Hashing: Introduction, Static Hashing, Hash Table, Hash Functions, Secure Hash Function, Overflow Handling, Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing, Dynamic Hashing Using Directories, Directory less Dynamic Hashing, Alternate hash functions (mid-square, folding, digit analysis), Double Hashing



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Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2104	
Course Title: ADVANCED DATA STRUCTURES	
CO-1	Student will be able to Implement data structures like linked lists for given problems.
CO-2	Student will be able to Construct various types of tree structures and apply graph algorithms for the given data
CO-3	Student will be able to Implement advanced data structures into the applications such as balanced search trees, AVL Trees, and Red-Black Trees
CO-4	Student will be able Describe the hash function and concepts of collision and its resolution methods



Estd:1980

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SYLLABUS: COMPUTER ORGANIZATION (B19IT2105)

UNIT-I: Basic Structure of Computers: Basic Organization of Computers, Historical Perspective, Bus Structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection Codes. Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms.

UNIT-II: Register Transfer Language and Microoperations: Register Transfer language. Register Transfer Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes, Computer Register, Computer Instructions, Instruction Cycle, Memory – Reference Instructions. Input –Output and Interrupt, Complete Computer Description,

UNIT-III: Central Processing Unit: General Register Organization, STACK Organization. Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer. Microprogrammed Control: Control Memory, Address Sequencing, Micro Program example, Design of Control Unit

UNIT-IV: Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access.

UNIT-V: Multi Processors: Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter Processor Arbitration.

Pipeline: Parallel Processing, Pipelining, Instruction Pipeline, RISC Pipeline, ArrayProcessor.

Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2105	
Course Title: COMPUTER ORGANIZATION	
CO-1	Illustrate the concepts of data representation, Arithmetic procedures and various micro operations
CO-2	Develop a detailed understanding of architectures and functionalities of control unit and central processing unit
CO-3	Describe and analysis of input output system, different types of Memories and evaluate memory requirement in basic computer
CO-4	Illustrate the concepts of multiprocessing and pipelining systems



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SYLLABUS: OBJECT ORIENTED PROGRAMMING THROUGH C++ (B19IT2106)

UNIT-I: Introduction to C++: Difference between C and C++, Evolution of C++, The Object Oriented Technology, Disadvantage of Conventional Programming-, Key Concepts of Object Oriented Programming, Advantage of OOP, Object Oriented Language.

UNIT-II: Classes and Objects & Constructors and Destructor: Classes in C++-Declaring Objects, Access Specifiers and their Scope, Defining Member Function-Overloading Member Function, Nested class, Constructors and Destructors, Introduction, Constructors and Destructor- Characteristics of Constructor and Destructor, Application with Constructor, Constructor with Arguments (parameterized Constructor, Destructors- Anonymous Objects.

UNIT-III: Operator Overloading and Type Conversion & Inheritance: The Keyword Operator, Overloading Unary Operator, Operator Return Type, Overloading Assignment Operator (=), Rules for Overloading Operators, Inheritance, Reusability, Types of Inheritance, Virtual Base Classes, Object as a Class Member, Abstract Classes, Advantages of Inheritance-Disadvantages of Inheritance.

UNIT-IV: Pointers & Binding Polymorphisms and Virtual Functions: Pointer, Features of Pointers, Pointer Declaration, Pointer to Class, Pointer Object, The this Pointer, Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Binding in C++, Virtual Functions, Rules for Virtual Function, Virtual Destructor.

UNIT-V: Generic Programming with Templates, Need for Templates, Definition of class Templates, Normal Function Templates, Overloading of Template Function, Bubble Sort Using Function Templates, Difference Between Templates and Macros, Linked Lists with Templates, Exception Handling, Principles of Exception Handling, The Keywords try throw and catch, Multiple Catch Statements – Specifying Exceptions.

Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2106	
Course Title : OBJECT ORIENTED PROGRAMMING THROUGH C++	
CO-1	Analyze the procedural and object oriented paradigm.
CO-2	Apply object oriented concepts to applications using dynamic memory management techniques and overloading concepts.
CO-3	Apply inheritance, pointer, polymorphism and virtual functions concepts.
CO-4	Understand generic programming, Exception handling.



Estd:1980

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SYLLABUS: ADVANCED DATA STRUCTURES LAB (B19IT2107)

LIST OF EXPERIMENTS:

1. Write a program to implement the Single Linked List operations (Insertion, Deletion, searching, reverse).
2. Write a program to implement the operations on stacks using Linked List.
3. Write a program to implement the operations on Queue using Linked List.
4. Write a program to add two Polynomials using Linked List.
5. Write a program to implement the Circular Single Linked List operations (Insertion, Deletion, searching, reverse).
6. Write a program to implement the Double Linked List operations (Insertion, Deletion, searching).
7. Write a program to sort list of array elements using Heap Sort.
8. Write a program to create a binary search tree and for implementing the in order, preorder, post order traversal using recursion
9. Write a program to perform various operations i.e., insertions and deletions on AVL trees.
10. Write a program to implement Dijkstra's algorithm to find shortest path in the graph.
11. Write a program Implementation of Breadth First Search Techniques
12. Write a program Implementation of Depth First Search Techniques.
13. Write a program to implement Prim's algorithm to generate a min-cost spanning tree.
14. Write a program to implement Krushkal's algorithm to generate a min-cost spanning tree.
15. Write a program to implementation of Static Hashing (Use Linear probing for collision resolution)

Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2107	
Course Title: ADVANCED DATA STRUCTURES LAB	
CO-1	Student will be able to Implement data structures like linked lists for given problems.
CO-2	Student will be able to Construct various types of tree structures and apply graph algorithms for the given data
CO-3	Student will be able to Implement advanced data structures into the applications such as balanced search trees, AVL Trees, and Red-Black Trees
CO-4	Student will be able Describe the hash function and concepts of collision and its resolution methods



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SYLLABUS: OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB (B19IT2108)

LIST OF EXPERIMENTS:

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects.
Read and display the contents of the array.
2. Write a C++ program to declare Struct. Initialize and display contents of member variables.
3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
6. Write a C++ to illustrate the concepts of console I/O operations.
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
8. Write a C++ program to allocate memory using new operator.
9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. Write a C++ program to create an array of pointers. Invoke functions using array objects.
11. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword

Course Outcomes for Second Year First Semester Course	
Course Code: B19IT2108	
Course Title: OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB	
CO-1	Apply the basic concepts in C++ like Class and objects
CO-2	Analyze memory management techniques like constructor, destructor and overloading mechanisms
CO-3	Apply reusability of code and usage of exception handling and generic programming



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SYLLABUS: PROFESSIONAL ETHICS AND HUMAN VALUES (B19MC2101)

UNIT-I: Human Values: Morals, Values and Ethics-Integrity-Work Ethic-Service learning Civic Virtue Respect for others Living Peacefully Caring Sharing Honesty -Courage-Cooperation Commitment Empathy Self Confidence Character Spirituality.

UNIT-II: Engineering Ethics: Senses of 'Engineering Ethics-Variety of moral issued- Types of inquiry Moral dilemmasMoral autonomy- Kohlberg's theory- Gilligan's theory-Consensus and controversy Models of professional roles-Theories about right action-Self-interest -Customs and religion Uses of Ethical theories Valuing time Cooperation Commitment.

UNIT-III: Engineering as Social Experimentation: Engineering As Social Experimentation- Framing the problem- Determining the facts codes of Ethics- Clarifying Concepts- Application issues Common Ground - General Principles- Utilitarian thinking respect for persons.

UNIT-IV: Engineers Responsibility for Safety and Risk: Safety and risk Assessment of safety and risk. Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety- Intellectual Property rights (IPR).

UNIT-V: Global Issues: Globalization- Cross-culture issues-Environmental Ethics- Computer Ethics Computers as the instrument of Unethical behavior Computers as the object of Unethical acts Autonomous Computers- Computer codes of Ethics- Weapons Development -Ethics and Research Analyzing Ethical Problems in research.

Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2101	
Course Title: PROFESSIONAL ETHICS AND HUMAN VALUES	
CO-1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships and field work.
CO-2	Identify the multiple ethical interests at stake in a real-world situation or practice and Articulate what makes a particular course of action ethically defensible.
CO-3	Assess their own ethical values and the social context of problems.
CO-4	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
CO-5	Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.



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Regulation: R19				II / IV - B.Tech. II - Semester					
INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19		BS	3	3	--	--	25	75	100
B19 IT 2201		PC	3	2	1	--	25	75	100
B19 IT 2202		PC	3	3	--	--	25	75	100
B19 IT 2203	Database Management Systems	PC	3	3	--	--	25	75	100
B19 IT 2204	Theory of Computation	PC	3	3	--	--	25	75	100
B19 IT 2205		PC	1.5	--	--	3	20	30	50
B19 IT 2206	UNIX Operating Systems Lab	PC	1	--	--	2	20	30	50
		PC	1.5	--	--	3	20	30	50
B19 IT 2208	Socially Relevant Project	PR	1	--	--	2	20	30	50
B19MC2201	Essence of Indian Traditional Knowledge	MC	0	3	--	--	--	--	--
TOTAL			20	17	1	10	205	495	700



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INFORMATION TECHNOLOGY

SYLLABUS: PROBABILITY AND STATISTICS (B19 BS 2202)

UNIT-I: Descriptive statistics and methods for data science: Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variables: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread or variance), Skewness, Kurtosis

Correlation: Definition, Karl Pearson's Coefficient of Correlation, Limits for correlation coefficient, Rank Correlation, Spearman's formula for rank correlation coefficient (without proofs).

Regression Analysis: Regression Lines, Regression Coefficients and their properties (without proofs).

Curve fitting: Method of least Squares, fitting of a Straight line, Fitting of a Parabola.

UNIT-II: Random Variables and Probability functions: Review of basic concepts of Probability (**no questions will be set on review**). Definition of a random variable, Distribution function, Properties of Distribution Function Discrete Random Variable, Probability Mass Function, Discrete Distribution Function, Continuous Random Variable, Probability Density Function, Continuous Distribution Function. Introduction to Joint random variable and its Probability functions.

Mathematical Expectation: Mathematical Expectation of a Random Variable, Expected Value of function of a Random Variable, Addition Theorem and Multiplication Theorem of Expectation (**without proofs**), Statistical Measures like Mean, Variance, Moments and Covariance in terms of Expectations.

Generating functions: Moment generating Function, Characteristic Function and Probability generating Function of a Random Variable.

UNIT-III: Discrete and Continuous Distributions: Discrete Distributions: Binomial distribution and Poisson distribution - Definition, Mean, Variance, moments, m.g.f., Characteristic function, p.g.f., Fitting of distributions.

Continuous Distributions: Normal Distribution - Definition, Standard Normal Variate, Mean, Variance, m.g.f., Characteristic function, Applications of Normal Distribution, Importance of Normal distribution. Exponential Distribution, Definition, Mean, Variance and Memory less property of Exponential distribution.

UNIT-IV: Sampling theory and Testing of Hypothesis: Sampling Theory: Sample, population, statistic, parameter, Sampling distribution, standard error, point and interval estimation. Testing of Hypothesis: Formulation of Null hypothesis, Alternative hypothesis, Critical region, level of significance, Errors in sampling- Type-I-error, Type-II-error, One-tailed and Two-tailed tests Degrees of freedom.

Large Sample Theory: Test of significance of single sample proportion, Test of significance for difference of proportions.

Small Sample Theory: Student's-t-distribution: definition, t-test for single mean, t-test for difference of means,

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Paired t-test for difference of means.

F-distribution: definition, F-test for equality of two population variances. Chi-square distribution: definition, Chi-square test for goodness of fit.

UNIT-V: Queuing Theory: Queue description, Birth and Death Process, Distribution of Inter-arrival times, Distribution of service times, Kendall's representation of a queuing model, Operating characteristics of a queuing model, steady-state solutions of $\{M/M/1: \infty/FCFS\}$ Model and $\{M/M/1; N/FCFS\}$ Model.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19 BS 2202	
Course Title: PROBABILITY AND STATISTICS	
CO-1	Understand the concepts of data science and fit a best suitable curve for the given data
CO-2	Identify the random variable as discrete/continuous and analyse it.
CO-3	Predict the discrete distribution suitable for the given data from its moments.
CO-4	Predict the continuous distribution suitable for the given data from its moments
CO-5	Decide the test applicable for giving inference about Population Parameter based on Sample statistic.
CO-6	Make business decisions about the resources needed to provide a service in day-to-day life applications including telecommunication, traffic engineering, computing and the design of factories, shops, offices and hospitals.



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SYLLABUS: JAVA PROGRAMMING (B19 IT 2201)

UNIT-I: Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators.

Control Statements: Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?;, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement.

UNIT-II: Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT-III: Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in ComputerMemory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two- dimensional Arrays, Arrays of Varying Lengths, Three- dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.



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UNIT-IV: Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto- boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions, try-with-resources, Catching Subclass Exception, Custom Exceptions, Nested try and catch Blocks, Rethrowing Exception, Throws Clause.

UNIT-V: String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread- Creation of NewThreads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads.

Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface, Creating JDBC Application, JDBC Batch Processing, JDBC Transaction Management

Course Outcomes for Second Year Second Semester Course	
Course Code: B19 IT 2201	
Course Title: JAVA PROGRAMMING	
CO-1	Develop applications using basic java concepts
CO-2	Develop applications using object oriented programming concepts
CO-3	Develop error free applications using exception handling mechanisms and multi tasking applications using multithreading concepts
CO-4	Develop interactive Jdbc applications with database connectivity



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SYLLABUS: OPERATING SYSTEMS (B19 IT2202)

UNIT-I: Operating Systems (OS) Overview: OS Concepts, OS functions, Evaluation of Operating systems. OS Services, OS structures: Monolithic structure, Layered structure, Micro Kernel structure, Modular structure, Virtual Machines, Interrupts, Systems calls- Types of System Calls, OS debugging, OS generations.

UNIT-II: Process Concept: Basic concepts, Process states, process control block, Operations on processes, Process Scheduling: Scheduling Criteria, Scheduling Algorithms. Multiple Processor Scheduling, Thread Scheduling, Examples. Multithreaded Programming: Multithreading Models, Thread Libraries, Threading Issues, Examples.

UNIT-III: Process Concurrency and Synchronization: Introduction, Race Condition, Critical Region, Mutual Exclusion, Peterson's Solution, Hardware Support, Operating System Support, Semaphores, Monitors, Classic Synchronization problem: Reader's-Writer's Problem, Barber problem, Producer –Consumer problem, Dining philosopher's problem.

Deadlocks: Resources, Conditions for resource deadlocks, Graph models of deadlocks, Deadlock detection and recovery, Deadlock avoidance, Deadlock prevention.

UNIT-IV: Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Free space Management Techniques, Paging, Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Page replacement algorithms, Frame allocation, Inverted paging, Pre-Paging, Segmentation, Paged Segmentation, Thrashing, Memory-mapped files.

UNIT-V: File Systems: Files, Directories, File system implementation, management and optimization. Secondary-Storage Structure: Overview of Disk structure, Disk scheduling, RAID structure. System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control List (ACLs), Revocation of access rights, Capabilities List (c-List).

Case Studies: Study of Operating System Functionalities in various operating Systems like Windows, Unix, Linux and Mobile Operating Systems.



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Course Outcomes for First Year First Semester Course	
Course Code: B19 IT2202	
Course Title: OPERATING SYSTEMS	
CO-1	Describe basic concepts, Generations, Functions, Services and Structures of different Operating Systems.
CO-2	Describe the concept of Process, Thread and also Utilize different algorithms for Scheduling multiple Processes & Threads.
CO-3	Apply different Mechanisms to implement Inter Process Communication without occurring dead lock
CO-4	Classify Memory Management Schemes and Apply and Compare various Page Replacement Techniques for better allocation



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SYLLABUS: DATABASE MANAGEMENT SYSTEMS (B19 IT2203)

UNIT-I: Introduction: Database system, Characteristics (Database Vs File System), Database Users (Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

UNIT-II: Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance
BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).

UNIT-III: Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams. SQL: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view (updatable and non-updatable), relational set operations.

UNIT-IV: Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form (BCNF), Lossless join and dependency preserving decomposition, Fourth normal form (4NF), Fifth Normal Form (5NF).

UNIT-V: Transaction Concept: Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

Indexing Techniques: B+ Trees: Search, Insert, Delete algorithms, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing: Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19 IT2203	
Course Title: DATABASE MANAGEMENT SYSTEMS	
CO-1	Analyze requirements of an organization and develop a database schema in terms of E R model and Relational model.
CO-2	Analyze a query and formulate solution using the knowledge of query languages like SQL.
CO-3	Design well structured relations by applying normalization to remove anomalies in relations.
CO-4	Examine issues in transaction execution, data storage and query processing and can formulate appropriate solutions.



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SYLLABUS: THEORY OF COMPUTATION (B19 IT2204)

UNIT-I: Finite Automata: Need of Automata theory, Central Concepts of Automata Theory, Automation, Finite Automata, Transition Systems, Acceptance of a String, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with ϵ -Transitions, Minimization of Finite Automata, Finite Automata with output-Mealy and Moore Machines, Applications and Limitation of Finite Automata.

UNIT-II: Regular Expressions, Regular Sets, Identity Rules, Equivalence of two RE, Manipulations of REs, Finite Automata and Regular Expressions, Inter Conversion, Equivalence between FA and RE, Pumping Lemma of Regular Sets, Closure Properties of Regular Sets, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Right and Left Linear Regular Grammars, Equivalence between RG and FA, Inter Conversion.

UNIT-III: Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, ϵ -Productions and Unit Productions, Normal Forms-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

UNIT-IV: Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars, Conversion, Application of Pushdown Automata.

UNIT-V: Turing Machine: Definition, Model, Representation of TMs-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a TM, Design of TMs, Types of TMs, Church's Thesis, Universal and Restricted TM, Decidable and Un-decidable Problems, Halting Problem of TMs, Post's Correspondence Problem, Modified PCP.

Formal languages and Chomsky Hierarchy.

Course Outcomes for First Year Second Semester Course	
Course Code: B19 IT2204	
Course Title: THEORY OF COMPUTATION	
CO-1	Analyze and construct Finite Automata from a regular expression, regular grammar or regular language
CO-2	Analyze and construct a PDA from CFG or CFL
CO-3	Analyze and construct a TM from REL or Unrestricted Language.



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SYLLABUS: JAVA PROGRAMMING LAB (B19IT2205)

LIST OF EXPERIMENTS

Exercise - 1 (Basics)

1. Write a JAVA program to display default value of all primitive data type of JAVA
2. Write a java program that display the roots of a quadratic equation $ax^2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.
3. Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

1. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
2. Write a JAVA program to sort for an element in a given list of elements using bubble sort
3. Write a JAVA program to sort for an element in a given list of elements using merge sort.
4. Write a JAVA program using StringBuffer to delete, remove character.

Exercise - 3 (Class, Objects)

1. Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.
2. Write a JAVA program to implement constructor.

Exercise - 4 (Methods)

1. Write a JAVA program to implement constructor overloading.
2. Write a JAVA program implement method overloading.

Exercise - 5 (Inheritance)

1. Write a JAVA program to implement Single Inheritance
2. Write a JAVA program to implement multi level Inheritance
3. Write a java program for abstract class to find areas of different shapes



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Exercise - 6 (Inheritance - Continued)

1. Write a JAVA program give example for “super” keyword.
2. Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

Exercise - 7 (Exception)

1. Write a JAVA program that describes exception handling mechanism
2. Write a JAVA program Illustrating Multiple catch clauses

Exercise – 8 (Runtime Polymorphism)

1. Write a JAVA program that implements Runtime polymorphism
2. Write a Case study on run time polymorphism, inheritance that implements in above problem

Exercise – 9 (User defined Exception)

1. Write a JAVA program for creation of Illustrating throw
2. Write a JAVA program for creation of Illustrating finally
3. Write a JAVA program for creation of Java Built-in Exceptions
4. Write a JAVA program for creation of User Defined Exception

Exercise – 10 (Threads)

1. Write a JAVA program that creates threads by extending Thread class .First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds ,(Repeat the same by implementing Runnable)
2. Write a program illustrating isAlive and join ()

Exercise – 11 (Packages)

1. Write a JAVA program illustrate class path
2. Write a case study on including in class path in your os environment of your package.
3. Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 12(Applet)

1. Write a JAVA program to paint like paint brush in applet.



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2. Write a JAVA program to display analog clock using Applet.
3. Write a JAVA program to create different shapes and fill colors using Applet.

Exercise - 13 (Event Handling)

1. Write a JAVA program that display the x and y position of the cursor movement using Mouse.
2. Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Course Outcomes for First Year Second Semester Course	
Course Code: B19IT2205	
Course Title: JAVA PROGRAMMING LAB	
CO-1	Apply primitive data types, Operations, Expressions, Control-flow, Strings in java programming
CO-2	Examine Class, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
CO-3	Analyzing simple inheritance, multi-level inheritance, Exception handling mechanism
CO-4	Analyze and Construct Threads, Event Handling, implement packages, developing applets



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SYLLABUS: UNIX OPERATING SYSTEM LAB (B19IT2206)

LIST OF EXPERIMENTS.

1.
 - a. Study of Unix/Linux general purpose utility command list: man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown
 - b. Study of vi editor
 - c. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system
 - d. Study of Unix/Linux file system (tree structure)
 - e. Study of .bashrc, /etc/bashrc and Environment variables.
2. Write a C program that makes a copy of a file using standard I/O, and system calls
3. Write a C program to emulate the UNIX ls -l command.
4. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls -l | sort
5. Simulate the following CPU scheduling algorithms: Round Robin (b) SJF (c) FCFS
- (d) Priority
6. Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit System calls
7. Simulate the following:
 - i. Multiprogramming with a fixed number of tasks (MFT)
 - ii. Multiprogramming with a variable number of tasks (MVT)
8. Simulate Bankers Algorithm for Dead Lock Avoidance
9. Simulate Bankers Algorithm for Dead Lock Prevention.
10. Simulate the following page replacement algorithms:
FIFO b) LRU c) LFU
11. Simulate the following File allocation strategies
Sequenced (b) Indexed (c) Linked
12. Write a C program that illustrates two processes communicating using shared memory
13. Write a C program to simulate producer and consumer problem using semaphores
14. Write C program to create a thread using pthreads library and let it run its function.
15. Write a C program to illustrate concurrent execution of threads using pthreads library.



Estd:1980

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ChinnaAmiram, Bhimavaram-534204. (AP)

Course Outcomes for First Year Second Semester Course	
Course Code: B19IT2206	
Course Title: UNIX OPERATING SYSTEM LAB	
CO-1	To use Unix utilities and perform basic shell control of the utilities
CO-2	To use the Unix file system and file access control
CO-3	To use of an operating system to develop software
CO-4	Students will be able to use Linux environment efficiently
CO-5	Solve problems using bash for shell scripting



Estd:1980

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SYLLABUS: DATABASE MANAGEMENT SYSTEMS LAB (B19IT2207)

LIST OF EXPERIMENTS

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
5.
 - a. Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
 - b. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers
12. Create a table and perform the search operation on table using indexing and non-indexing techniques.



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Course Outcomes for First Year First Semester Course	
Course Code: B19IT2207	
Course Title: DATABASE MANAGEMENT SYSTEMS LAB	
CO-1	Utilize SQL to execute queries for creating database and performing data manipulation operations
CO-2	Examine integrity constraints to build efficient databases
CO-3	Apply Queries using Advanced Concepts of SQL
CO-4	Build PL/SQL programs including stored procedures, functions, cursors and triggers



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SYLLABUS: SOCIALLY RELEVANT PROJECT (B19 IT2208)

1. Water Conservation Related Works
2. Swatch Bharath (Internal External)
3. Helping police
4. Traffic monitoring
5. Teaching Rural Kids (Sarva siksha Abhiyan)
6. Street light monitoring
7. Electricity Conservation
8. Solar panel utilization
9. E- policing & cyber solution
10. Pollution
11. Any social related

Course Outcomes for First Year Second Semester Course	
Course Code: B19 IT2208	
Course Title: SOCIALLY RELEVANT PROJECT	
CO-1	Use scientific reasoning to gather, evaluate, and interpret ideas
CO-2	Analyze and design solutions to solve the ideas
CO-3	Use one or more creative tools to complete the projects



Estd:1980

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SYLLABUS: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE (B19MC2201)

(Common to CSE and IT)

UNIT-I: Introduction to traditional knowledge-Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

UNIT-II: Protection of traditional knowledge - Protection of traditional knowledge: The need for protecting traditional knowledge Significance of TK Protection, value of TK in globaleconomy, Role of Government to harness TK.

UNIT-III: Legal frame work and TK - A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT-IV: Traditional knowledge and intellectual property - Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasingprotection of Indian Traditional Knowledge.

UNIT-V: Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societiesdepend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19MC2201	
Course Title: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE	
CO-1	Understand the concept of Traditional knowledge and its importance
CO-2	Know the need and importance of protecting traditional knowledge
CO-3	Know the various enactments related to the protection of traditional knowledge
CO-4	Understand the concepts of Intellectual property to protect the traditional knowledge



MECHANICAL ENGINEERING

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Estd:1980

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Regulation: R19			I / IV - B.Tech. I - Semester						
MECHANICAL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 HS1101	English	HS	3	3	--	--	25	75	100
B19 BS1101	Mathematics-I	BS	3	3	--	--	25	75	100
B19 BS1103	Engineering Physics	BS	3	3	--	--	25	75	100
B19 EE1101	Basic Electrical & Electronics Engineering	ES	3	3	--	--	25	75	100
B19 ME1101	Engineering Drawing	ES	2.5	1	--	3	25	75	100
B19BS1106	Engineering Physics Lab	BS	1.5	--	--	3	20	30	50
B19 HS1102	English Lab	HS	1.5	--	--	3	20	30	50
B19 ME1102	Workshop Practice Lab	ES	1.5	--	--	3	20	30	50
B19MC1101	Environmental Science	MC	0	3	--	--	--	--	--
TOTAL			19	16	--	12	185	465	650



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MECHANICAL ENGINEERING

SYLLABUS: ENGLISH (B19HS1101)

(Common to CE, CSE, EEE, IT & ME)

UNIT-I: Lesson: A Drawer full of happiness from *Infotech English*, Maruthi Publications.

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Self-introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.

Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.

Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.

Pronunciation: Vowels, consonants, plural markers and their realizations.

UNIT-II : Lesson:-: Nehru's letter to his daughter, Indira on her birthday from *Infotech English*, Maruthi Publications.

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.

Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (precis writing); avoiding redundancies and repetitions.

Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.

Grammar: Articles, prepositions, conjunctions, use of synonyms and antonyms.

Pronunciation: Past tense markers, word stress-di-syllabic words.

UNIT-III: Lesson: Stephen Hawking-Positivity' Benchmark' from *Infotech English*, Maruthi Publications.

Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.



Functional English: complaining and apologizing.

Reading: Reading a text in detail by making basic inferences -recognizing: and interpreting specific context clues; strategies to use text clues for comprehension, critical reading.

Reading for Writing: Letter writing- types, format and principles of letterwriting, E-mail etiquette, writing a Resume/CV and covering letter.

Vocabulary: Technical vocabulary from across technical branches (20 words. GRE. Vocabulary 20 words), Idioms & Phrasal verbs, Homonyms, word applications, sequencing of words.

Grammar: Sentence Structures, Transformation of sentences (Active and passive Voice, Degrees of comparison, Simple, Compound and Complex).

Pronunciation: Word stress-poly-syllabic words.

UNIT-IV: Lesson: Liking a Tree, Unbowed: Wangari Maathai biography from *Infotech English*, Maruthi Publications.

Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: asking for permissions, requesting, Inviting.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Pamphlet writing, writing for media, writing SOP's.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, cloze ~~and~~ foreign phrases.

Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting, question Tags, direct and indirect speech, reporting for academic purposes.

Pronunciation: Contrastive Stress.

UNIT-V: Lesson: Stay Hungry–Stay Foolish from *Infotech English*, Maruthi Publications.

Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.

Speaking: Formal oral presentations on topics from academic contexts—with/without the use of PPT slides. Functional English: Suggesting/Opinion giving.

Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.



Reading for Writing: Report writing, writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words GRE 'Vocabulary' (20 words, antonyms and synonyms, word applications, coherence, matching emotions).

Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement, parallel structures, phrases and clauses).

Pronunciation: Stress in compound words.

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1101	
Course Title: ENGLISH	
CO-1	Identify the context, topic and pieces of specific information by understanding and responding to the social or transactional dialogues spoken by native speakers of English.
CO-2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.
CO-3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.
CO-4	Apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.
CO-5	Construct sentences using proper grammatical structures and correct word forms.



Estd:1980

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SYLLABUS: MATHEMATICS-I (B19BS1101)

(LINEAR ALGEBRA, DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS)
(Common to All Branches)

UNIT-I: Linear systems of equations: Rank, Echelon form, Normal form, consistency of system of linear equations, Solution of linear systems by Gauss elimination, Jacobi and Gauss-Seidel methods.

UNIT-II: Eigen values - Eigen vectors and Quadratic forms: Eigen values, Eigen vectors, Properties, Cayley-Hamilton theorem, Inverse and powers of a matrix using Cayley-Hamilton theorem, Reduction to diagonal form, Quadratic forms, Reduction of a Quadratic form to Canonical form.

UNIT-III: Differential equations of first order and first degree: Linear, Bernoulli, Exact, Reducible to exact types.

Applications: Orthogonal trajectories, Newton's Law of cooling, Simple electrical circuits. (R-L and R-C circuits only)

UNIT-IV: Linear differential equations of higher order: Linear Non-homogeneous equations of higher order with constant coefficients with source (RHS) term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $x V(x)$. Simultaneous differential equations with constant coefficients, Method of Variation of parameters.

UNIT-V: Laplace transformation: Laplace transforms of standard functions, properties, transforms of $tf(t)$, $f(t)/t$, transforms of derivatives and integrals, transforms of unit step function, Dirac delta function; Inverse Laplace transforms, convolution theorem (without proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1101	
Course Title: MATHEMATICS – I	
CO-1	Solve a given system of linear algebraic equations
CO-2	Determine Eigen values and Eigen vectors of a system represented by a matrix.
CO-3	Solve ordinary differential equations of first order and first degree.
CO-4	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits
CO-5	Solve linear ordinary differential equations of second order and higher order.
CO-6	Determine Laplace transform, inverse Laplace transform and solve linear ODE



SYLLABUS: ENGINEERING PHYSICS (B19 BS1103)

(Common to CE & ME)

UNIT-I: SCIENCE OF SOLIDS –CRYSTALLOGRAPHY AND NANOMATERIALS: Crystallography:

Basis and lattice, Crystal systems, Bravais lattice, Characteristics of unit cell, Atomic packing fraction for S.C, B.C.C, F.C.C lattices, Miller indices – representation of lattice planes, Diffraction of x rays in Crystals and Bragg's law.

Nanomaterial's: Introduction, Salient features of Nano materials, Synthesis methods – Ball milling, Condensation, Chemical Vapour Deposition, Sol – Gel. Characterization techniques for nano materials, Carbon Nano Tubes (C N T s), Applications of Nanomaterials

UNIT-II: ACOUSTICS & ULTRASONICS

Acoustics : Introduction – Reverberation time – Sabine's formula (Derivation using growth and decay method) – absorption coefficient and its determination – factors affecting acoustics of buildings and their remedies.

Ultrasonics: Production of ultrasonics by Magnetostriction and piezoelectric methods – Detection of ultrasonics - acoustic grating – Non-Destructive Testing – pulse echo system through transmission and reflection modes – Applications.

UNIT-III: ELASTICITY

Elasticity: Stress, Strain; Hooke's law, stress – strain curve, generalized Hooke's law with and without thermal strain for isotropic materials, different types of moduli and their relations, bending of beams – Bending moment of a beam – Depression of c

UNIT-IV: MAGNETICS AND DIELECTRICS

Magnetics: Introduction – Magnetic dipole moment – Magnetization – Magnet's susceptibility and permeability – Origin of permanent magnetic moment – Bohr Magneton– Classification of magnetic materials (Dia, Para and Ferro) – Domain concept of Ferromagnetism – Hysteresis – soft and hard magnetic materials – Applications of Ferromagnetic materials.

Dielectrics: Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz internal field – Claussius-Mossoti equation – Frequency dependence of polarization – Applications of dielectrics.

UNIT-V: LASERS AND OPTICAL FIBERS

Lasers: Introduction, Interaction of radiation with matter, conditions for light amplification, Einstein's relations. Requirements of lasers device, Types of lasers, Design and working of Ruby and He – Ne lasers, Laser



characteristics and applications.

Fiber Optics: Introduction to optical fibers, Principle of light propagation in fiber, Acceptance angle, Numerical aperture, Modes of propagations, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1103	
Course Title: ENGINEERING PHYSICS	
CO-1	Explain the structure of solids and their determination
CO-2	Demonstrate the synthesis methods and applications of nano materials
CO-3	Understand the concepts of elasticity and different types of moduli and their relation
CO-4	Explain the sound propagation in buildings and related aspects
CO-5	Characterize the magnetic and dielectric materials from their basic behaviour and learn their applications.
CO-6	Understand the basics of modern technologies ultrasonics, lasers and optical fibers and their applications in various fields



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Estd:1980

SYLLABUS: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING (B19EE1101)
(Mechanical Engineering)

UNIT-I: DC CIRCUITS: Electrical circuit elements (R - L and C) - Ohms Law- Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem.

UNIT-II: AC CIRCUITS: Representation of sinusoidal waveforms - Peak, Average and RMS values - Phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits Introduction to three phase AC circuits.

UNIT-III: DC MACHINES: Principle of operation of DC generator – EMF equation – types of DC machines – OCC characteristics of DC generator- principle and operation of DC Motor -torque equation – characteristics of DC motors – speed control methods of DC motor- applications

UNIT-IV: AC MACHINES: Principle and operation of Single Phase Transformer - OC and SC test on transformer - Equivalent circuit - principle and operation of Induction Motor [Elementary treatment only].

UNIT-V: DIODES & TRANSISTORS: PN junction diodes – diode applications (half wave and bridge rectifiers), PNP and NPN junction transistor, CB, CE, CC configurations and characteristics-transistor as an amplifier

Course Outcomes for First Year First Semester Course	
Course Code: B19EE1101	
Course Title: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	
CO-1	Apply concepts of KVL/KCL in solving DC circuits.
CO-2	Analyze simple electric circuits with DC excitation and single phase AC circuits consisting of series RL - RC - RLC combinations.
CO-3	Identify type of electrical machine based on their operation.
CO-4	Illustrate working principles of induction motor - DC Motor.
CO-5	Choose correct rating of a transformer for a specific application.
CO-6	Explain operation of Rectifiers and transistors.



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Estd:1980

SYLLABUS: ENGINEERING DRAWING (B19ME1101)

(Common to CE, EEE & ME)

UNIT-I: Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general method (eccentricity method only), cycloids, involutes, tangents & normals for the curves.

UNIT-II: Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to one of the reference planes (HP, VP or PP)

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

UNIT-III: Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT-V: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Course Outcomes for First Year First Semester Course	
Course Code: B19ME1101	
Course Title: ENGINEERING DRAWING	
CO-1	Apply principles of drawing to Construct polygons and engineering curves.
CO-2	Apply principles of drawing to draw the projections of points and lines.
CO-3	Apply principles of drawing to draw the projections of planes
CO-4	Apply principles of drawing to draw the projections of solids.
CO-5	Apply principles of drawing to represent the object in 3D view through isometric views.



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Estd:1980

SYLLABUS: ENGINEERING PHYSICS LAB (B19BS1106)
(Common to CE& ME)

1. Determination of the Rigidity modulus of elasticity of a material - Torsional pendulum.
2. Determination Young's modulus by single Cantilever oscillations method.
3. Verification of the laws of vibrations in stretched strings – Sonometer
4. Magnetic field along the axis of a current carrying coil –Stewart and Gee's apparatus.
5. Determination of Magnetic susceptibility by Quinke's method.
6. Determination of velocity of sound - Volume Resonator method.
7. Determination of dielectric constant by charging and discharging method.
8. Determination of wave length of lasers by diffraction grating
9. Determination of wave length of light from a source using Diffraction Grating by Normal incidence method.
10. Determination of radius of curvature of Plano convex lens – Newton's Rings.
11. Determination of the thickness of a thin spacer using interference – Air Wedge method.
12. Verification of Laws of series and parallel combinations of resistances – Carey Foster's bridge.
13. Resolving power of a grating.
14. Determination of Temperature Coefficient of Resistance of a thermistor.
15. Determination of resistivity of semiconductors by Four probe method.

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1106	
Course Title: ENGINEERING PHYSICS LAB	
CO-1	Students get hands on experience in setting up experiments and using the instruments / equipment individually.
CO-2	Get introduced to using new / advanced technologies and understand their significance.



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Estd:1980

SYLLABUS: ENGLISH LAB (B19HS1102)
(Common to All Branches)

UNIT-I: Pronunciation

Letters and Sounds
The Sounds of English
Phonetic Transcription

UNIT-II: Past tense markers

Word stress-di-syllabic words
Poly-syllabic words

UNIT-III: Rhythm & Intonation

UNIT-IV: Contrastive Stress (Homographs)

UNIT-V: Word Stress: Weak and Strong forms

Stress in compound words

Course Outcomes for First Year First Semester Course	
Course Code: B19HS1102	
Course Title: ENGLISH LAB	
CO-1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.
CO-4	Exhibit an acceptable etiquette essential in social settings.
CO-5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.



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Estd:1980

SYLLABUS: WORK SHOP PRACTICE LAB (B19ME1102)
(Mechanical Engineering)

LIST OF EXPERIMENTS

CARPENTRY:

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

FITTING:

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

TIN SMITHY

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

HOUSE WIRING

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance



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Estd:1980

Course Outcomes for First Year First Semester Course	
Course Code: B19ME1102	
Course Title: WORK SHOP PRACTICE LAB	
CO-1	Apply wood working skills in real world applications.
CO-2	Build different parts with metal sheets in real world applications.
CO-3	Apply fitting operations in various applications.
CO-4	Apply different types of basic electric circuit connections.



Estd:1980

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SYLLABUS: ENVIRONMENTAL SCIENCE (B19MC1101)
(Common to CSE, EEE & ME)

UNIT-I: Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;. Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources: Natural resources and associated problems.

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV: Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e



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Estd:1980

– waste management.

UNIT-V: Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation.-Public awareness.

UNIT-VI: Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.



Regulation: R19				I / IV - B.Tech. II - Semester					
CIVIL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	C	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS1201	Mathematics-II	BS	3	3	-	-	25	75	100
	Engineering Mechanics	ES	3	3	-	-	25	75	100
B19 BS1204	Engineering Chemistry	BS	3	3	-	-	25	75	100
B19 CS1201	Programming for ProblemSolving using C	ES	3	3	--	--	25	75	100
B19 ME1203	Computer Aided Engineering Draw g	ES	2.5	1	--	3	25	75	100
B19 BS1207	Engineering Chemistry Lab	BS	1.5	--	--	3	20	30	50
B19 HS1202	Communication Skills Lab	HS	1.5	--	--	3	20	30	50
B19 CS1204	Programming for ProblemSolving Using C Lab	ES	1.5	--	--	3	20	30	50
B19 EE 1203	Basic Electrical & Electronics EngineeringLab	ES	1.5	--	--	2	20	30	50
B19 ME1204	Engineering Exploration Project	PR	1	--	--	2	--	50	50
TOTAL			21	13	--	16	205	545	750



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Estd:1980

MECHANICAL ENGINEERING

SYLLABUS: MATHEMATICS – II (B19BS1201)

(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)

(Common to CE, EEE, & ME)

UNIT-I: Interpolation: Interpolation, forward differences, backward differences, Central differences and relations between the operators, Differences of a polynomial, Newton's formulae for interpolation, Interpolation with unequal intervals, Lagrange interpolation.

UNIT-II: Solution of Algebraic and Transcendental Equations & Numerical Integration and solution of Ordinary Differential equations: Introduction, Bisection method, Method of false position, Iteration method & Newton-Raphson method. Trapezoidal rule, Simpson's 1/3 rule, Solution of ordinary differential equations by Taylor's method, Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method.

UNIT-III: Partial differentiation: Introduction, Homogeneous functions, Euler's theorem, Chain rule, Total derivative, Jacobians and their properties.

Applications: Taylor series expansion for a function of two variables, Maxima and Minima of functions of two variables with and without constraints, Lagrange's method. Leibnitz's rules for differentiation under integral sign.

UNIT-IV: First order and higher order partial differential equations: Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of Lagrange linear equation. Solutions of Linear homogeneous and non-homogeneous partial differential equations with constant coefficients – source (RHS) terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$.

UNIT-V: Applications of partial differential equations: Method of separation of variables, One – dimensional wave equation, the Alembert's solution, one- dimensional heat equation



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Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1201	
Course Title: MATHEMATICS-II	
CO-1	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.
CO-2	Find a real root of algebraic and transcendental equations, evaluate numerically certain definite integrals & solve a first order ordinary differential equation by Euler and RK methods.
CO-3	Compute partial derivatives, total derivative and Jacobian.
CO-4	Find maxima/minima of functions of two variables and evaluate some real definite integrals.
CO-5	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.
CO-6	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation.



SYLLABUS: ENGINEERING MECHANICS (B19ME1202)

(Mechanical Engineering)

UNIT-I: Basic Concepts: Scalar and vector quantities- Representation of vectors- Free vector force, Specification of force- Effect of force on rigid body- Free body diagram. Concurrent Forces in a plane: Principles of statics- Resolution and Composition of forces in a plane-

Equilibrium of concurrent forces in a plane- Method of projections- Equilibrium of three forces in a plane Method of moments. Parallel Force system in a plane.

UNIT-II: Centroid & Moment of Inertia: Centroid & M.I – Area & Mass M.I – Radius of Gyration, Parallel axis– Perpendicular axis theorem – Simple Problems.

UNIT-III: General Case of Forces in a Plane: Resultant and equilibrium of general case of forces in a plane, Statically determinate plane trusses-Method of joints and Method of sections.

Friction – Coulombs laws of dry friction – Limiting friction, Problems on Wedge friction, Belt Friction- problems.

UNIT-IV: Dynamics of Particles - Rectilinear Motion – Kinematics, D'Alembert's principle, Kinetics – Work & Energy – Impulse Moment, Direct Central Impact – coefficient of restitution. Curvilinear Motion – Kinematics, Projectile Motion, Moment of momentum, Work & Energy in Curvilinear motion.

UNIT-V: Vector Integration Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux. Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME1202	
Course Title: ENGINEERING MECHANICS (B19ME1202)	
CO-1	Determine the resultant of the given force systems & Analyze force systems using equations of equilibrium.
CO-2	Determine centroid, center of gravity and moment of inertia of areas and bodies.
CO-3	Analyze trusses and simple beams.
CO-4	Identify the frictional forces and its influence on equilibrium.
CO-5	Determine the displacement, velocity and acceleration relations and apply the work energy and impulse momentum to dynamic systems in rectilinear and curvilinear motion.
CO-6	Determine the displacement, velocity and acceleration relations and apply the work energy and impulse momentum to dynamic rigid bodies.



SYLLABUS: ENGINEERING CHEMISTRY (B19BS1204)

(Common to CE & ME)

UNIT-I: Water and its treatment: Introduction – source of water – impurities of water – Hardness of water – Estimation of water hardness by EDTA method – Boiler troubles: Sludge and scale formation in boilers; caustic embrittlement; Boiler corrosion; Priming and foaming – Water softening: Lime – Soda Process, Zeolite Process; Demineralization by Ion – Exchange Process. Municipal Water treatment – Desalination of Brackish water: Electrodialysis; Reverse osmosis. Indian standards and WHO standards of drinking water. Design of drinking water plant

UNIT-II: Fuels and Lubricants: Fuels: Introduction – classification of fuels – calorific value: HCV and LCV; Determination of calorific value of solid fuel by bomb calorimeter; Proximate and ultimate analysis of coal; coke: Manufacture of coke by Otto – Hoffmann's by product coke oven process; Refining of Petroleum; cracking FB MB Knocking – octane number of gasoline; cetane number of diesel oil. Synthetic Petrol; LPG, CNG. Lubricants: Definition ; Mechanism of lubrication; Properties of Lubricants (Definition and Significance)

UNIT-III: Corrosion and its Prevention: Definition- Theories of corrosion (i) Dry Corrosion (ii) Wet Corrosion. Types of Electrochemical corrosion : Pitting corrosion, Differential aeration corrosion galvanic corrosion, Stress corrosion. Factors influencing corrosion; Protection from corrosion- material selection and design cathodic Protection, corrosion inhibitors Protective coatings – Galvanizing, Tinning. Inorganic coatings – Anodizing; organic coatings – Paints Varnishes – Special Paints.

UNIT-IV: High Polymers and Plastics; Rubber & Elastomers Definition – Types of polymerisation – Free radical mechanism of addition Polymerisation; - Plastics as engineering materials, Thermo Plastics and thermosetting Plastics – compounding of Plastics – Fabrication of Plastics – Preparation, Properties and applications of Polyethylene , PVC, Nylon 6,6; - Bullet Proof Plastics: Kelvar and Polycarbonate – Fiber reinforced Plastics – Conducting Polymers; Biodegradable Polymers – PHBV; Nylon-2 nylon – 6; Natural rubber: Vulcanization – compounding of rubber, Preparation, Properties and applications of Bu Na – S; Bu Na – N.

UNIT-V: Building & Construction Materials

Ceramics:- Definition – Characteristics – Classification of Ceramics – Application of Ceramics.

Portland Cement:- Manufacture of Portland Cement – Setting and hardening of Portland Cement – Mortar- Concrete – Reinforced Cement Concrete(RCC); Decay of Concrete – Special Cements.

Refractories:- Definition – Characteristics – Classification – Properties and failure of refractories.

Insulators: Thermal and electrical insulators.



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Estd:1980

Course Outcomes for First Year First Semester Course	
Course Code: B19BS1204	
Course Title: ENGINEERING CHEMISTRY	
CO-1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.
CO-2	Fuels which are used commonly and their economics, advantages and limitations are discussed.
CO-3	Students gained knowledge reasons for corrosion and some methods of corrosion control.
CO-4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.
CO-5	Similarly students understand liquid crystals and semiconductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.



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Estd:1980

SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C (B19CS1201)
(Common to CE, EEE & ME)

UNIT-I: Introduction to Computers: Computer Systems, Computing Environments, Computer languages, Creating and running Programs, Computer Numbering System, Storing Integers, Storing Real Numbers

Introduction to the C Language: Background, C Programs, Identifiers, Types, Variable, Constants, Input/output, Programming Examples, Scope, Storage Classes and Type Qualifiers.

Structure of a C Program: Expressions Precedence and Associativity, Side Effects, Evaluating Expressions, Type Conversion Statements, Simple Programs, Command Line Arguments.

UNIT-II: Bitwise Operators: Exact Size Integer Types, Logical Bitwise Operators, Shift Operators. **Selection & Making Decisions:** Logical Data and Operators, Two Way Selection, Multiway Selection, More Standard Functions

Repetition: Concept of Loop, Pretest and Post-test Loops, Initialization and Updating, Event and Counter Controlled Loops, Loops in C, Other Statements Related to Looping, Looping Applications, Programming Examples

UNIT-III: Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Programming Example – Calculate Averages

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String/ Data Conversion, A Programming Example – Morse Code

Enumerated, Structure, and Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Programming Application

UNIT-IV: Pointers: Introduction, Pointers to pointers, Compatibility, L value and R value

Pointer Applications: Arrays, and Pointers, Pointer Arithmetic and Arrays, Memory Allocation Function, Array of Pointers, Programming Application

Processor Commands: Processor Commands

UNIT-V: Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter- Function Communication, Standard Functions, Passing Array to Functions, Passing Pointer to Functions, Recursion

Text Input / Output: Files, Streams, Standard Library Input / Output Functions, Formatting Input / Output Functions, Character Input / Output Functions

Binary Input / Output: Text versus Binary Streams, Standard Library, Functions for Files, Converting File Type.



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Estd:1980

Course Outcomes for First Year Second Semester Course	
Course Code: B19CS1201	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C	
CO-1	Students will learn about computer systems, computing environments, developing of a computer program and Structure of a C Program
CO-2	Students will learn to use different operators, data types and loops for developing C Programs.
CO-3	Students will able to write programs using Arrays ,Strings, enumerated types, Structure and Union
CO-4	Students will able to design and implement programs to analyze the different pointer applications
CO-5	Students will able to decompose a problem into functions and to develop modular reusable code



SYLLABUS: COMPUTER AIDED ENGINEERING DRAWING (B19ME1203)
 (Mechanical Engineering)

UNIT-I: PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes –Auxiliary Views.

UNIT-II: SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

DEVELOPMENT OF SOLIDS: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone and their parts.

UNIT-III: INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder VsCylinder, Prism Vs Prism and Cylinder Vs Cone.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

UNIT-IV: INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,

VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore and delete.

UNIT-V: COMPUTER AIDED SOLID MODELING: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling ofBuilding & Building Parts.

Course Outcomes for First Year Second Semester Course	
Course Code: B19CE1201	
Course Title: BUILDING MATERIALS AND CONCRETE TECHNOLOGY	
CO-1	Apply principles of drawing to draw the projections of solids.
CO-2	Apply principles of drawing to draw sections of solids and sectional views.
CO-3	Apply principles of drawing to draw the development of solids
CO-4	Apply the principles of drawing to draw the intersection of right regular solids.
CO-5	Apply the principles of drawing to draw the perspective views of points, lines, plane figures and simple solids.
CO-6	Draw isometric and orthographic drawings using CAD packages.



Estd:1980

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SYLLABUS: ENGINEERING CHEMISTRY LAB (B19BS1207)

(Common to CE & ME)

LIST OF EXPERIMENTS:

1. Estimation of HCL using standard Sodium Hydroxide.
2. Determination of total hardness of water by EDTA method.
3. Estimation of Ferrous Iron by KMnO_4 .
4. Estimation of oxalic acid by KMnO_4 .
5. Estimation of Mohr's salt by $\text{K}_2\text{Cr}_2\text{O}_7$.
6. Estimation of Dissolved oxygen by Winkler's method.
7. Determination of pH by pH meter and universal indicator method.
8. Conductometric titration of strong acid Vs strong base.
9. Conductometric titration of strong acid Vs weak base.
10. Potentiometric titration of strong acid Vs strong base.
11. Potentiometric titration of strong acid Vs weak base.
12. Preparation of Phenol formaldehyde resin.
13. Determination of saponification value of oils.
14. Determination of pour and cloud points of lubricating oil.
15. Determination of Acid value of oil.

Course Outcomes for First Year Second Semester Course	
Course Code: B19BS1207	
Course Title: ENGINEERING CHEMISTRY LAB	
CO-1	An understanding of Professional and develop confidence on recent trends.
CO-2	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.
CO-3	Acquire ability to apply real time knowledge of chemistry.
CO-4	Exposed to the real time working environment.
CO-5	Demonstrate the ability to learn Principles, design and conduct experiments.
CO-6	Ability to work on laboratory and multidisciplinary tasks.



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Estd:1980

SYLLABUS: COMMUNICATION SKILLS LAB (B19HS1202)
(Common to CE, ECE, EEE & ME)

UNIT-I: JAM, Common Errors Neutralizing accent

UNIT-II: Telephonic Etiquette, Role Plays, Poster Presentations

UNIT-III: Presentation Skills Public Speaking Data Interpretation

UNIT-IV: Group Discussion Do's and Don'ts

UNIT-V: Curriculum Vitae Covering Letter Interview Skills Mock Interviews, FAQ's.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS1202	
Course Title: COMMUNICATION SKILLS LAB	
CO-1	Learn different aspects of English language proficiency in LSRW skills.
CO-2	Apply communication skills through various language learning activities.
CO-3	Draft job application letters.
CO-4	Adopt a professional etiquette in formal settings.
CO-5	Improve fluency and clarity in both spoken and written English.



SYLLABUS: PROGRAMMING FOR PROBLEM SOLVING USING C LAB (B19CS1204)

(Common to CE, EEE & ME)

1. Exercise 1:

Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.

Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5 inches.

Write a C program to display multiple variables.

2. Exercise 2:

Write a C program to calculate the distance between the two points.

Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even.

If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

3. Exercise 3:

Write a C program to convert a string to a long integer.

Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

Write a C program to calculate the factorial of a given number.

4. Exercise 4:

Write a program in C to display the n terms of even natural number and their sum.

Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.

3. Write a C program to check whether a given number is an Armstrong number or not.

5. Exercise 5:

Write a program in C to print all unique elements in an array.

Write a program in C to separate odd and even integers in separate arrays.

Write a program in C to sort elements of array in ascending order.

6. Exercise 6:

Write a program in C for multiplication of two square Matrices.

Write a program in C to find transpose of a given matrix.

7. Exercise 7:

Write a program in C to search an element in a row wise and column wise sorted matrix.

Write a program in C to print individual characters of string in reverse order.

8. Exercise 8:

Write a program in C to compare two strings without using string library functions.

Write a program in C to copy one string to another string.



9. Exercise 9:

Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

Write a program in C to demonstrate how to handle the pointers in the program.

10. Exercise 10:

Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

Write a program in C to add two numbers using pointers

11. Exercise 11:

Write a program in C to add numbers using call by reference.

Write a program in C to find the largest element using Dynamic Memory Allocation

12. Exercise 12:

Write a program in C to swap elements using call by reference.

Write a program in C to count the number of vowels and consonants in a string using a pointer.

13. Exercise 13:

Write a program in C to show how a function returning pointer.

Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function

14. Exercise 14:

Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two program.

Write a program in C to convert decimal number to binary number using the function.

15. Exercise 15:

Write a program in C to check whether a number is a prime number or not using the function.

Write a program in C to get the largest element of an array using the function.

16. Exercise 16:

Write a program in C to append multiple lines at the end of a text file.

Write a program in C to copy a file in another name.

Write a program in C to remove a file from the disk.

Course Outcomes for First Year First Semester Course	
Course Code: B19CS1204	
Course Title: PROGRAMMING FOR PROBLEM SOLVING USING C LAB	
CO-1	Gains Knowledge on various concepts of a C language.
CO-2	Able to draw flowcharts and write algorithms.
CO-3	Able design and development of C problem solving skills .
CO-4	Able to design and develop modular programming skills.
CO-5	Able to trace and debug a program.



SYLLABUS: BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB (B19EE1203)
 (Mechanical Engineering)

LIST OF EXPERIMENTS:

Section A: Electrical Engineering:

The following experiments are required to be conducted as compulsory experiments

Verification of Kirchhoff laws

Verification of Superposition Theorem.

Swinburne's test on D.C. Shunt machine.

OC and SC tests on single phase transformer.

Speed control of D.C. Shunt motor.

Brake test on D.C. Shunt Motor.

Brake test on D.C. Series Motor

Section B: Electronics Engineering:

The following experiments are required to be conducted as compulsory experiments:

PN junction diode characteristics

Forward bias b) Reverse bias (Cut in voltage and Resistance calculations)

Half wave rectifier with and without filters

Full wave rectifier with and without filters.

Transistor CE characteristics (input and output)

Course Outcomes for First Year Second Semester Course	
Course Code: B19EE1203	
Course Title: BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB	
CO-1	Verify Kirchhoff's Laws & Superposition theorem for dc supply
CO-2	Analyze the performance of AC and DC Machines by testing
CO-3	Perform speed control of dc shunt motor
CO-4	Study I – V Characteristics of Diode
CO-5	Determine the ripple factor of half wave & full wave rectifiers



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Estd:1980

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SYLLABUS: ENGINEERING EXPLORATION PROJECT (B19ME1204)

(Mechanical Engineering)

Project Stream 1:

Electronics, Robotics, IOT and Sensors

Project Stream 2:

Computer Science and IT Applications

Project Stream 3:

Mechanical and Electrical tools

Project Stream4:

Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.



Estd:1980

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Regulation: R19			II / IV - B.Tech. I - Semester						
MECHANICAL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS2102	Mathematics-III	BS	3	3	--	--	25	75	100
B19 ME2101	Strength of Materials	PC	3	3	--	--	25	75	100
B19 ME2102	Engineering Thermodynamics	PC	3	3	--	--	25	75	100
B19 ME2103	Manufacturing Processes	PC	3	3	--	--	25	75	100
B19 ME2104	Metallurgy and Materials Science	PC	3	3	--	--	25	75	100
B19 ME2105	Mechanical Engineering Drawing	PC	3	2	--	2	25	75	100
B19 ME2106	Mechanical Engineering Lab	PC	1.5	--	--	3	20	30	50
B19ME2107	Manufacturing Processes Lab	PC	1.5	--	--	3	20	30	50
B19MC2101	Professional Ethics and Human Values	MC	--	3	--	--	--	--	--
B19MC2104	Introduction to Machine Learning using Python	MC	--	2	--	2	--	--	--
TOTAL			21	22	--	10	190	510	700



Estd:1980

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MECHANICAL ENGINEERING
SYLLABUS: MATHEMATICS III (B19BS2101)
(Multivariable Calculus and Fourier Analysis)

UNIT-I : Fourier Series

Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Even and odd functions, Change of interval, Half-range sine and cosine series.

UNIT-II : Fourier Transforms: Fourier integral theorem (without proof), Complex form of Fourier integral, Fourier sine and cosine integrals, Fourier transform, Fourier sine and cosine transforms, Finite Fourier transforms, properties, inverse transforms, Parseval's Identities.

UNIT-III: Single and Multiple integrals Beta and Gamma functions, Properties, Relation between Beta and Gamma functions, Applications: evaluation of improper integrals, error function and the complimentary error function.

Double and triple integrals, change of variables, Change of order of integration. Applications: Areas and volumes.

UNIT-IV: Vector Differentiation: Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.

UNIT-V: Vector Integration: Line integral, Work done, Potential function; Area, Surface and volume integrals, Flux.

Vector integral theorems: Green's, Stokes' and Gauss Divergence theorems (without proof) and related Problems.

Course Outcomes for Second Year First Semester Course	
Course Code: B19BS2101	
Course Title: MATHEMATICS III	
CO-1	Determine Fourier series and half range series of functions.
CO-2	Determine different Fourier transforms of non-periodic functions and also use them to evaluate integrals.
CO-3	Use the knowledge of Beta and Gamma functions in evaluating improper integrals.
CO-4	Evaluate double integrals, simple triple integrals & find areas and volume.
CO-5	Determine the gradient of a scalar function, divergence and curl of a vector function. Determine scalar potential.
CO-6	Apply Green's, Stokes' and Gauss divergence theorems to solve problems.



SYLLABUS: STRENGTH OF MATERIALS (B19ME2101)

UNIT-I: Simple Stresses: Stress, Strain, Stress-Strain curve, Lateral strain, Bars of varying cross-section, Compound bars, Temperature stresses in bars, Modulus of Rigidity, Complementary Shears.

Complex Stresses: Stresses acting on an inclined plane under uniaxial and biaxial state of stress, Principal planes and Principal stresses, Mohr's circle for biaxial stresses.

UNIT-II: Shear Forces and Bending Moments: Beam - Types of loads, Types of supports, types of beams, Shear Force and Bending Moment, S.F. and B.M. diagrams for cantilever, simply supported and over hanging beams loaded with point loads, Uniform Distributed loads and Moments, Relationship between Rate of Loading, Shear Force and Bending Moment

UNIT-III: Stresses in Beams: Theory of bending, Flexural formula, Determination of bending stresses- section modulus of rectangular, circular, I, and T sections, Determination of simple beam sections, Shear stresses in beams, shear stresses distribution across various beams sections like rectangular, circular, I and T.

UNIT-IV: Elastic Constants and Stain Energy: Bulk modulus, Relationship between elastic constants, Strain energy, Impact Load.

Torsional Stresses in Shafts: Analysis of torsional stresses, Power transmitted, combined bending and torsion

UNIT-V: Thin Cylinders and Spherical Shells: Stresses and strains in thin cylinders, thin spherical shell- derivation for longitudinal and circumferential stresses and volumetric strains.

Thick Cylinders: Lamé's equation- Cylinders subjected to inside and outside pressures-compound cylinders.

Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2101	
Course Title: STRENGTH OF MATERIALS	
CO-1	Understand the concepts of simple stresses and strains under different loads, and apply the knowledge for structural members and calculating principal stresses.
CO-2	Construct and interpret Shear Force and Bending Moment Diagrams for statically determinate beams under different loading conditions.
CO-3	Determine stresses due to bending of beams subjected to different loads.
CO-4	Understand the concepts of strain energy under different loading conditions, and Examine the stresses produced in circular shafts subjected to twisting moments.
CO-5	Solve for stresses and strains produced in thin and thick walled pressure vessels.



SYLLABUS: ENGINEERING THERMODYNAMICS (B19ME2102)

UNIT-I: Introduction: Basic Concepts: System, boundary, Surrounding, control volume, Universe, Types of Systems, Macroscopic and Microscopic viewpoints, Concept of Continuum, Thermodynamic Equilibrium, State, Property, Process, Cycle – Reversibility – Quasi – static Process, Irreversible Process, Causes of Irreversibility – Energy in State and in Transition, Types, Work and Heat, Point and Path function. Zeroth law of thermodynamics, Concept of equality of temperatures- Equation of state- Universal gas constant- Deviations from perfect gas model- Vanderwall's equation of state- Compressibility charts-

UNIT-II: First law of thermodynamics: Joule's experiments-First law of thermodynamics- Isolated systems and steady flow systems- Specific heats at constant volume and pressure - Enthalpy- First law applied to flow systems- Systems undergoing a cycle and change of state- First law applied to steady flow processes-various non-flow processes-Properties of end states- Heat transfer and work transfer- Change in internal energy-throttling and free expansion- Flow processes- Variable specific heats

UNIT-III: Second law of thermodynamics-Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Kelvin- Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clausius theorem Clausius Inequality, Entropy, Principle of Entropy Increase –Third Law of Thermodynamics

UNIT-IV: Air standard Cycles-Otto, Diesel, Dual Combustion cycles, Sterling Cycle, Atkinson Cycle, Ericson Cycle, Brayton cycle – Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis – Comparison of Otto- Diesel and Dual cycles based on same compression ratio- same maximum pressure and same maximum temperature.

UNIT-V: General Relations, Availability and Unavailability-Helmholtz function and Gibbs function, Maxwell's equations- Tds relations, relation between specific heats, Available energy, unavailable energy, Available and unavailable forms of energy for a flow and non-flow process-irreversibility



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Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2102	
Course Title: ENGINEERING THERMODYNAMICS	
CO-1	Apply the thermodynamic concepts in real life systems and compute properties of various perfect gases.
CO-2	Analyze the first law of thermodynamics to various thermodynamic systems undergoing different thermodynamic processes
CO-3	Apply the second law of thermodynamics to working of various heat engine and thermal efficiency of air standard cycles
CO-4	Analyze the general relation of thermodynamic functions, availability and irreversibility



SYLLABUS: MANUFACTURING PROCESSES (B19ME2103)

UNIT-I: Manufacturing concepts: Product cycle, Job, batch and mass production, Primary and secondary manufacturing processes.

Metal Casting Process: Principle of metal casting, Pattern: Materials, Allowances and Types, Core boxes, Moulding sands: ingredients, properties, preparation, types, Moulding tools, Sand moulding, Machine moulding, Melting and pouring Classification of furnaces, Cupola furnace, pouring ladles; Element of gating system, casting defects.

UNIT-II: Special Casting Techniques: Permanent mould casting, Pressure die casting, Centrifugal casting, Shell mold casting, Investment casting and CO₂ process.

UNIT-III: Metal Forming: Hot & Cold working, Rolling, Extrusion, metal spinning, Drawing, Piercing.
Sheet Metal Forming: Concept of spring back, Materials, tools, operations, embossing, coining, stretch forming.

UNIT-IV: Forging Processes: Forgability, Forging Materials, Classification: smith, drop, press and machine forging, Forging tools, Forging Operations, High energy rate forming, Swaging.

UNIT-V: Welding Processes: Welding metallurgy, Weldability, Classification: Plastic welding (Forge, Resistance & Thermit welding), Fusion welding (Gas, Arc & Thermit welding), Solid state welding (Friction, Ultrasonic, Diffusion and Explosive welding), Soldering and Brazing, Weld defects, Weld inspection and testing.

Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2103	
Course Title: MANUFACTURING PROCESSES	
CO-1	Analyze various factors involved in casting process for mould preparation, casting methods, melting, gating system design and casting defects.
CO-2	Identify various cold and hot working processes such as rolling, extrusion, drawing, spinning.
CO-3	Analyze various sheet metal operations and forging techniques.
CO-4	Distinguish various welding processes.



SYLLABUS: METALLURGY AND MATERIALS SCIENCE (B19ME2104)

UNIT-I: Structure of crystalline solids: Atomic structure & bonding in solids- Unit cell, Space lattice, Crystal structures and its types-calculations of radius, Coordination Number and Atomic Packing Factor for different cubic structures, Indices for planes and directions - Imperfection in solids, point defects, Line defects, Planar defects and Volume defects- Concept of Slip & twinning.

UNIT-II: Phase diagrams: Basic terms-Solid solutions - Gibbs phase rule- Lever rule – cooling curves- Phase diagrams - construction of phase diagrams- binary phase diagrams - Al-Cu and Al-Si phase diagrams- Invariant reactions, eutectic, peritectic, eutectoid, peritectoid reactions, metatectic & monotectic reactions, Iron carbon phase diagram -Heat treatment of steel- Annealing, and its types, normalizing, hardening, tempering, martempering, austempering.

UNIT-III: TTT diagrams, Construction of TTT diagram, TTT diagram for hypoeutectoid and alloy steels, CCT diagram- Martensitic transformation, nature of martensitic transformation- Surface hardening processes like case hardening, carburizing, cyaniding, nitriding, Induction hardening, Flame hardening, hardenability, Jominy end-quench test.

UNIT-IV: Engineering Alloys: Effect of alloying elements of steel -Properties, composition, and uses of Plain carbon, low carbon, medium & high carbon steels. stainless steels, high speed steels, Hadfield steels, tool steels - Cast irons, gray CI, white CI, malleable CI, SG Cast iron-The light alloys- Al & Mg & Titanium alloys- Copper & its alloys: brasses & bronzes, Smart materials- Nano materials.

UNIT-V: Composite Materials: Classification of composite materials, dispersion strengthened, particlereinforced and fiber reinforced composites, laminates properties of matrix and reinforcement materials and structural applications of different types of composite materials – Types of Fabrication of composite materials. Powder Metallurgy: Production of metal powders - Powder Metallurgy process and its applications.



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Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2104	
Course Title: METALLURGY AND MATERIALS SCIENCE	
CO-1	Identify the properties of metals with respect to crystal structure and analyze imperfection in crystals.
CO-2	Compute phase change parameters in isomorphism & eutectic systems and Choose appropriate heat-treatment process fulfilling given criteria.
CO-3	Analyze various I.T curves and surface hardening methods to obtain required material properties and list various engineering materials used for the specified applications.
CO-4	Analyze the powder metallurgy process, types and manufacturing methods of composite materials.



SYLLABUS: MECHANICAL ENGINEERING DRAWING (B19ME2105)

Screw threads, Screw Fastenings, keys, and Riveted joints using standard Empirical formulae.

Cotter-joints, Shaft couplings: Box and split muff couplings, Flanged, Flexible, Universal and Oldham couplings, Assembly drawing of various engine components and machine tool components (Simple eccentric, swivel bearing, plumber block, Screw Jack, Stuffing Box).

Conventional representations, Limits, Fits and Tolerances, Geometrical Tolerances, Indication of surface roughness, Production Drawings.

Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2105	
Course Title : MECHANICAL ENGINEERING DRAWING	
CO-1	Apply standard empirical formulae for various screw threads, screw fastenings, keys and joints. Identify the various shaft couplings and bearings.
CO-2	Prepare assembly drawing of various mechanical components.
CO-3	Identify various symbols for materials, machining operations and welded joints. Calculate tolerances to obtain various fits. Identify geometrical tolerances and surface finish symbols.
CO-4	Prepare process sheets and production drawings various components



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SYLLABUS: MECHANICAL ENGINEERING LAB (B19ME2106)

LIST OF EXPERIMENTS:

1. Study and valve timing diagrams for four-stroke and study & PTD of two-stroke engines.
2. Determination of volumetric efficiency of the given air compressor by (i) plate orifice method and (ii) tank capacity method.
3. Calibration of the given pressure gauge.
4. Determination of flash and fire points and b) Canradsons carbon residue test.
5. Determination of calorific value of flues (solid, liquid and gaseous) by Bomb calorimeter/Gas calorimeter.
6. Determination of the kinematic and absolute viscosity of the given sample oils.
7. Determination of inertia of the given flywheel and connecting rod.
8. Determination of modulus of rigidity of the given wire with torsion pendulum.
9. Study of boilers, various mountings and accessories.
10. Assembling of the given two-stroke petrol engine. (Instead of engine, any mechanical unit can be given for this experiment.)

Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2106	
Course Title: MECHANICAL ENGINEERING LAB	
CO-1	Assess the environmental, societal safety and health issue through determining the flash & fire point of various lubricating oils as well as fuels, along with computing the viscosity of lubricating oils
CO-2	Functioning and communicating as an individual in a team to write and prepare effective reports on experiments conducted in the laboratory



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SYLLABUS: MANUFACTURING PROCESSES LAB (B19ME2107)

LIST OF EXPERIMENTS:

1. Prepare a Sand mould of stepped pulley
2. Prepare a Sand mould of bend pipe
3. Prepare a Sand mould of flanged pipe
4. Inspect the Grain Fineness number of silica sand.
5. Examine the Moisture and clay content in the given moulding sand.
6. Analyze the Compression strength of moulding sand specimen.
7. Analyze the Hardness of moulding sand specimen.
8. Prepare a S hook using forging operations.
9. Prepare a Vent rod using forging operations.
10. Prepare a Lap joint by Arc welding process
11. Prepare a Butt joint by Arc welding process
12. Prepare a T joint by Arc welding process

Course Outcomes for Second Year First Semester Course	
Course Code: B19ME2107	
Course Title: MANUFACTURING PROCESSES LAB	
CO-1	Apply the knowledge of casting, welding and forging to make various sand moulds, welded joints and forged Components
CO-2	Distinguish various moulding sand tests



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SYLLABUS: PROFESSIONAL ETHICS AND HUMAN VALUES (B19MC2101)
(Common to CSE, IT & Mechanical)

UNIT-I: Human Values: Morals, Values and Ethics-Integrity-Work Ethic-Service learning Civic Virtue Respect for others Living Peacefully Caring Sharing Honesty -Courage-Cooperation Commitment Empathy Self Confidence Character Spirituality.

UNIT-II: Engineering Ethics: Senses of 'Engineering Ethics-Variety of moral issued- Types of inquiry Moral dilemmasMoral autonomy- Kohlberg's theory- Gilligan's theory-Consensus and controversy Models of professional roles-Theories about right action-Self-interest -Customs and religion Uses of Ethical theories Valuing time Cooperation Commitment.

UNIT-III: Engineering as Social Experimentation: Engineering As Social Experimentation- Framing the problem- Determining the facts codes of Ethics- Clarifying Concepts- Application issues Common Ground - General Principles- Utilitarian thinking respect for persons.

UNIT-IV: Engineers Responsibility for Safety and Risk: Safety and risk Assessment of safety and risk. Risk benefit analysis and reducing risk-Safety and the Engineer-Designing for the safety- Intellectual Property rights (IPR).

UNIT-V: Global Issues: Globalization- Cross-culture issues-Environmental Ethics- Computer Ethics Computers as the instrument of Unethical behavior Computers as the object of Unethical acts Autonomous Computers- Computer codes of Ethics- Weapons Development -Ethics and Research Analyzing Ethical Problems in research.

Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2101	
Course Title: PROFESSIONAL ETHICS AND HUMAN VALUES	
CO-1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships and field work.
CO-2	Identify the multiple ethical interests at stake in a real-world situation or practice and Articulate what makes a particular course of action ethically defensible.
CO-3	Assess their own ethical values and the social context of problems.
CO-4	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
CO-5	Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.



SYLLABUS: INTRODUCTION TO MACHINE LEARNING USING PYTHON (B19MC2104)

UNIT-I: Introduction to Python:

About Python, History, Features of Python, Variables, Data Types, Operations, Operators, FOR loops, IF loops, WHILE loops, Python Classes and Python Methods

UNIT-II: NumPy Arrays, Pandas and Matplotlib:

NumPy arrays, Array creation, Indexing and slicing, Lists, Tuples, Dictionary, Sets, Pandas Data Frame: Reading and Writing a Data Frame, Creating and Extracting Features, Conversion of Categorical Data to Numerical Data, Merging Data Frames. Data Visualization: Use of Matplotlib Library for Various Plots like Scatter, Bar, Histogram plots, Introduce Various Correlation Techniques.

UNIT-III: Introduction to Machine Learning:

Introduction to Artificial Intelligence (AI), Machine Learning and Deep Learning, Types of Machine Learning: Supervised, unsupervised & Reinforced Learning, Machine Learning Pipeline: Loading, Preprocessing, Normalizing of Data, Train and Test Split, Evaluation Methods

UNIT-IV: Various ML Algorithms:

Supervised: *Regression*: Simple Linear, Multiple Linear, Polynomial, Logarithmic, Quadratic, Exponential, Sigmoidal Regression. *Classification*: Decision Tree, K-Nearest Neighbor, Logistic and Support Vector Machine classifiers.

Unsupervised Learning: K-means Clustering, Hierarchical Clustering and DBSCAN.

UNIT-V: Building models:

Building of best machine learning model for 4 different real data

Course Outcomes for Second Year First Semester Course	
Course Code: B19MC2104	
Course Title: INTRODUCTION TO MACHINE LEARNING USING PYTHON	
CO-1	Understand basic fundamentals of python programming
CO-2	Acquire in-sights into Numpy, Pandas & Matplotlib
CO-3	Understand the importance of machine learning
CO-4	Differentiate supervised & unsupervised learning
CO-5	Build his own machine learning algorithm to deal with real data



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Regulation: R19				II / IV - B.Tech. II - Semester					
MECHANICAL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
B19 BS2201	Mathematics-IV	BS	3	3	-	-	25	75	100
B19 ME2201	Advanced Strength of Materials	PC	3	3	-	-	25	75	100
B19 ME2202	Applied Thermal Engineering	PC	3	3	-	-	25	75	100
B19 ME2203	Metal Cutting and Machine Tools	PC	3	3	--	--	25	75	100
B19 ME2204	Fluid Mechanics	PC	3	3	--	--	25	75	100
B19 HS2201	Managerial Economics and Financial Accountancy	HS	3	3	--	--	25	75	100
B19 ME2205	Strength of Materials Lab	PC	1.5	--	--	3	20	30	50
B19ME 2206	Machine Tools Lab	PC	1.5	--	--	3	20	30	50
B19 MC 2202	Constitution of India	MC	0	3	--	--	--	--	--
TOTAL			21	21	--	6	190	510	700



MECHANICAL ENGINEERING
SYLLABUS: MATHEMATICS-IV (B19BS2201)
(COMPLEX VARIABLES AND STATISTICAL METHODS)

UNIT-I: Functions of a Complex Variable: Review- Cartesian form and polar form of a complex variable, Real and imaginary parts of z^n , e^z , $\sin z$, $\sinh z$ and $\log z$ (**no questions may be set on the review portion**).

Limit and continuity of a function of a complex variable, derivative, analytic function, entire function, Cauchy-Riemann equations, determine an analytic function based on the knowledge of its real and imaginary parts, Milne-Thomson method, Applications of analytic function to flow problems, and in Electrostatics. Conformal mapping: the transformations defined by $w = z+c$, $w = cz$, $w = 1/z$. The Bilinear transformation.

UNIT-II: Complex Integration: Line integral, Cauchy's integral theorem, Cauchy's integral formula. Expansion of a function in a Taylor series, McLaren series and Laurent series. Types of singularities, Residues, Cauchy's residue theorem. Evaluation of real definite integrals -integration around unit circle (Theorems without proofs).

UNIT-III: Difference equations and Z-transforms: Formation of a difference equation, Rules for finding complementary function and particular integral for linear difference equations.

Definition of Z- transform, some standard Z- transforms, properties, transform of a function multiplied by n, initial value theorem and final value theorem (without proof), evaluation of inverse Z- transforms, convolution theorem (without proof), solution of linear difference equations by the use of Z- transforms.

UNIT-IV: Probability Distributions: A brief review of random variables, Binomial, Poisson and Normal distributions, definitions of pmf/ pdf, notation, mean, variance, moment generating function. Fitting of Binomial or Poisson distributions for a given frequency distribution.

UNIT-V: Sampling theory and Testing of Hypothesis: Sampling theory: Introduction, population and samples, Sampling distribution, standard error, central limit theorem (without proof), level of significance, procedure of testing of hypothesis.

Large samples: Testing of hypothesis for single proportion and two proportions.

Small samples: Degrees of freedom, Students' t- distribution, t-test for single mean, two means; Chi- squared distribution, test for goodness of a fit.



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Course Outcomes for Second Year Second Semester Course	
Course Code: B19BS2201	
Course Title: MATHEMATICS-IV	
CO-1	Comprehend the concept of Analytic function and apply in Electrostatics and Fluid dynamics
CO-2	Determine Laurent series of functions about isolated singularities, and determine residues. Use the residue theorem to evaluate certain real definite integrals.
CO-3	Formulate and solve linear difference equations.
CO-4	Use Z-transforms to solve linear difference equations with constant coefficients.
CO-5	Identify a random variable as discrete/continuous, find its expected value and also fit a probability distribution for a given frequency distribution.
CO-6	Decide the test applicable and apply it for giving inference about Population Parameter based on sample statistic for some large samples and small samples.



SYLLABUS: ADVANCED STRENGTH OF MATERIALS (B19ME2201)

UNIT-I: Deflections of Beams: Relation between curvature, slope and deflection; Slope and deflection of cantilever, simply supported and overhanging beams – Macaulay's method and Moment area method.

UNIT-II: Fixed Beams: Relations between fixing moments of a fixed beam of uniform cross section, BMD & SFD of fixed beams of uniform and variable cross sections, Effect of sinking of support.

UNIT-III: Continuous beams: Clapeyron's theorem of three moments for a continuous beam of varying and uniform cross sections, BMD & SFD of continuous beams of uniform cross section, Effect of sinking of support.

UNIT-IV: Columns and Struts: Buckling of columns, Euler's theory – Columns with both ends hinged, both ends fixed, one end fixed and other end hinged, one end free and other end fixed, Limitation of Euler's formula, Empirical formulae – Rankine's formula, Column carrying eccentric load.

UNIT-V Bending of Curved Bars: Winkler-Bach theory of curved bars subjected to uniform bending moment – rectangular, circular, and trapezoidal cross sections, Stresses in a crane hook.

Course Outcomes for Second Year Second Semester Course	
Course Code: B19ME2201	
Course Title: ADVANCED STRENGTH OF MATERIALS	
CO-1	Apply the knowledge of mathematics and engineering fundamentals to solve the problems of slope and deflection of statically determinate beams.
CO-2	Acquire the knowledge of constructing Shear Force and Bending Moment diagrams for fixed Beams.
CO-3	Acquire the knowledge of constructing Shear Force and Bending Moment diagrams for continuous Beams.
CO-4	Apply different theories to design the columns and struts subjected to different load conditions.
CO-5	Investigate various structural members such as curved bars, subjected to different loading conditions for determination of stresses and Strains.



SYLLABUS: APPLIED THERMAL ENGINEERING (B19ME2202)

UNIT-I Properties of Pure Substance: Definition of pure substance, phase change of a pure substance, p-T (Pressure-Temperature) diagram for a pure substance, p-V-T(Pressure-Volume-Temperature) surface, phase change terminology and definitions, property Diagrams in common use, Formation of steam, Important terms relating to steam formation, Thermodynamic properties of steam and steam tables, External work done during evaporation, Internal latent heat, Internal energy of steam, Entropy of water, Entropy of evaporation, Entropy of wet steam, Entropy of superheated steam, Enthalpy-Entropy (h-s) charts for Mollier diagram, Determination of dryness fraction-Tank or bucket calorimeter, throttling calorimeter, separating and throttling calorimeter.

UNIT-II: Vapor Power Cycles: Vapor power cycle- Rankine cycle- Reheat cycle- Regenerative cycle- Thermodynamic variables effecting efficiency and output of Rankine and Regenerative cycles- Improvements of efficiency, Binary vapor power cycle.

UNIT-III: Steam Nozzles: Type of nozzles- Flow through nozzles- Condition for maximum discharge- Nozzle efficiency- Super saturated flow in nozzles- Relationship between area velocity and pressure in nozzle flow- Steam injectors.

UNIT-IV: Steam Turbines: Classification of steam turbines- Impulse turbine and reaction turbine- Compounding in turbines- Velocity diagrams in impulse and reaction turbines- Degree of reaction- Condition for maximum efficiency of reaction turbines- Effect of friction on turbines constructional features governing of turbines.

UNIT-V: Condensers: Classification of condenser- Jet, Evaporative and surface condensers- Vacuum and its measurement- Vacuum efficiency- Sources of air leakage in condensers- Condenser efficiency- Daltons law of partial pressures- Determination of mass of cooling water- Air pumps.

Steam Boilers:

Working principle of various boilers their accessories and mountings (Simple vertical, Cochran, Babcock & Wilcox and Lancashire Boiler), Performance of boilers (simple problems)



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Course Outcomes for First Year First Semester Course	
Course Code: B19ME2202	
Course Title: APPLIED THERMAL ENGINEERING	
CO-1	Apply the laws of thermodynamics for estimating the properties of pure substance
CO-2	Analyze the working of vapour power cycles and their performance
CO-3	Analyze the functionality of steam nozzle and steam Turbine in power plants to estimate their performance
CO-4	Apply the laws of thermodynamics for estimating the performance of steam Condensers and steam boilers in power plants



SYLLABUS: METAL CUTTING AND MACHINE TOOLS (B19ME2203)

UNIT-I: Mechanics of Metal Cutting: Orthogonal and oblique cutting, mechanics of chip formation, types of chips; classification, nomenclature, signature (ASA & ISO systems) of single point cutting tools, tool materials; tool wear and tool life; Cutting forces-Merchant's circle, Machinability, Cutting fluids.

UNIT-II: Machine tools using Single point cutting tools: Engine lathe; Capstan and turret lathe, shaper, planner, Slotter and boring-Types, Parts, Specifications, Mechanisms, Operations and machining parameters.

UNIT-III: Machine tools using Multi point cutting tools: Drilling machine- Types, Parts, Specifications, Mechanisms, Types of drills, Nomenclatures of twist drill, Operations and machining parameters **Milling machine-**Types, Parts, Specifications, Mechanisms, Attachments, Types of Milling cutters, Nomenclature of plain milling cutter, Operations, machining parameters, Indexing-Differential Indexing method. **Broaching machine-**Types, Parts, Specifications, Types of Broaches, Nomenclature of pull broach, Operations and machining parameters

UNIT-IV: Machine tools using Abrasive wheels: Grinding Machine- Types, Parts, Specifications, Manufacturing of grinding wheel-bonding processes, grit, grade and structure, selection of grinding wheels, mounting of grinding wheels, glazing, loading, dressing and truing of grinding wheel, Operations and machining parameters Micro finishing Operations-Lapping, honing, super finishing, polishing and buffing

UNIT-V: Unconventional Methods of Machining: Process, Characteristics, Advantages, Limitations, Applications of Abrasive Jet Machining (AJM), Ultrasonic Machining (USM), Water Jet Machining (WJM), Electro Discharge Machining (EDM), Wire-cut EDM, Electron Beam Machining (EBM), Plasma Arc Machining (PAM), Laser Beam Machining (LBM), Chemical milling; Photochemical milling, Electro Chemical Machining (ECM), Electro Chemical Grinding (ECG)



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Course Outcomes for First Year Second Semester Course	
Course Code: B19ME2203	
Course Title: METAL CUTTING AND MACHINE TOOLS	
CO-1	Analyze mechanics of metal cutting to determine cutting forces, tool life, tool wear.
CO-2	Differentiate various machining operations on lathe, shaper, planer, slotting and boring machine tool
CO-3	Illustrate various machining operations on milling, drilling, broaching and grinding machines.
CO-4	Distinguish various Unconventional methods of machining process such as AJM, USM, EDM, ECM.



SYLLABUS: FLUID MECHANICS (B19ME2204)

UNIT-I: Properties of fluids- Introduction-Viscosity- Pressure and its measurement, Absolute, Gauge, Atmospheric and Vacuum pressure – Manometers, Simple manometers, Differential manometers. Hydrostatic forces on surfaces- Total Pressure and Pressure Centre- Vertical, Horizontal, inclined and curved plane surfaces submerged in liquid- Buoyancy and Flotation

UNIT-II: Fluid Kinematics & Fluid Dynamics: Types of fluid flow- Continuity equation- Velocity potential function and Stream Function- Types of Motion, Linear Translation, Linear deformation, Angular deformation, Rotation, free and forced vortex flow – Euler's equation -Bernoulli's equation and its applications-Venturimeter, Orifice Meter, Pitot tube-Momentum Equation.

UNIT-III: Flow through pipes: Hagen Poiseuille equation- Reynolds experiment - Loss of head due to friction in pipes, Darcy Weisbach equation, Chezy's equation - Minor losses in pipes - pipes in series and pipes in parallel, total energy line-hydraulic gradient line. Flow through branched pipes.

Dimensional and Modeling Analysis: Fundamental and derived dimensions- Dimensionless groups- Rayleigh method- Buckingham's π -theorem- Model Analysis - Types of similarity- Geometric, Kinematic and Dynamic similarities- Dimensionless numbers- Model Laws.

UNIT-IV: Laminar Boundary Layer: Definition- Laminar Boundary Layer- Turbulent Boundary Layer - Laminar sub layer- Boundary layer thickness-Displacement thickness, Momentum thickness and Energy thickness- Momentum integral equation- Flow over a flat plate.

Turbulent Boundary Layer: Laminar, turbulent, transition- Momentum equations and Reynold's stresses- Fully developed turbulent flow through a pipe- Turbulent boundary layer on a flat plate- Laminar sub-layer- Boundary layer separation and control.

UNIT-V: Compressible Fluid Flow: Thermodynamic relations- Continuity, Momentum and Energy equations- Velocity of sound in a compressible fluid- Mach number and its significance- Limits of incompressibility- Pressure field due to a moving source of disturbance- Propagation of pressure waves in a compressible fluids- Stagnation properties- Stagnation pressure, Temperature and density- Area velocity relationship for compressible flow.



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Course Outcomes for First Year Second Semester Course	
Course Code: B19ME2204	
Course Title: FLUID MECHANICS	
CO-1	Understand the basic concepts and properties of fluids.
CO-2	Apply the principles of fluid kinematics and dynamics in solving problems.
CO-3	Analyze and solve fluid flow problems in pipe and apply the concepts of dimensional analysis.
CO-4	Understand and analyze boundary layer concepts.
CO-5	Apply compressible fluid flow theory in solving aerospace and other systems.



SYLLABUS: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY (B19HS2201)

UNIT-I: Introduction to Economics: Wealth, Welfare and Scarce Definitions of Economics; Micro & Macro Economics.

Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of demand – Meaning, types, Significance of Elasticity of Demand, Measurement of price Elasticity of Demand.

Need for Demand forecasting, forecasting techniques.

UNIT-II: Cost Analysis: Classification of cost, Elements of cost, Methods of costing (Job costing, Process costing & Unit costing).

Break-Even Analysis (BEA): Determination of Break-Even Point, Assumptions and Applications.

UNIT-III: Market Structures: Features and price determination under Perfect competition, Monopoly, Monopolistic competition and Oligopoly.

Pricing practices: Price - meaning, methods of pricing.

UNIT-IV: Economic Systems: Features and Evaluation of Capitalism, Socialism and Mixed Economy.

Business cycles: Meaning, Phases, Causes & theories of Business Cycle.

UNIT-V: Depreciation and Financial Accounting: Depreciation-causes and methods (straight line method, diminishing balance method).

Financial Accounts: Preparation of Trading Account, Profit & Loss Account and Balance sheet.

Course Outcomes for First Year Second Semester Course	
Course Code: B19HS2201	
Course Title: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY	
CO-1	Able to analyse Demand.
CO-2	Able to Calculate BEP
CO-3	Able to understand Pricing Practices
CO-4	Able to understand Economics Systems and Business Cycles
CO-5	Able to Calculate Depreciation and Final Accounts



SYLLABUS: STRENGTH OF MATERIALS LAB (B19ME2205)

1. Tensile test on mild steel specimen.
2. Compression test on wooden specimen
3. Single and double shear tests on mild steel specimen.
4. Torsion Test on solid circular shaft.
5. Izod impact test on given material
6. Charpy impact test on given material
7. Brinell hardness test on given material
8. Rockwell hardness test on given material
9. Vickers hardness test on given material
10. Compression and tension tests on helical springs

11. .

Course Outcomes for First Year Second Semester Course	
Course Code: B19ME2205	
Course Title: STRENGTH OF MATERIALS LAB	
CO-1	Analyze the relationship between load and deformation of different materials under the influence of axial (tensile & compressive), shear and bending loads.
CO-2	Analyze the torsional stresses produced in different machine members, e.g., shafts and springs, and to compute the rigidity modulus of their materials.
CO-3	Examine the strength of different materials under impact loads.
CO-4	Determine the indentation hardness of different materials on different hardness scales.



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SYLLABUS: MACHINE TOOLS LAB (B19ME2206)

1. Perform Step turning & Taper Turning on a given specimen
2. Perform Knurling and Thread Cutting on a given specimen
3. Perform Form turning and Thread cutting on a given specimen
4. Perform Eccentric turning on a given specimen
5. Machining of horizontal, vertical, step and Angular surface on a shaper machine
6. Perform Gear Cutting on a milling machine.
7. Analyze the cutting tool tip temperature in turning.
8. Inspect the single point cutting tool angles
9. Measurement of surface roughness

Course Outcomes for First Year First Semester Course	
Course Code: B19ME2206	
Course Title: MACHINE TOOLS LAB	
CO-1	Distinguish various machining operations on Lathe, Shaper and Milling.
CO-2	Analyze the shear angle, tool tip temperature and surface roughness by applying the knowledge of metal cutting.



SYLLABUS: CONSTITUTION OF INDIA (B19MC2202)

UNIT-I: Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes: After completion of this unit student will

Understand the concept of Indian constitution

Apply the knowledge on directive principle of state policy

Analyze the History, features of Indian constitution

Evaluate Preamble Fundamental Rights and Duties

UNIT-II: Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning outcomes:-After completion of this unit student will

Understand the structure of Indian government

Differentiate between the state and central government

Explain the role of President and Prime Minister

Know the Structure of supreme court and High court

UNIT-III: State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Learning outcomes:-After completion of this unit student will

Understand the structure of state government

Analyze the role Governor and Chief Minister

Explain the role of state Secretariat

Differentiate between structure and functions of state secretariat

UNIT-IV: Local Administration - District's Administration Head - Role and Importance, Municipalities

- Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning outcomes:-After completion of this unit student will

Understand the local Administration

Compare and contrast district administration role and importance



Analyze the role of Myer and elected representatives of Municipalities

Evaluate Zillapanchayat block level organization

UNIT-V: Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission; Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes:-After completion of this unit student will Know the role of Election Commission apply knowledge

Contrast and compare the role of Chief Election commissioner and Commissiononerate Analyze role of state election commission

Evaluate various commissions of viz SC/ST/OBC and women.

Course Outcomes for First Year Second Semester Course	
Course Code: B19MC2202	
Course Title: CONSTITUTION OF INDIA	
CO-1	Understand historical background of the constitution making and its importance for building a democratic India.
CO-2	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
CO-3	Understand the value of the fundamental rights and duties for becoming good citizen of India.
CO-4	Analyze the decentralization of power between central, state and local self- government.
CO-5	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
CO-6	a. Know the sources, features and principles of Indian Constitution. b. Learn about Union Government, State government and its administration. c. Get acquainted with Local administration and Pachayati Raj. d. Be aware of basic concepts and developments of Human Rights. e. Gain knowledge on roles and functioning of Election Commission



CIVIL ENGINEERING



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Regulation: R19				I / II - M.Tech. I - Semester					
STRUCTURAL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19 ST1101	Theory of Elasticity	PC	3	3	0	0	25	75	100
M19 ST1102	Structural Dynamics	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19 ST1109	Advanced Concrete Technology	PC	2	2	0	0	25	75	100
M19ST1110	Advanced Concrete Laboratory	PC	2	0	0	4	25	75	100
M19 ST1111	Advanced Structural Engineering Laboratory	PC	2	0	0	4	25	75	100
#AC-1	Audit course -I	AC	0	2	0	0	0	0	0
TOTAL			18	16	0	8	175	525	700

	Code	Course		Code	Course
#PE-I	M19ST1103	Matrix Methods of Structures	#A C 1 & 2	M19AC0001	English for Research Paper Writing
	M19ST1104	Analytical & Numerical Methods for Structural Engineering		M19AC0002	Disaster Management
	M19ST1105	Design of RCC Foundations		M19AC0003	Sanskrit for Technical Knowledge
				M19AC0004	Value Education
#PE-II	M19ST1106	Bridge Engineering		M19AC0005	Constitution of India
	M19ST1107	Repair and Rehabilitation of Structures		M19AC0006	Pedagogy Studies
	M19ST1108	Advanced Reinforced Concrete Design		M19AC0007	Stress Management by Yoga
				M19AC0008	Personality Development through Life Enlightenment Skills.

STRUCTURAL ENGINEERING

SYLLABUS : THEORY OF ELASTICITY (M19ST1101)

UNIT-I: Elasticity – Notation for forces and stresses – components of stresses and strains – Hooke's Law - Plane Stress – Plane strain – Differential Equations of equilibrium – Boundary conditions – Compatibility equations - Stress function – Boundary Conditions.

UNIT-II : Two dimensional problems in rectangular co- ordinates – Solution by polynomials – Saint Venant's principle – Determination of displacements – Bending of simple beams – Application of Fourier series for two dimensional problems for gravity loading

UNIT-III: Two dimensional problems in polar co- ordinates - General equations in polar co- ordinates– Stress distribution for problems having symmetrical about an axis - Strain components in polar co- ordinates– Displacements for symmetrical stress distributions - Stresses for plates with circular holes subjected to far field tension – stress concentration factor.

UNIT-IV: Analysis of stress and strain in three dimension - Principal stresses – Stress ellipsoid and stress director surface – Determination of principal stresses - Maximum shear stress – Homogeneous Deformation – General Theorems - Differential equations of equilibrium – Conditions of compatibility– Equations of equilibrium in terms of displacements – Principle of superposition – Uniqueness of solution –Reciprocal theorem.

UNIT-V: Torsion of Prismatic bars – Bars with elliptical cross section – Other elementary solution Membrane analogy – Torsion of rectangular bars – Solution of Torsional problems by energy method.

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1101	
Course Title: THEORY OF ELASTICITY	
CO-1	Understand the notations of stress and strain
CO-2	Analyze the stresses and strains in rectangular co-ordinate system and
CO-3	Analyze the stresses and strains in polar co-ordinate system
CO-4	Evaluate the equilibrium and compatibility conditions
CO-5	Analyze members for different shaped bars subjected to torsion.



SYLLABUS: STRUCTURAL DYNAMICS (M19ST1102)

UNIT-I: Theory of vibrations: Introduction - Elements of vibratory system - Degrees of Freedom - Continuous System - Lumped mass idealization - Oscillatory motion - Simple Harmonic motion - Victorian representation of S.H.M. - Free vibrations of single degree of freedom system – un damped and damped vibrations - critical damping - Logarithmic decrement - Forced vibration of SDOF systems - Harmonic excitation - Vibration Isolation - Dynamic magnification factor – Phase angle.

UNIT-II: Introduction to Structural Dynamics : Fundamental objectives of dynamic analysis -Types of prescribed loading - Methods of discretization - Formulation of equations of motion by different methods – Direct equilibration using Newton's law of motion / D'Alembert's Principle, Principle of virtual work and Hamilton principle. **Single Degree of Freedom Systems:** Formulation and solution of the equation of motion - Free vibration response - Response to Harmonic, Periodic, Impulsive and general dynamic loadings - Duhamel integral.

UNIT-III: Multi Degree of Freedom Systems: Selection of the degrees of Freedom - Evaluation of structural property matrices - Formulation of the MDOF equations of motion -Undamped free vibrations - Solutions of Eigen value problem for natural frequencies and mode shapes - Analysis of Dynamic response – Normal co-ordinates - Uncoupled equations of motion - Orthogonal properties of normal modes - Mode superposition procedure.

UNIT-IV: Practical Vibration Analysis: Introduction - Stodola method - Fundamental mode analysis - Analysis of second and higher modes - Holzer method - Basic procedure. **Continuous Systems:** Introduction - Flexural vibrations of beams - Elementary case – Derivation of governing differential equation of motion - Analysis of undamped free vibrations of beams in flexure - Natural frequencies and mode-shapes of simple beams with different end conditions – Principles of application to continuous beams.

UNIT-V: Introduction to Earthquake Analysis: Deterministic Earthquake Response: Systems on Rigid Foundations -Types of Earthquake Excitations – Lumped SDOF Elastic Systems, Translational Excitations - Generalized coordinate -SDOF Elastic Systems, Translational Excitations, Linear Static Method – Analysis for obtaining response of multi storied RC Building.



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Course Outcomes for First Year First Semester Course	
Course Code: M19ST1102	
Course Title: STRUCTURAL DYNAMICS	
CO-1	Understand the response of structural systems to dynamic loads
CO-2	Understand the behavior and response of linear and nonlinear SDOF and MDOF structures with various dynamic loading
CO-3	Understand the behavior and response of MDOF structures with various Dynamic loading.
CO-4	Possess the ability to find out suitable solution for continuous system
CO-5	Understand the behavior of structures subjected to dynamic loads under free vibration
CO-6	Understand the behavior of structures subjected to dynamic loads Harmonic excitation and earthquake load.



SYLLABUS: MATRIX METHODS OF STRUCTURES (M19ST1103)

UNIT-I: Introduction of matrix methods of analysis – Static and kinematic indeterminacy – Degree of freedom – Structure idealization- stiffness and flexibility methods – Suitability: Element -stiffness matrix for truss element, beam element and Torsional element-Element force-displacement equations.

UNIT-II: Stiffness method – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of simple pin jointed trusses – continuous beams – rigid jointed plane frames

UNIT-III: Stiffness method for Grid elements – development of stiffness matrix coordinates transformation. Examples of grid problems – tapered and curved beams

UNIT-IV: Additional topics in stiffness methods – discussion of band width – semi band width – static condensation – sub structuring – Loads between joints- Support displacements- inertial and thermal stresses- Beams on elastic foundation by stiffness method.

UNIT-V: Analysis of plane truss - continuous beams with and without settlement - plane frame including side sway single storey, single – bay and gable frame by flexibility method using system approach.

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1103	
Course Title: MATRIX METHODS OF STRUCTURES	
CO-1	Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent displacements, force and equilibrium Methods
CO-2	Perform structural analysis using the stiffness method.
CO-3	Solve multiple degree of freedom two and three dimensional problems involving trusses, beams, frames and plane stress
CO-4	Understand basic finite element analysis



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**SYLLABUS: ANALYTICAL & NUMERICAL METHODS FOR STRUCTURAL ENGINEERING
(M19ST1104)**

UNIT-I: Transform Methods- Laplace transform methods for one-dimensional wave equation - Displacements in a long string - Longitudinal vibration of an elastic bar - Fourier transforms methods for one-dimensional heat conduction problems in infinite and semi- infinite rod.

UNIT-II: Elliptic Equations- Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation **Calculus Of Variations-** Variation and its properties - Euler's equation - Functional dependent on first and higher order derivatives - Functional dependent on functions of several independent variables - Some applications - Direct methods - Ritz and Kantorovich methods

UNIT-III: Integral Equations- Fred holm and Volterra integral equations - Relation between differential and integral equations - Green's function –Fred holm equation with separable kernel - Iterative method for solving equations of second kind.

UNIT-IV: Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulas using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems - Richardson's extrapolation - Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations – Application to Simply Supported Beams, Columns & rectangular Plates.

UNIT-V: Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation. Numerical Integration: Methodbased on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method – New Marks Method and Applicationto Beams – Calculations of Slopes & Deflections.



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Course Outcomes for First Year First Semester Course	
Course Code: M19ST1104	
Course Title: ANALYTICAL & NUMERICAL METHODS FOR STRUCTURAL ENGINEERING	
CO-1	Understand the applications of Laplace and Fourier transforms
CO-2	Implement the principles and techniques of Variations
CO-3	Find the solutions for different kinds of integral equations
CO-4	Adopt the principles and techniques of finite difference methods
CO-5	Use Numerical differentiation and integration techniques for finding numerical solutions



SYLLABUS: DESIGN OF REINFORCED CONCRETE FOUNDATIONS (M19ST1105)

UNIT-I: Foundation Structures & Design of Centrally Loaded Isolated Footings and Column Pedestals –

Introduction, Rigid and Flexible Foundations, Loads and their Effects, Design Requirements, Geotechnical Design, Empirical and Exact Methods of Analysis of foundations, Design Loads for Foundations, Recommended Approach to Structural Design of Foundations. Introduction, General Procedure for Design, Design of Square Footing of Uniform Depth (Pad Footing), Design of sloped Rectangular Footings, Design Procedure, Detailing of Steel, Design of Rectangular Pad Footings, Design of Plain Concrete Footings, Design of Pedestals, Design Calculation for Pedestals.

UNIT-II: Wall Footings – Introduction Simple Plain Concrete Wall Footings, Reinforced Concrete Continuous Strip Wall Footings, Design of continuous Strip Wall Footings, Design for Longitudinal Steel, R.C.T Beam Footings in Shrinkable Soils, Foundations of Partition Wall in Ground Floors, Summary. Strip Footings Under Several Columns – Introduction, Design Procedure for Equally loaded and Equally Spaced Columns, Analysis of Continuous Strip Footing for Unsymmetrical Loading, Analysis of Strip Footing with Unsymmetrical Loads, Detailing of Members.

UNIT-III: Raft Foundations – Introduction, Rigid and Flexible Foundations, common Types of Rafts, Deflection Requirements of Beams and Slabs in Rafts, General considerations in Design of Rigid Rafts, Types of Loadings and Choice of Rafts, Record of Contact Pressures Measured Under Rafts, Modern Theoretical Analysis. **Design of Flat Slab Rafts-Mat Foundations** – Introduction, Components of Flat Slabs, Preliminary Planning of Flat Slab Rafts, Analysis of Flat Slab by Direct Design Method, Method of Analysis, Values for Longitudinal Distribution and Transverse, Redistribution, Shear in Flat Slabs, Bending of Columns in flat Slabs, Limitations of Direct Design Method for Mats, Detailing of Steel, Design of Edge Beam in Flat Slabs. **Beam and Slab Rafts** – Introduction, Planning of the Raft, Action of the Raft, Approximate Dimensioning of the Raft, Design of the Beam and Slab Raft under Uniform Pressure, Structural Analysis for the Main Slab, Design of Secondary and Main Beams, Analysis by Winkler Model, Detailing of Steel.

UNIT-IV: Combined Piled Raft Foundations (CPRF) – Introduction, Types and uses of Piled Rafts, , Interaction of Pile and Raft, Ultimate Capacity and Settlement of Piles, Estimation of Settlement of Raft in Soils, Allowable Maximum and Differential Settlement in Buildings, Design of CPRF System, conceptual Method of Design, Conceptual Method of Analysis, Distribution of Piles in the Rafts, Theoretical Methods of Analysis. Circular and Annular Rafts – Introduction, Positioning of chimney Load on Annular Raft, Forces Acting on Annular Rafts, Pressures Under Dead Load and Moment, Methods of Analysis, Conventional Analysis of Annular



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Rafts, Analysis of Ring Beams Under circular Layout of Columns, Analysis of Ring Beam Transmitting Column Load to Annular Rafts, Detailing of Annular Raft Under Columns of a Circular Water Tank.

UNIT-V: Under-reamed Pile Foundations – Introduction, Safe Loads on Under-reamed Piles, Design of Under-reamed Pile Foundation for Load Bearing Walls of Buildings, Design of Grade Beams, Design of Under-reamed Piles Under Columns of Buildings, Use of Under-reamed Piles for Expansive Soils. Design of cantilever and Basement Retaining Walls – Introduction, Earth Pressure and Rigid Walls, Calculation of Earth Pressure on Retaining Walls, Design of Rigid Walls, Design of Ordinary R.C. cantilever Walls, Design of cantilever Walls without Toe, Design of Basement Walls, Calculation of Earth Pressures in Clays, Design of Free Standing Basement Walls.

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1105	
Course Title: DESIGN OF REINFORCED CONCRETE FOUNDATIONS	
CO-1	Attain the perception of site investigation to select suitable type of foundation based on soil category
CO-2	Capable of ensuring design concepts of shallow foundation
CO-3	Can be efficient in selecting suitable type of pile for different soil stratum and inevaluation of group capacity by formulation
CO-4	Design different types of well foundation



SYLLABUS: BRIDGE ENGINEERING (M19ST1106)

UNIT-I: Concrete Bridges: Introduction-Types of Bridges-Economic span length-Types of loading- Dead load-live load-Impact Effect-Centrifugal force-wind loads-Lateral loads-Longitudinal forces- Seismic loads- Frictional resistance of expansion bearings-Secondary Stresses- Temperature Effect-Erection Forces and effects-Width of roadway and footway-General Design Requirements.

UNIT-II: Pigeaud's method- design of longitudinal girders-Guyon-Messonet method- Hendry Jaeger method- Courbon's theory. (Ref: IRC- 21), voided slabs, Super Structure: Slab bridge- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- T-Beam bridges.

UNIT-III: Box Culverts- Single Cell Box Culvert – Design Loads, Design Moments, Shears and Thrusts. Design of Critical sections.

UNIT-IV: Plate girder bridges - Elements of plate girder and their design-web-flange -intermediate stiffener-vertical stiffeners- bearing stiffener- Design problem.

UNIT-V: Sub structure- Abutments- Stability analysis of abutments- piers- loads on piers – Analysis of piers- Design problem (Ref: IRC- 13, IRC- 21, IRC- 78)- Pipe culvert- Flow pattern in pipe culverts- culvert alignment- culvert entrance structure- Hydraulic design and structural design of pipe culverts- reinforcements in pipes. (Ref: IRC: SP-13)

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1106	
Course Title: BRIDGE ENGINEERING	
CO-1	To decide the structural form for a bridge depending on the functional requirements and site conditions. Identify various structural components of the chosen bridge form.
CO-2	Design theories for super structure and substructure of bridges, R.C.C T Beam Bridge.
CO-3	Design of box culverts.
CO-4	Design of railway bridges, plate girder bridges.
CO-5	Stability analysis of abutments, different types of bearings, abutments, piers and various types of foundations for Bridges



SYLLABUS: REPAIR AND REHABILITATION OF STRUCTURES (M19ST1107)

UNIT-I: Materials for repair and rehabilitation-Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibers- wraps- Glass and Carbon fiber wraps-Steel Plates-Non destructive evaluation:Importance-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects- Visual investigation- Acoustical emission methods- Corrosion activity measurement-chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT-II: Strengthening and stabilization- Techniques- design considerations- Beam shear capacity strengthening- Shear Transfer strengthening- stress reduction techniques-Column strengthening- flexural strengthening- Connection stabilization and strengthening, Crackstabilization.

UNIT-III: Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental de-bonding mechanisms- intermediate crack de-bonding- CDC de-bonding- plate end de-bonding- strengthening of floor of structures

UNIT-IV: Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods- Mechanical properties of fiber reinforced concrete- applications of fiber reinforced concretes-Light-weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete-Fly ash concrete- Introduction- classification of fly ash- properties and reaction mechanism of fly ash- Properties of fly ash concrete in fresh state and hardened state- Durability of fly ash concretes

UNIT-V: High performance concretes- Introduction Development of high performance concretes Materials of high performance concretes Properties of high performance concretes, Self Consolidating concrete, properties, qualifications.

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1107	
Course Title: REPAIR AND REHABILITATION OF STRUCTURES	
CO-1	Recognize the various materials for repair and rehabilitation. Non- destructive evaluation of concrete structures.
CO-2	Design and suggest repair strategies for deteriorated concrete structures including repairing with composites.
CO-3	Understand the methods of strengthening methods for concrete structures.
CO-4	Design of special concretes.



SYLLABUS: ADVANCED REINFORCED CONCRETE DESIGN (M19ST1108)

UNIT-I: Limit Analysis of R C Structures: Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S.code provisions, loading pattern, Bending Moment Envelop, Application for Fixed Beams and Continuous Beams. Inelastic Analysis of Slabs, Moment Redistribution.

UNIT-II: Yield line analysis for slabs: Yield line criterion – Virtual work and equilibrium methods of analysis – For square circular, Rectangular, Triangular and Hexagonal with simple and continuous end conditions.

UNIT-III: Ribbed slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements. Flat slabs: Direct design method – Distribution of moments in column strips and middle strip- moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip sketch showing reinforcement details.

UNIT-IV: Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams, Design by IS 456. Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels, Design of Procedure of Corbels, Design of Nibs. Detailing of reinforcement.

UNIT-V: Design of Slender Columns – Slenderness limits, Methods of Design of Slender Columns, Additional Moment Method, Procedure for Design of Slender Columns. Detailing of reinforcement. Eccentrically Loaded columns- development of interaction Diagrams

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1108	
Course Title: ADVANCED REINFORCED CONCRETE DESIGN	
CO-1	Analyze fixed and continuous beams after redistribution of moments
CO-2	Apply virtual work/equilibrium method for analysis of R.C Elements
CO-3	Design flat slab with and without drop panel or column heads
CO-4	Analyze and Design deep beams
CO-5	Compute/determinate manually in slender columns



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SYLLABUS: ADVANCED CONCRETE TECHNOLOGY (M19ST1109)

UNIT-I: Concrete Making Materials : Cement – Bogus Compounds – Hydration Process – Types of Cement – Aggregates Gradation Charts – Combined Aggregate – Alkali Silica Reaction – Admixtures – Chemical and Mineral Admixtures. Bureau of Indian Standards (BIS) Provisions

UNIT-II: Fresh And Hardened Concrete: Fresh Concrete – workability tests on Concrete – Setting Times of Fresh Concrete – Segregation and bleeding. Hardened Concrete: Abrams Law, Gelspace ratios, Maturity concept – Stress strain Behaviour – Creep and Shrinkage – Durability Tests on Concrete – Non Destructive Testing of Concrete. BIS Provisions.

UNIT-III: High Strength Concrete – Microstructure – Manufacturing and Properties – Design of HSC Using Erintroy Shaklok method – Ultra High Strength Concrete. High Performance Concrete – Requirements and Properties of High Performance Concrete – Design Considerations. BIS Provisions.

UNIT-IV: Special Concretes: Self Compacting concrete, Polymer Concrete, Fibre Reinforced Concrete – Reactive Powder Concrete – Requirements and Guidelines – Advantages and Applications. **Concrete Mix Design:** Quality Control – Quality Assurance – Quality Audit - Mix Design Method – BIS Method – IS.10262 – 2019 Concrete Mix proportion guidelines. DOE Method – Light Weight Concrete, Self Compacting Concrete.

UNIT-V: Formwork – materials – structural requests – form work systems – connections – specifications – design of form work – shores – removal for forms – shores – re shoring – failure of formwork.

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1109	
Course Title: ADVANCED CONCRETE TECHNOLOGY	
CO-1	Classify and explain various concrete making materials
CO-2	Apply fundamental knowledge in the fresh hardened and high strength properties of concrete
CO-3	Determine the application and use of various special concrete and formwork
CO-4	Design and develop a concrete mix design for different codes.



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SYLLABUS: ADVANCED CONCRETE TECHNOLOGY LABORATORY (M19ST1110)

1. Study on Water/ Cement Ratios Vs Workability of different concretes
2. Study on Water/ Cement Ratios Vs Strength of different concretes
3. Study of variation of Coarse Aggregate to Fine Aggregates on Workability
4. Study of variation of Coarse Aggregate to Fine Aggregates on Strength
5. Strain measurement -Electrical resistance strain gauges
6. Non Destructive testing- Impact Hammer test, UPV test
7. Qualifications tests on Self compaction concrete-LBox, JBox, Ubox and Slump tests

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1110	
Course Title: ADVANCED CONCRETE TECHNOLOGY LABORATORY	
CO-1	Conduct various laboratory tests on Cement ,Aggregates
CO-2	Know the strain measurement
CO-3	Perform Non-Destructive testing of concrete
CO-4	Chemical analysis on concrete and Aggregate and Sand

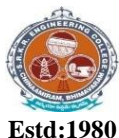


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SYLLABUS: ADVANCED STRUCTURAL ENGINEERING LABORATORY (M19ST1111)
(Common to All Branches)

1. Study on Deflection and Cracks on a Under Reinforced Over Reinforced and Balanced Sections
2. Study on Performance of RCC Beams designed for Bending and failing in Shear
3. Study on Performance of RCC Beams designed for Shear and failing in Bending
4. Study on Performance of RCCO neways labs
5. Study on Performance of RCCT wows labs with simply supported edge conditions
6. Study on Performance of RCCT wows labs with fixed edge conditions
7. Calculation of Young's Modulus of Elasticity of Concrete
8. Extraction and Study of Concrete Core samples from pavements

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1111	
Course Title: ADVANCED STRUCTURAL ENGINEERING LABORATORY	
CO-1	Design and test the deflection and cracks in R.C. Beams
CO-2	Design and test the Shear behavior in RCC Beam
CO-3	Design and test the flexure behavior in RCC Beam
CO-4	Design and test the flexure behavior in RCC one ways lab and Two ways labs
CO-5	Determine the Young's Modulus of Elasticity of Concrete



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SYLLABUS: ENGLISHFORRESEARCHPAPERWRITING (M19AC0001)

UNIT-I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs And Sentences, Being Concise and Removing Redundancy ,Avoiding Ambiguity and Vagueness

UNIT-II: Clarifying Who Did What, Highlighting Your Findings, Hedging And Criticizing Paraphrasing and Plagiarism ,Sections of a Paper.

UNIT-III: Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV: Key skills are needed when writing a Title, key skills are needed when writing an abstract, key skills are needed when writing an introduction ,skills needed when writing a Review of the Literature, skills are needed when writing the Methods.

UNIT-V: skills needed when writing the Results skills are needed when writing the Discussion, skills are needed when writing the Conclusions ,useful phrases ,how to ensure paper is as good as it could possibly be the first-time submission

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0001	
Course Title: ENGLISHFORRESEARCHPAPERWRITING	
CO-1	Understand that how to improve your writing skills and level of readability
CO-2	Learn about what to write in each section
CO-3	UnderstandtheskillsneededwhenwritingaTitleEnsurethegoodqualityof paper at very first time submission



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SYLLABUS: DISASTER MANAGEMENT (M19AC0002)

UNIT-I: Disaster :Definition, Factors And Significance; Difference Between Hazard And Disaster;
Natural And Manmade Disasters :Difference ,Nature ,Types And Magnitude.

UNIT-II: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters:
Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-
made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And
Epidemics, War And Conflicts

UNIT-III: Disaster Prone Areas In India: Study Of Seismic Zones; Areas Prone To Floods And Droughts,
Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami;
Post-Disaster Diseases And Epidemics.

UNIT-IV: Disaster Preparedness And Management: Preparedness: Monitoring Of Phenomena Triggering A
Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other
Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V: Risk Assessment: Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National
Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning,
People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation.
Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.



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SYLLABUS: SANSKRITFORTECHNICALKNOWLEDGE (M19AC0003)

UNIT-I: Alphabets in Sanskrit, Past/Present/FutureTense, Simple Sentences

UNIT-II: Order, Introduction of roots, Technical information about Sanskrit Literature

UNIT-III: TechnicalconceptsofEngineering-Electrical,Mechanical,Architecture,Mathematics

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0003	
Course Title: SANSKRITFORTECHNICALKNOWLEDGE	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science& technology can be understood.
CO-3	Being a logical language will help to develop logic in students.



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SYLLABUS: VALUE EDUCATION (M19AC0004)

UNIT-I: Values and self-development – Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non-moral valuation. Standards and principles. Value judgements.

UNIT-II: Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness. Cleanliness. Honesty, Humanity. Power of faith, National Unity, Patriotism, Love for nature, Discipline

UNIT-III: Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation, Doing best for saving nature

UNIT-IV: Character and Competence Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Non violence, Humility Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0004	
Course Title: VALUE EDUCATION	
CO-1	Knowledge of self-development
CO-2	Learn the importance of Human values
CO-3	Developing the overall personality



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SYLLABUS: CONSTITUTION OF INDIA (M19AC0005)

UNIT-I: History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working)

UNIT-II: Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT-III: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties

UNIT-IV: Organs of Governance: Parliament, Composition, Qualification and Disqualifications, Power and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Panchayatiraj: Introduction, PRI: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-V: Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0005	
Course Title: CONSTITUTION OF INDIA	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO-2	Discuss the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO-4	Discuss the passage of the Hindu Code Bill of 1956.



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SYLLABUS: PEDAGOGY STUDIES (M19AC0006)

UNIT-I: Introduction and Methodology: Aims and rationale, Policy background, Conceptual frame work and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT-II: Thematic overview: Pedagogical practices are being used by teachers informal and informal class rooms in developing countries, Curriculum, Teacher education.

UNIT-III: Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

UNIT-IV: Theory of change, Strength and nature of the body of evidence for effective pedagogical practices Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. Professional development: alignment with classroom practices and follow-up support

UNIT-V: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.



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SYLLABUS: STRESS MANAGEMENT BY YOGA (M19AC0007)

UNIT-I: Definitions of Eight parts of yoga (Ashtanga)

UNIT-II: Yam and Niyam.

Do's and Don'ts in life.

i) Ahimsa, satya, astheya, brahmacharya and aparigraha
Shaucha, santosh, tapa, swadhyay, ishvarapranidhana

UNIT-III: Asan and Pranayam

i) Various yoga poses and their benefits for mind & body ii) Regularization of breathing techniques and its effects-Types pranayama

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0007	
Course Title: STRESSMANAGEMENTBY YOGA	
CO-1	Develop a healthy mind in a healthy body thus improving social health also.
CO-2	Improve efficiency



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**SYLLABUS: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT
SKILLS (M19AC0008)**

UNIT-I: Neetisatakam-Holistic development of personality
Verses-19,20,21,22 (wisdom),Verses-29,31,32(pride & heroism)
Verses-26,28,63,65(virtue),Verses-52,53,59(don'ts),Verses-71,73,75,78(do's)

UNIT-II: Approach today's work and duties. Shrimad Bhagwad Geeta: Chapter 2-Verses: 41, 47, 48
Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5, 13, 17, 23, 35,
Chapter 18-Verses 45, 46, 48.

UNIT-III: Statements of basic knowledge, Shrimad Bhagwad Geeta: Chapter 2-Verses 56, 62, 68,
Chapter 12-Verses 13, 14, 15, 16, 17, 18, Personality of Role model. Shrimad Bhagwad Geeta: Chapter 2-Verses
17, Chapter 3-Verses 36, 37, 42, Chapter 4-Verses 18, 38, 39, Chapter 18-Verses 37, 38, 63

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0008	
Course Title: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	
CO-1	Study of Shrimad-Bhagwad Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students.



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Regulation: R19				I / I - M.Tech. II - Semester					
CIVIL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19ST1201	Finite Element Methods in Structural Engineering	PC	3	3	-	-	25	75	100
M19ST1202	Theory of Plates and Shells	PC	3	3	-	-	25	75	100
#PE-III	Program Elective-III	PE	3	3	-	-	25	75	100
#PE-IV	Program Elective-IV	PE	3	3	--	--	25	75	100
M19ST1209	Computer Aided Design Laboratory	PC	2	--	--	4	25	75	100
M19ST1210	Design of Structures Laboratory	PC	2	--	--	4	2	75	100
M19ST1211	Mini Project With Seminar	PC	2	--	--	4	100	--	100
M19AC0005	AuditCourse-2	AC	--	2	--	--	--	--	--
TOTAL			18	14	0	12	250	450	700

	Code	Course
#PE-III	M19ST1203	Stability of Structures
	M19ST1204	Advanced Steel Design
	M19ST1205	Analysis of Off shore Structures
#PE-IV	M19ST1206	Earth quake Resistant Design of Buildings
	M19ST1207	Structural Optimization Techniques
	M19ST1208	Earth Retaining Structures



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STRUCTURAL ENGINEERING

SYLLABUS : FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING (M19ST1201)

UNIT-I: Review of stiffness method- Principle of Stationary potential energy- Potential energy of anelastic body- Rayleigh-Ritz method of functional approximation-variational approaches-weighted residual methods

UNIT-II: Finite Element formulation of truss element: Stiffness matrix-properties of stiffness matrix – Selection of approximate displacement functions-solution of a plane truss-transformation matrix and stiffness matrix for a 3D truss-Inclined and skewed supports-Galerkin's method for 1 D truss-Computation of stress in a truss element.

UNIT-III: Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples of beam analysis for concentrated and distributed loading-Galerkin's method-2D arbitrarily oriented beam element-inclined and skewed supports-rigid plane Frame examples

UNIT-IV: Finite element formulation for plane stress, plane strain and axisymmetric problems-Derivation of CST and LST stiffness matrix and equations- treatment of body and surface forces-Finite Element solution for plane stress and axisymmetric problems-comparison of CST and LST elements –convergence of solution-interpretation of stresses.

UNIT-V: Iso-parametric Formulation: Iso-parametric bar element-plane bilinear Iso-parametric element-quadratic plane element-shape functions, evaluation of stiffness matrix, consistent nodal load vector-Gauss quadrature-appropriate order of quadrature-element and mesh instabilities-spurious zero energy modes ,stress computation-patch test.

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1201	
Course Title: FINITE ELEMENT METHODS IN STRUCTURAL ENGINEERING	
CO-1	Apply finite element method to solve problems in solid mechanics.
CO-2	Formulate and solve problems in one dimensional structures including trusses, beams.
CO-3	Formulate finite element characteristic equations for two dimensional elements and analyze plain stress, plain strain, axisymmetric and plate bending problems.



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SYLLABUS: THEORY OF PLATES AND SHELLS (M19ST1202)

UNIT-I: Derivation of governing differential equation for plate– in plane bending and transverse bending effects- Rectangular plates: Plates under various loading conditions like concentrated, uniformly distributed load and hydrostatic pressure. Navier and Levy's type of solutions for various boundary condition.

UNIT-II: Circular plates: Symmetrically loaded, circular plates under various loading conditions, Annular plates.

UNIT-III: Introduction to Shells-Single and double curvature-Equations of Equilibrium of Shells: Derivation of stress resultants, Principles of membrane theory and bending theory

UNIT-IV: Cylindrical Shells: Derivation of the governing DKJ equation for bending theory, details of Schorer's theory. Application to the analysis and design of short and long shells. Use of ASCE Manual coefficients for the design.

UNIT-V: Beam theory of cylindrical shells: Beam and arch action. Design of diaphragms-Geometry Analysis and design of elliptic Paraboloid, Conoidal and Hyperbolic Paraboloid shapes by membrane theory.

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1202	
Course Title: THEORY OF PLATES AND SHELLS	
CO-1	Gain the knowledge of Navier's solution, Levy's solution and solve for the rectangular and square plates
CO-2	Analyze circular plates with various boundary conditions.
CO-3	Focus on the finite difference method of solving plate problems.
CO-4	Ability to realize the potential energy principle and find the solution of rectangular plates for various loadings



SYLLABUS: STABILITY OF STRUCTURES (M19ST1203)

UNIT-I: Beam columns: Beams column with a concentrated lateral load – Beams column with a uniformly distributed lateral load-Beams column with end moments lateral load Superposition of Solutions – simply supported Beam column- Differential equation for beam columns-Fixed-Fixed beam column with concentrated load at mid-span-Fixed-Fixed beam column with Uniformly distributed loads.

UNIT-II: Elastic buckling of columns: Method of Neutral Equilibrium- Critical load of the Euler Column- Boundary Conditions Effective-Length Concept and design Curve – Higher –Order Differential Equation for Columns- The Behavior of Imperfect Columns- Initially Bent columns-Eccentrically loaded columns–Effect of shear for eon critical load–

In-elastic buckling of Columns-Tangent modulus theory-Double modulus theory Shanley's theory of in elastic column behaviour.

UNIT-III: Approximate Methods of Analysis: Conservation of energy principles, Calculation of critical loads using approximate deflection curve, Principle of stationary potential energy, Raleigh-Ritz method, Buckling load of column with variable cross section, Galerkin's method, Calculation of critical load by finite differences.

UNIT-IV: Buckling of Frames: Introduction-Mode of Buckling-Elastic Critical Load of Frame Using Neutral Equilibrium-Elastic Critical Load of Frame Using Slope- deflection Equations- Elastic Critical Load of Frame Using Matrix Analysis.

UNIT-V: Torsional Buckling: Pure Torsion of Thin Walled Bars Open Cross Section–Non Uniform Torsion of Thin Walled Bars of Open Cross Section-Torsional buckling–Buckling of Torsion and Flexure. **Lateral Buckling of Beams:** Lateral Buckling of Simply Supported Rectangular Beams of Cross Section subjected for Pure Bending, Lateral Buckling of I- Section subjected to Pure Bending

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1203	
Course Title: STABILITY OF STRUCTURES	
CO-1	Analyze different types of structural instabilities
CO-2	Execute and workout the inelastic buckling using various methodologies.
CO-3	Examine the behavior of beam columns and frames with and without sidesway using classical and stiffness methods
CO-4	To be well versed in the lateral buckling, torsional buckling, Flexural torsional buckling of various beams and non-circular sections.



SYLLABUS: ADVANCED STEEL DESIGN (M19ST1204)

UNIT-I: Simple Connections–Riveted, Bolted Pinned And Welded Connections: Riveted Connections – Bolted Connections –Load Transfer Mechanism – Failure of Bolted Joints –Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate –Strength and Efficiency of the Joint–Combined Shear and Tension–Slip-Critical connections – Prying Action – Combined Shear and Tension for Slip-Critical Connections.Design of Groove Welds–Design of Fillet Welds–Design of Intermittent Fillet Welds– Failure of Welds.

UNIT-II: Plastic Analysis: Introduction – Plastic Theory – Plastic neutral Axis plastic moment, Elastic & Plastic Section moduli - shape factors plastic Hinge – Fundamental condition condition simplistic analysis, methods of plastic analysis–collapse load–simply supported, propped cantilever beam, fixed beams continuous beams, portal frame single bay single storey portal frame at different level subjected to vertical and horizontal loads.

UNIT-III: Eccentric And Moment Connections: Introduction – Beams – Column Connections – Connections Subjected to Eccentric Shear–Bolted Framed Connections–Bolted Seat Connections Bolted Bracket Connections. Bolted Moment Connections–Welded Framed Connections–Welded Bracket Connections–Moment Resistant Connections.

UNIT-IV: Analysis And Design Of Industrial Buildings: Dead loads, live load and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs ;wind effect on cladding and louvers;Design of angular roof truss, tubular truss, truss for a railway platform.Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT-V: Design Of Steel Truss Girder Bridges: Types of truss bridges, component parts of a truss bridge, economic Proportions of trusses, self-weight of truss girders, design of bridge Compression members, tension members; wind load on truss girder Bridges; wind effect on to lateral bracing; bottom lateral bracing; portal Bracing; sway bracing Design of Lacing.

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1204	
Course Title: ADVANCED STEEL DESIGN	
CO-1	The learner will be able to design different connections in steel structures
CO-2	The learner will be able to apply concepts of plastic analysis and design for beams And frames
CO-3	The learner will be able to Design of purlins for roofs and Design Of Steel Truss Girder Bridges



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SYLLABUS: ANALYSIS OF OFF SHORE STRUCTURES (M19ST1205)

UNIT-I: Introduction to different types of off shore structures, Concept of fixed, compliant and floating structures, Law of floatation, fluid pressure and centre of pressure, estimation of centre of gravity, hydrostatic particulars, stability criteria of floating bodies, and motions of a floating body.

UNIT-II: Conservation mass and momentum, Euler equation, Bernoulli's Equation, Potential flow, Classification of waves, small amplitude or Linear Airy's theory, dispersion relationship, water particle kinematics, wave energy.

UNIT-III: Wave force estimation- Wave force on small bodies-Moris on equation, Estimation of Wave force on a vertical cylinder, Force due to current, Effect of marine growth on vertical cylinders.

UNIT-IV: Wave force on large bodies-Froude-krylov theory, Diffraction theory.

UNIT-V: Static and dynamic analysis of fixed offshore structures.

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1205	
Course Title: ANALYSIS OF OFF SHORE STRUCTURES	
CO-1	Perform concept development of off-shore structure
CO-2	Find the wave force on vertical cylinder
CO-3	Perform static and dynamic analysis of fixed offshore structure



SYLLABUS: EARTH QUAKE RESISTANT DESIGN OF BUILDINGS (M19ST1206)

UNIT-I: Engineering seismology–rebound theory–plate tectonics –seismic waves-earthquake size and various scales–local site effects–Indian seismicity–seismic zones of India–theory of vibrations–near ground and far ground rotation and their effects

UNIT-II: Seismic design concepts–EQ load on simple building–load path–floor and roof diaphragms–seismic resistant building architecture–plan configuration–vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall– braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF–Infill wall–Non- structural elements

UNIT-III: Calculation of EQ load 3D modeling of building systems and analysis(theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls

UNIT-IV: Cyclic loading behavior of RC, steel and pre-stressed concrete elements-modern concepts-Base isolation–Adaptive systems–case studies

UNIT-V: Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting-restoration of buildings

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1206	
Course Title: EARTH QUAKE RESISTANT DESIGN OF BUILDINGS	
CO-1	Determine the natural frequency of a single degree of freedom dynamic system for given mass, stiffness and damping properties.
CO-2	Determine the maximum dynamic response of an elastic vibrating structure to a given forcing function
CO-3	Determine the static design base shear based on the type of structural system, irregularity, location and occupancy.
CO-4	Distribute the static base shear to the structure based on vertical distribution of mass horizontal distribution of mass, and center of gravity.
CO-5	Recognize special conditions such as irregular buildings, building separation, P-delta



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SYLLABUS: STRUCTURAL OPTIMIZATION TECHNIQUES (M19ST1207)

UNIT-I: Need and scope for optimization – statements of optimization problems-Objective function and its surface design variables-constraints and constraint surface Classification of optimization problems various functions (continuous, discontinuous and discrete) and function behavior (monotonic and unimodal)

UNIT-II: Classical optimization techniques: Differential calculus method, multi variable optimization by method of constrained variation and Lagrange multipliers (generalized problem) Kuhn-Tucker conditions of optimality-Fully stressed design and optimality criterion based algorithms-introduction, characteristics of fully stressed design theoretical basis-examples

UNIT-III: Non-Linear programming: Unconstrained minimization- Fibonacci, golden search, Quadratic and cubic interpolation methods for a one dimensional minimization and uni variate method, Powell's method, Newton's method and Davidon Fletcher Powell's method for multivariable optimization-Constrained minimization-Cutting plane method-Zoutendijk's method-penalty function methods

UNIT-IV: Linear programming: Definitions and theorems-Simplex method-Duality in Linear programming-Plastic analysis and Minimum weight design and rigid frame

UNIT-V: Introduction to quadratic programming: Geometric programming-and dynamic programming-Design of beams and frames using dynamic programming technique

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1207	
Course Title: STRUCTURAL OPTIMIZATION TECHNIQUES	
CO-1	Derive optimized structure using classical and modern methods of optimization.
CO-2	Gain the knowledge on Formulation of Structural Optimization problems.
CO-3	Gain the knowledge on the concept of classical methods of optimization for multivariable
CO-4	With equality or inequality constraints : solution by method of Lagrange Multiplier Applications in structural engineering, Kuhn-Tucker conditions.



SYLLABUS: EARTH RETAINING STRUCTURES (M19ST1208)

UNIT-I: Earth pressures–Different types and their coefficients–Classical Theories of Earth pressure

– Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT-II: Retaining walls–different types–Type of Failures of Retaining Walls–Stability requirements–Drainage behind Retaining walls–Provision of Joints–Relief Shells.

UNIT-III: Reinforced Soil Retaining Walls–Reinforced soil–Different components–their functions–
Design principles of reinforced soil retaining walls.

UNIT-IV: Sheet Pile Structures–Types of Sheet piles–Cantilever sheet piles in sand and clays–Anchored sheet piles–
Free earth and Fixed earth support methods–Rowe's moment Reduction method– Location of anchors and Design of Anchorage system.

UNIT-V: Braced cuts and Cofferdams–Lateral Pressure in Braced cuts–Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects–TV A method and Cummins' methods.

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1208	
Course Title: EARTH RETAINING STRUCTURES	
CO-1	Solve for earth pressure exerted by soil on retaining walls using earth pressure theories.
CO-2	Analyze the stability of conventional retaining walls.
CO-3	Design reinforced soil wall using the concept to restrain forced soil.
CO-4	Analyze the stability of sheet pile walls.
CO-5	Design various components of braced cuts and cofferdams.



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SYLLABUS: COMPUTERAIDEDDESIGNLABORATORY (M19ST1209)

1. Programming for beams subject to different loading
2. Analysis and Design of reinforced concrete multistoried building
3. Analysis of plane and spacetruss
4. Analysis of plane and space frame
5. Determination of mode shapes and frequencies of tall buildings using lumped
Mass (stick model) approximation
6. Wind Analysis on tall structures
7. Dynamic analysis of Multistory structures

Course Outcomes for First Year Second Semester Course	
Course Code: M19ST1209	
Course Title: COMPUTER AIDED DESIGN LABORATORY	
CO-1	Develop Computer Programs for Analysis and Design of various Structural Elements
CO-2	Use different Structural Engineering software's to solve various civil Engineering programs



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SYLLABUS: DESIGN OF STRUCTURES LABORATORY (M19ST1210)

1. Design of Folded Plates
2. Design of blastresistant structures
3. Design of berth structures
4. Elevated Service Reservoirs
5. Bowstring girderbridge
6. Balanced cantilever bridge
7. Design of Piles and pile caps

Course Outcomes for First Year First Semester Course	
Course Code: M19ST1210	
Course Title: DESIGN OF STRUCTURES LABORATORY	
CO-1	To design the Folded Plates, blast resistant structures and berth structures
CO-2	To design the Bow string girder bridge and Balanced cantilever bridge



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SYLLABUS: MINI PROJECT WITH SEMINAR (M19ST1211)

MINI PROJECT WITH SEMINAR

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.



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Regulation: R19			II / II - M.Tech. I - Semester						
STRUCTURAL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
#PE-V/MOOCs	Program Elective-V/MOOCs	PE	3	3	--	--	25	75	100
#OE-I/MOOCs	Open Elective-I/MOOCs	OE	3	3	--	--	25	75	100
M19ST2106	Dissertation-I /Industrial Project	PR	10	0	--	20	50	50	100
TOTAL			16	6	--	20	200	200	300

	Course Code	Course
#PE-V/MOOCs	M19ST2101	Design of Pre-stressed Concrete Structures
	M19ST2102	Reliability Analysis and Design
	M19ST2103	Industrial Structures
	M19 ST 2104(MOOCs-I)	Students Going for Industrial Project/Thesis will complete these courses through MOOCs. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but The chosen subject should not be covered in their M. Tech Course
#OE-I/MOOCs	#OE-I	Students have to choose one open elective course offered by departments other than the parent department. List of open Electives offered by other departments are enclosed.
	M19 ST 2105(MOOCs-II)	Students Going for Industrial Project/Thesis will complete these courses through MOOCs. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but The chosen subject should not be covered in their M. Tech Course



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OPEN ELECTIVE SOFFERED TO OTHER DEPARTMENTS	
M19ST2107	Construction Management
M19ST2108	Green Technology
M19ST2109	Analysis of Off shore Structures



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STRUCTURAL ENGINEERING

SYLLABUS :DESIGN OF PRE-STRESSED CONCRETE STRUCTURES (M19ST2101)

UNIT-I : Prestressing Systems – Pretensioning Systems – Postensioning Systems – High Strength Steel and Concrete - Analysis of Prestress - Resultant Stresses at a Section – Pressure Line or Thrust Line – Concept of Load Balancing - Losses of Prestress – Loss Due to Elastic Deformation of Concrete – Shrinkage of Concrete – Creep – Relaxation of Stress in Steel –Friction–Anchorage Slip.

UNIT-II : DEFLECTIONS OF PRESTRESSED CONCRETE MEMBERS: Importance of Control of Deflections–Factors Influencing Deflection–Short-term Deflections of Uncracked Members–Prediction of Long-time Deflections–Deflections of Cracked Members–Requirements of IS 1343-2012.

ULTIMATE FLEXURAL STRENGTH OF BEAMS: Introduction, Flexural theory using first principles–Simplified Methods–Ultimate Moment of Resistance of untensioned Steel.

UNIT-III: COMPOSITE CONSTRUCTIONS: Introduction, Advantages, Types of Composite Construction, Analysis of Composite beams- Differential shrinkage- Ultimate Flexural and shear strength of composite sections- Deflection of Composite Beams. Design of Composite sections.

UNIT-IV: PRESTRESSED CONCRETES LABS : Types Of Prestressed Concrete Floor Slabs-Design of Prestressed Concrete One Way and Two Way Slabs. **Prestressed Concrete Pipes and Poles:** Circular prestressing –Types of Prestressed Concrete Pipes-Design of Prestressed Concrete Pipes-Prestressed Concrete Poles.

UNIT-V: CONTINUOUS BEAMS: Advantage of Continuous Members – Effect of Prestressing in Indeterminate Structures – Methods of Achieving Continuity – Methods of Analysis of Secondary Moments – Concordant Cable Profile – Guyon's Theorem. Redistribution of moments in a continuous beam.

Anchorage Zone Stresses in Beams: Introduction, Stress distribution in End Block –Anchorage zone stresses–Magnel's method-Guyon's Method-Anchorage zone Reinforcement.



Estd:1980

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Course Outcomes for Second Year First Semester Course	
Course Code: M19ST2101	
Course Title: DESIGN OF PRE-STRESSED CONCRETE STRUCTURES	
CO-1	Explain the principle, types and systems of prestressing and analyze the deflections.
CO-2	Determine the flexural strength and design the flexural members, end blocks.
CO-3	Analyze the statically indeterminate structures and design the continuous beam.
CO-4	Design the tension and compression members and apply it for design of piles.
CO-5	Analyze the stress, deflections, flexural and shear strength and apply it for the design of bridges.
CO-6	Analyze the Composite construction of Pre-stressed and in-situ concrete.



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SYLLABUS: RELIABILITY ANALYSIS AND DESIGN (M19ST2102)

UNIT-I: Concepts of Structural Safety: General, Design methods. Basic Statistics: Introduction, Data reduction, Histograms, Sample correlation. Probability Theory: Introduction, Random events, Random variables, Functions of random variables, Moments and expectation, Common probability distribution, Extremal distribution..

UNIT-II: Resistance Distributions and Parameters: Introduction, Statistics of properties of concrete, Statistics of properties of steel, Statistics of strength of bricks and mortar, Dimensional variations, Characterization of variables, Allowable stresses based on specified reliability..

UNIT-III: Probabilistic Analysis of Loads: Gravity loads, Wind load. Basic Structural Reliability: Introduction, Computation of structural reliability. Monte Carlo Study of Structural Safety: General, Monte Carlo method, Applications.

UNIT-IV: Level 2 Reliability Methods: Introduction, Basic variables and failure surface, First-order second-moment methods (FOSM).

UNIT-V: Reliability Based Design: Introduction, Determination of partial safety factors, Safety checking formats, Development of reliability based design criteria, Optimal safety factors, Summary of results of study for Indian standard – RCC design. Reliability of Structural Systems: Preliminary concepts as applied to simple structures

Course Outcomes for Second Year First Semester Course	
Course Code: M19ST2102	
Course Title: RELIABILITY ANALYSIS AND DESIGN	
CO-1	Understand the importance of reliability in Civil engineering.
CO-2	Apply the concepts of computation of structural reliability for solving engineering problems.
CO-3	Gain the knowledge of reliability based structural design.



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SYLLABUS: INDUSTRIAL STRUCTURES (M19ST2103)

UNIT-I: Planning and functional requirements-classification of industries and industrial structures- planning for layout-requirements regarding lighting ventilation and fire safety-protection against noise and vibrations

UNIT-II: Light gauge steel structures: Local buckling of thin sections, Post packing of thin elements, Light gauge steel columns and compression members, Form factor for columns and compression members, Stiffened compression elements, Multiple stiffened compression elements, Unstiffened compression elements effective length of light gauge steel compression members,

UNIT-III: Basic design stress, Allowable design stress, Light gauge steel beams, Laterally supported light gauge steel beams web crippling. Allowable design stress in beams, Beams subjected to combined axial end bending stress, connections.

UNIT-IV: Analysis of Communication Towers: Analysis of Transmission line Towers: Loads on towers, Sag (dip) and Tension in uniformly loaded conductors, Analysis of towers (analysis as coplanar assembly), Design of members in towers, Design of foundation of towers. Design of Steel Chimneys for wind and gravity loads.

UNIT-V: Industrial buildings-roofs for industrial buildings (Steel)- design of gantry girder-design of corbel and nibs- machine foundations

Course Outcomes for Second Year First Semester Course	
Course Code: M19ST2103	
Course Title: INDUSTRIAL STRUCTURES	
CO-1	Plan the functional requirements of structural systems for various industries.
CO-2	Get an idea about the materials used and design of industrial structural elements.
CO-3	Design power transmission structures.
CO-4	Possess the ability to understand the design concepts of design of gantry girder



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SYLLABUS: MOOCS-I (M19ST2104)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course



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OPENELECTIVE

Offered from	Course Code	Course Name	Offered to
COMPUTERS CIENCE&EN GINEERING	M19CST2106	Python Programming	ST, CS, PSA &CAD/CAM
	M19CST2107	Artificial Intelligence	
	M19CST2108	Advanced Data structures	
ELECTRONICS& COMMUNICATIO NENGINEERING	M19 CS2107	Signals and systems	ST,CST,PSA, IT &CAD/CAM
	M19 CS2108	Principles of Communication	
	M19 CS2109	Image and video Processing	
ELECTRICAL &ELECTRON ICSENGINEE RING	M19PS2107	Electric And Hybrid Vehicles	ST,CST,CS, IT &CAD/CAM
	M19PS2108	Energy From Waste	
	M19PS2109	Energy Management and Auditing	
INFORMATIO NTECHNOLO GY	M19IT2108	Web Technologies	ST, CS, PSA &CAD/CAM
	M19IT2109	Internet of Things	
	M19IT2110	Machine Learning	
MECHNAIC ALENGINEE RING	M19CAD2107	Operations Research	ST, CST, CS,PSA &IT
	M19CAD2108	Nano Technology	
	M19CAD2109	Product Design &Manufacturing	
SCIENCE &HUMANI TIES	M19BS2101	Management and Organisational Behaviour	ST, CST, CS,PSA, IT &CAD/CAM



Estd:1980

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SYLLABUS: MOOCS-II (M19ST2105)

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SYLLABUS: DISSERTATION-I/INDUSTRIAL PROJECT (M19ST2106)

The Student has to register for Dissertation-I / Industrial project in III semester. Student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

Continuous assessment of Dissertation-I during the III-Semester will be monitored by the PRC.

Dissertation-I/ Industrial Project is evaluated for 50 internal marks and 50 external marks.

Internal marks 50 awarded by Project Guide and PRC jointly based on continuous assessment consisting of two seminars based on Dissertation work-I.

External marks 50 awarded by External Examiner, Supervisor and Head of the Department jointly based on a review and Viva voce on Dissertation work-I



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Regulation: R19				II / II - M.Tech. III - Semester					
STRUCTURAL ENGINEERING (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19ST2201	Dissertation-II /Industrial Project	PR	16	0	0	32	--	100	100



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STRUCTURAL ENGINEERING

SYLLABUS : DISSERTATION-II/INDUSTRIAL PROJECT (M19ST2201)

The student has to continue his/her work from Dissertation-I / Industrial project to complete Dissertation-II in IV semester.

Continuous assessment of Dissertation-II during IV-Semester will be monitored by the PRC.

Dissertation-II is evaluated for 100 external marks based on Review and Viva Voce.

Review and Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work for 100 marks.

If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the College.



COMPUTER SCIENCE AND ENGINEERING



Estd:1980

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Regulation: R19			I / II - M.Tech. I - Semester						
COMPUTER SCIENCE & TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19 CST1101	Mathematical Foundations of Computer Science	PC	3	3	0	0	25	75	100
M19 CST 1102	Advanced Data Structures	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19 RD 1101	Research Methodology and IPR	CC	2	2	0	0	25	75	100
M19 CST 1113	Advanced Data Structures Lab	PC	2	0	0	4	25	75	100
M19 CST 1114	Computing Lab	PC	2	0	0	4	25	75	100
#AC-1	Audit course -1	AC	0	2	0	0	0	0	0
TOTAL			18	16	0	8	175	525	700

	Code	Course		Code	Course
#PE-I	M19CST1103	Artificial Intelligence		M19AC0001	English for Research Paper Writing
	M19CST1104	Cloud Computing		M19AC0002	Disaster Management
	M19CST1105	Digital Image Processing	# AC 1 & 2	M19AC0003	Sanskrit for Technical Knowledge
	M19CST1106	Advanced Operating System		M19AC0004	Value Education
	M19CST1107	Optimization Techniques		M19AC0005	Constitution of India
#PE-II	M19CST1108	Bigdata Analytics		M19AC0006	Pedagogy Studies
	M19CST1109	Applied Cryptography		M19AC0007	Stress Management by Yoga
	M19CST1110	Advanced Computer Networks		M19AC0008	Personality Development through Life Enlightenment Skills.
	M19CST1111	Embedded Computing			
	M19CST1112	Parallel Computer Architecture			



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COMPUTER SCIENCE & TECHNOLOGY

SYLLABUS : MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE (M19CST1101)

UNIT-I : Review on basic Probability concepts- sample space -Addition and Multiplication theorems- Bay's theorem- Random variables (Discrete & Continuous).

Probability mass, density and cumulative distribution functions(for discrete & continuous random variables)- Joint distribution function- discrete & continuous random variables-conditional distribution- Expected value, Variance- Conditional expectation- Central limit theorem, probabilistic inequalities- Chebychev's inequality, Jensen's inequality- Cauchy – Schwartz inequality- Convergence in probability- Markov chains.

UNIT-II : Parametric families of distributions: Binomial, Poisson, Normal, Uniform, exponential And Gamma distribution, derivation of basic characteristics, Hypergeometric & multinomial distributions.

UNIT-III: Statistical inference, introduction to multivariate Statistical models: Scatter diagram, fitting of straight line, parabola, power and exponential curves: ax^b , ab^x , ae^{bx} using method of least square approximation, multiple regression (linear equations)- principal component analysis.

Random Samples: Sampling distributions of Estimators, efficient and unbiased estimation, point & interval estimator: Method of moments and maximum likelihood estimator.

UNIT-IV: Graph Theory: Isomorphism, Planar graphs, Euler's and Hamiltonian circuits or Euler's cycles: graph coloring- Chromatic number.

Trees: Introduction- Trees- Labeled tree- some diagrams on directed and undirected trees, Review of Basic properties of a tree- Sequential representation of a binary tree.

UNIT-V: Counting Methods: Permutation & Combination with & without repetition: Principle of inclusion & exclusion: Special technique to solve combinational enumerator problem: **Recurrence relation:** order & degree of recurrence relation, Solution of Linear homogeneous and non-homogeneous recurrence relation with constant coefficient using methods of generating function, characteristic roots & particular solution by method of determinant coefficients..



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1101	
Course Title: MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	
CO-1	To understand the basic notions of discrete and continuous probability.
CO-2	To understand the methods of statistical inference, and the role that sampling distributions play in those methods.
CO-3	To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.
CO-4	Fit a best suitable curve for the given data
CO-5	Utilize the concepts in graph theory in their field.
CO-6	Solve different counting problems as well as recurrence relations.



SYLLABUS: ADVANCED DATA STRUCTURES (M19CST1102)

UNIT-I: Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. **Hashing:** Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT-II: Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists

UNIT-III: Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees

UNIT-IV: Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem(LCS), Applying Dynamic Programming to the LCS Problem.

UNIT-V: Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k- D Trees. Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem stochastic process in manufacturing, Game theory

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1102	
Course Title: ADVANCED DATA STRUCTURES	
CO-1	Understand the implementation of symbol table using hashing techniques.
CO-2	Understand the implementation of skip lists and Need for Randomizing Data Structure
CO-3	Develop and analyze algorithms for red-black trees, B-trees and Splay trees.
CO-4	Develop algorithms for text processing applications.
CO-5	Identify suitable data structures and develop algorithms for computational geometry problems.



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SYLLABUS: ARTIFICIAL INTELLIGENCE (M19CST1103)

UNIT-I: Introduction to artificial intelligence: Introduction , history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI,

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative- deepening a*, constraint satisfaction.

UNIT-II: Problem reduction and game playing: Introduction, problem reduction, game playing, alpha- beta pruning, two-player perfect information games, **Logic concepts:** Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic.

UNIT-III: Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames, **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web, **Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools.

UNIT-IV: Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory , **Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

UNIT-V: Machine learning paradigms: Introduction, machine learning systems, supervised and unsupervised learnings, inductive learning, deductive learning, clustering, support vector machines, case based reasoning and learning, **Artificial neural networks:** Introduction, artificial networks, single layer feed forward networks, multi layered forward networks, design issues of artificial neural networks



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1103	
Course Title: ARTIFICIAL INTELLIGENCE	
CO-1	Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents
CO-2	Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.
CO-3	Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing
CO-4	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO-5	Solve problems with uncertain information using Bayesian approaches.



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SYLLABUS: CLOUD COMPUTING (M19CST1104)

UNIT-I: History of Centralized and Distributed Computing, Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems, System models for Distributed and cloud computing, Software environments for distributed systems and clouds.

UNIT-II: Introduction to Cloud Computing, Cloud issues and challenges, Properties, Characteristics, Service models, Deployment models. Cloud resources: Network and API, Virtual and Physical computational resources, Data-storage. Virtualization concepts, Types of Virtualization: Introduction to Various Hypervisors, High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs.

UNIT-III: Service models, Infrastructure as a Service (IaaS), Resource Virtualization: Server, Storage, Network, Case studies. Platform as a Service (PaaS), Cloud platform & Management: Computation, Storage, Case studies. Software as a Service (SaaS), Web services, Web 2.0, Web OS, Case studies, Anything as a service (XaaS).

UNIT-IV: Cloud Programming and Software Environments, Parallel and Distributed Programming paradigms, Programming on Amazon AWS and Microsoft Azure, Programming support of Google App Engine, Emerging Cloud software Environment.

UNIT-V: Cloud Access: authentication, authorization and accounting, Cloud Provenance and meta-data, Cloud Reliability and fault-tolerance, Cloud Security, privacy, policy and compliance, Cloud federation, interoperability and standards..

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1104	
Course Title: : CLOUD COMPUTING	
CO-1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
CO-2	Use and Examine different cloud computing services
CO-3	Identify the appropriate cloud platform and software environment for the given application.
CO-4	Explain the core issues of cloud computing such as security, privacy, and interoperability.



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SYLLABUS: DIGITAL IMAGE PROCESSING (M19CST1105)

UNIT-I: Digital Image Fundamentals: Image Formation and types, Basic geometric transformations, Fourier Transforms, Walsh, Hadamard, Discrete Cosine, Hotelling Transforms.

UNIT-II: Image Enhancement and Restoration: Histogram Modification Techniques, Image Smoothing, Image Sharpening, Image Restoration, Degradation Model, Noise Models, Spatial Filtering, Frequency Domain Filtering.

UNIT-III: Image Segmentation and Recognition: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Based Segmentation, Morphology operations. Pattern classification, Clustering and Matching, Knowledge representation and use for scene analysis and image understanding (2D and 3D), Object recognition and identification, Case study of various applications

UNIT-IV: Pattern Recognition: Key concepts, Supervised/Unsupervised Learning, Loss functions and generalization, Probability Theory, Parametric VS Non-parametric methods, Elements of Computational Learning Theory Ensemble Learning, Bagging, Boosting, Random Forest

UNIT-V: Dimensionality Reduction - CCA, LDA, ICA, NMF - Canonical Variates – Feature Selection vs Feature Extraction, Filter Methods - Sub-space approaches - Embedded methods, Low-Rank approaches - Recommender Systems

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1105	
Course Title: DIGITAL IMAGE PROCESSING	
CO-1	Students are able to develop software tools such as Games, Animation, and Recognition system.
CO-2	Key concepts, tools and approaches for pattern recognition on complex datasets.



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SYLLABUS: ADVANCED OPERATING SYSTEMS (M19CST1106)

UNIT-I: Multiprocessor Operating Systems: System Architectures, Structures of OS, OS design issues, Process synchronization, Process Scheduling and Allocation, memory management.

UNIT-II: Distributed Operating Systems: System Architectures, Design issues Communication models, clock synchronization, mutual exclusion, election algorithms, Distributed Deadlock detection

UNIT-III: Database Operating Systems: Requirements of Database OS, Transaction process model, Synchronization primitives, Concurrency control algorithms.

UNIT-IV: Plate girder bridges - Elements of plate girder and their design-web-flange -intermediate stiffener- vertical stiffeners- bearing stiffener- Design problem.

UNIT-V: Mobile Operating Systems: ARM and Intel architectures, Power Management, Mobile OS Architectures, Underlying OS, Kernel structure and native level programming, Runtime issues, Approaches to power management.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1106	
Course Title: ADVANCED OPERATING SYSTEMS	
CO-1	Knowledge about advanced concepts in OS
CO-2	Ability to develop OS for distributed systems
CO-3	Ability to develop modules for mobile devices



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SYLLABUS: OPTIMIZATION TECHNIQUES (M19CST1107)

UNIT-I: Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

UNIT-II: Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

UNIT-III: Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT-IV:

Scheduling and sequencing - single server and multiple server models – deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-V: Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1107	
Course Title: OPTIMIZATION TECHNIQUES	
CO-1	Students should be able to apply the dynamic programming to solve problems of discrete and continuous variables.
CO-2	Students should be able to apply the concept of non-linear programming
CO-3	Students should be able to carry out sensitivity analysis
CO-4	Student should be able to model the real world problem and simulate it.



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SYLLABUS: BIG DATA ANALYTICS (M19CST1108)

UNIT-I: Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; **Generics:** Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II: Working with Big Data: Google File System, Hadoop Distributed File System (HDFS), Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), **Basic programs of Hadoop Map Reduce:** Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV: Hadoop I/O: The Writable Interface, Writable Comparable and comparators, **Writable Classes:** Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable:Implementing a Raw Comparator for speed, Custom comparators

UNIT-V: Pig:Hadoop Programming Made Easier, Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin, **Applying Structure to Hadoop Data with Hive:** Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1108	
Course Title: BIG DATA ANALYTICS	
CO-1	Understand the programming requirements viz., generic types and methods to perform data analysis
CO-2	Understand the existing technologies and the need of distributed files systems to analyze the big data
CO-3	To understand and analyze Map-Reduce programming model for better optimization
CO-4	Collect, manage, store, query, and analyze big data; and identify the need of interfaces to perform I/O operations in Hadoop
CO-5	Identify the need based tools, viz., Pig and Hive and to handle
CO-6	Formulate an effective strategy to implement a successful Data analytics project



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SYLLABUS: APPLIED CRYPTOGRAPHY (M19CST1109)

UNIT-I: Foundations, Protocol Building Blocks, Basic Protocols, Advanced Protocols - Zero- Knowledge Proofs, Zero-Knowledge Proofs of Identity, Blind Signatures, Identity-Based Public- Key Cryptography, Key Length, Key Management, Electronic Codebook Mode, Block Replay, Cipher Block Chaining Mode, Stream Ciphers, Self-Synchronizing Stream Ciphers, Cipher- Feedback Mode, Synchronous Stream Ciphers, Output-Feedback Mode, Counter Mode, Other Block-Cipher Modes, Choosing a Cipher Mode.

UNIT-II: Information Theory, Complexity Theory, Number Theory, Factoring, Prime Number Generation, Discrete Logarithms in a Finite Field, Data Encryption Standard (DES), IDEA, CAST, Blowfish, RC5, Double Encryption, Triple Encryption.

UNIT-III: Pseudo-Random-Sequence Generators and Stream Ciphers- Linear Congruential Generators, Linear Feedback Shift Registers, Stream Ciphers using LFSRs, RC4, Feedback with Carry Shift Registers, Stream Ciphers Using FCSRs, Nonlinear-Feedback Shift Registers, Other Stream Ciphers, One-Way Hash Functions- MD5, Secure Hash Algorithm (SHA), One Way Hash Functions Using Symmetric Block, Using Public Key Algorithms, Message Authentication Codes.

UNIT-IV: Public-Key Algorithms, Knapsack Algorithms, RSA, Rabinm ElGamal, Elliptic Curve Cryptosystems, Digital Signature Algorithm (DSA), DSA Variants, Gost Digital Signature Algorithm, Discrete Logarithm Signature Schemes, Ong-Schnorr-Shamir, Schnorr, Converting Identification Schemes to Signature Schemes.

UNIT-V: Diffie- Hellman, Station-to-Station Protocol, Multiple-Key Public-Key Cryptography, Subliminal Channel, Undeniable Digital Signatures, Designated Confirmer Signatures, Kerberos, Privacy-Enhanced Mail (PEM), Message Security Protocol (MSP), Pretty Good Privacy (PGP), Smart Cards, Public-Key Cryptography Standards (PKCS).



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1109	
Course Title: APPLIED CRYPTOGRAPHY	
CO-1	Demonstrate the basics of Cryptographic protocols
CO-2	Explain the concepts of Stream Ciphers and Public Key Encryption
CO-3	Demonstrate Number Theory for Symmetric and Asymmetric Ciphers and discuss various Ciphers
CO-4	Discuss Hashing Algorithms and Message Authentication Codes
CO-5	Discuss Key-Exchange algorithms and Real world Implementations



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SYLLABUS: ADVANCED COMPUTER NETWORKS (M19CST1110)

UNIT-I: Network layer: Network Layer design issues: store-and forward packet switching, services provided transport layers, implementation connection less services, implementation connection oriented services, comparison of virtual –circuit and datagram subnets. **Routing Algorithm** –shortest path routing, flooding, distance vector routing, link state routing, Hierarchical routing, Broadcast routing, Multicasting routing, routing for mobiles Hosts, routing in Adhoc networks-**congestion control algorithms**-Load shedding, Congestion control in Datagram Subnet.

UNIT-II: IPV4 Address: Address space, notations, classful addressing, classless addressing network addressing translation (NAT), **IPV6 Address structure** address space, **Internetworking** need for network layer internet as a data gram, internet as connection less network. **IPV4** datagram, Fragmentation, checksum, options. **IPV6** Advantages, packet format, extension Headers, Transition form IPV4 to IPV6

UNIT-III: Process to process delivery: client/server paradigm, multiplexing and Demultiplexing, connectionless versus connection oriented services, reliable versus reliable.**UDP:** well known ports for UDP, user data gram, check sum, UDP operation, and uses of UDP.**TCP:** TCP services, TCP features, segment, A TCP connection, Flow control, error control,congestion control. **SCTP:** SCTP services SCTP features, packet format, An SCTP association, flow control, error control.

UNIT-IV: Congestion control: open loop congestion control, closed loop congestion control, Congestion control in TCP, frame relay, **QUALITY OF SERVICE:** flow characteristics, flow classes **TECHNIQUES TO IMPROVE QOS:** scheduling, traffic shaping, resource reservation, admission control. Emerging trends Computer Networks: **Motivation for mobile computing:** protocol Stack Issues in Mobile Computing Environment, Mobility issues in mobile computing, data dissemination security issues mobile networks

UNIT-V: Domain name system: The name space, resource records, name servers **E-mail:** architecture and services, the user agent, message formats, message transfer, final delivery. **Www:** architecture overview, static web documents, dynamic web documents, hyper text transfer protocol, performance elements, the wireless web. **Multimedia:** introduction digital a audio , Audio compression, streaming audio, internet radio, voice over IP, introduction to video, video compression, video on demand, the MBone-the multicast back bone



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1110	
Course Title: ADVANCED COMPUTER NETWORKS	
CO-1	Illustrate reference models with layers, protocols and interfaces.
CO-2	Describe Sub netting and Addressing of IP V4 and IPV6.
CO-3	Describe and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation.
CO-4	Discuss the concepts of congestion control and quality of service
CO-5	Demonstrate Data Communications System and its components.



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SYLLABUS: EMBEDDED COMPUTING (M19CST1111)

UNIT-I: Programming on Linux Platform: System Calls, Scheduling, Memory Allocation, Timers, Embedded Linux, Root File System, Busy Box. Operating System Overview: Processes, Tasks, Threads, Multi-Threading, Semaphore, Message Queue.

UNIT-II: Introduction to Software Development Tools: GNU GCC, make, gdb, static and dynamic linking, C libraries, compiler options, code optimization switches, lint, code profiling tools.

UNIT-III: Interfacing Modules: Sensor and actuator interface, data transfer and control, GPS, GSM module interfacing with data processing and display, OpenCV for machine vision, Audiosignal processing.

UNIT-IV: Networking Basics: Sockets, ports, UDP, TCP/IP, client server model, socket programming, 802.11, Bluetooth, ZigBee, SSH, firewalls, network security.

UNIT-V: IA32 Instruction Set: application binary interface, exception and interrupt handling, interrupt latency, assemblers, assembler directives, macros, simulation and debugging tools.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1111	
Course Title: EMBEDDED COMPUTING	
CO-1	Describes the differences between the general computing system and the embedded computing system.
CO-2	Summarizes various software development tools like GNU, GCC etc.
CO-3	Develop interface modules for various types of sensors
CO-4	Write client server program using TCP and UDP sockets



SYLLABUS: PARALLEL COMPUTER ARCHITECTURE (M19CST1112)

UNIT-I: Fundamentals of Computer Design:

Defining Computer Architecture – Trends in Technology – Trends in Power in Integrated Circuits– Trends in Cost – Dependability – Measuring, Reporting and Summarizing Performance – Quantitative Principles of Computer Design – Basic and Intermediate concepts of pipelining – Pipeline Hazards – Pipelining Implementation issues.

UNIT-II: Instruction-Level Parallelism and Its Exploitation:

Instruction-Level Parallelism: Concepts and Challenges – Basic Compiler Techniques for Exposing ILP – Reducing Branch Costs with Prediction – Overcoming Data Hazards with Dynamic Scheduling – Dynamic Scheduling: Algorithm and Examples – Hardware-Based Speculation – Exploiting ILP Using Multiple Issue and Static Scheduling – Exploiting ILP Using Dynamic Scheduling, Multiple Issue and Speculation – Studies of the Limitations of ILP – Limitations on ILP for Realizable Processors – Hardware versus Software Speculation – Using ILP Support to Exploit Thread-Level Parallelism

UNIT-III: Data-Level and Thread-Level Parallelism

Vector Architecture – SIMD Instruction Set Extensions for Multimedia – Graphics Processing Units – Detecting and Enhancing Loop-Level Parallelism – Centralized Shared- Memory Architectures – Performance of Shared-Memory Multiprocessors – Distributed Shared Memory and Directory Based Coherence – Basics of Synchronization – Models of Memory Consistency – Programming Models and Workloads for Warehouse-Scale Computers– Computer Architecture of Warehouse-Scale Computers –Physical Infrastructure and Costs of Warehouse-Scale Computers

UNIT-IV: Memory Hierarchy Design

Cache Performance – Six Basic Cache Optimizations – Virtual Memory – Protection and Examples of Virtual Memory – Ten Advanced Optimizations of Cache Performance – Memory Technology and Optimizations – Protection: Virtual Memory and Virtual Machines – The Design of Memory Hierarchies

UNIT-V: Storage Systems & Case Studies

Advanced Topics in Disk Storage – Definition and Examples of Real Faults and Failures – I/O Performance, Reliability Measures and Benchmarks – Designing and Evaluating an I/O System – The Internet Archive Cluster Case Studies / Lab Exercises: INTEL i3, i5, i7 processor cores, NVIDIA GPUs, AMD, ARM processor cores – Simulators – GEM5, CACTI, SIMICS, Multi2sim and INTEL Software development tools.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1112	
Course Title: PARALLEL COMPUTER ARCHITECTURE	
CO-1	Students accustomed with the representation of data, addressing modes, and instructions sets.
CO-2	Students able to understand parallelism both in terms of a single processor and multiple processors Technical knowhow of parallel hardware constructs to include instruction-level parallelism for multi core process or design



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SYLLABUS: RESEARCH METHODOLOGY AND IPR (M19RD1101)

UNIT-I: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-III: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Course Outcomes for First Year First Semester Course	
Course Code: M19RD1101	
Course Title: RESEARCH METHODOLOGY AND IPR	
CO-1	Analyze research related information
CO-2	Formulate a Research Proposals and Publish papers with research ethics
CO-3	Award for Intellectual Property Rights like Patents, Trade and Copyrights
CO-4	Analyze Various Intellectual Property Rights



SYLLABUS: ADVANCED DATA STRUCTURES LAB (M19CST1114)

1. Perform various operations on AVL Trees
2. Perform various operations on BST
3. Implementation of Static Hashing
4. Implementation of Huffman coding
5. Implementation of B Tree.
6. Consider telephone book database of N clients. Make use of a hash table implementation to quickly look up clients telephone number.
7. Implement all the functions of a dictionary (ADT) using hashing. Data: Set of (key, value) pairs, Keys are mapped to values, Keys must be comparable, Keys must be unique Standard Operations: Insert(key, value), Find(key), Delete(key)
8. For given set of elements create skip list. Find the element in the set that is closest to some given value.
9. Implement KMP algorithm for Pattern Matching
10. Implement Boyer-Moore algorithm for Pattern Matching
11. Implement Naïve string matching algorithm.
12. Implement insertion, deletion, display and search operation in m-way B tree (i.e. a non- leaf node can have at most m children) for the given data as integers (Test the program for m=3, 5,7).
13. Implementation of Skip lists

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1114	
Course Title: ADVANCED DATA STRUCTURES LAB	
CO-1	Develop solutions for a range of problems using object oriented programming.
CO-2	Implement complex problems using advanced data structures (like Dictionaries, Skip Lists and trees.).
CO-3	Implement operations like searching, insertion, and deletion, Traversing mechanism etc. on various data structures.
CO-4	Utilize data structures in the applications such as binary search trees, AVL and B Trees



SYLLABUS: COMPUTING LAB (M19CST1115)

Note: First SIX experiments are mandatory. Remaining experiments can be done based on the student's choice of any one specialization.

1.
 - a) Write a python program to print the multiplication table for the given number?
 - b) Write a python program to check whether the given number is prime or not?
 - c) Write a python program to find factorial of the given number?
2. Write a python program to implement simple Chat bot?
3.
 - a) Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing)?
 - b) Write a python program to implement List methods (Add, Append, Extend& Delete).
4.
 - a) Write a python program to Illustrate Different Set Operations?
 - b) Write a python program to generate Calendar for the given month and year?
 - c) Write a python program to implement Simple Calculator program?
5.
 - a) Write a python program to Add Two Matrices.
 - b) Write a python program to Transpose a Matrix.
6.
 - a) Write a python program to remove punctuations from the given string?
 - b) Write a python program to sort the sentence in alphabetical order?

**Artificial Intelligence
Specialization:**

1. Write a python program to implement Breadth First Search Traversal?
2. Write a python program to implement Water Jug Problem?
3. Write a program to implement Hangman game using python.
4. Write a program to implement Tic-Tac-Toe game
5.
 - a) Write a python program to remove stop words for a given passage from a text file using NLTK?
 - b) Write a python program to implement stemming for a given sentence using NLTK?
 - c) Write a python program to POS (Parts of Speech) tagging for the give sentence using NLTK?

Big Data Specialization:

1.
 - a) Perform setting up and Installing Hadoop in its three operating modes:Standalone, Pseudo distributed, Fully distributed
 - b) Use web based tools to monitor your Hadoop setup.
2. Implement the following file management tasks in Hadoop:
 - Adding files and directories



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- Retrieving files
 - Deleting files
3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
 4. Write a Map Reduce program that mines weather data.
Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with Map Reduce, since it is semi structured and record-oriented.
 5. Implement Matrix Multiplication with Hadoop Map Reduce
 6. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter Your data.
 7. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions and indexes

Cryptography Specialization:

Exercise –1:

Write a Java program to perform encryption and decryption using the following algorithms:

- a) Ceaser Cipher
- b) Substitution Cipher
- c) Hill Cipher

Exercise – 2:

Write a Java program to implement the 3 DES and AES algorithms.

Exercise – 3:

Write a JAVA program to implement the BlowFish algorithm

Exercise-4 :

Implement MD-5 using Java

Exercise-5:

Write a Java program to implement RSA (2048 Key Length) Algorithm.

Exercise-6:

Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as



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one of the parties (Alice) and the JavaScript application as other party (bob).

Exercise-7:

Calculate the message digest of a text using the SHA-2 algorithm in JAVA.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1115	
Course Title: COMPUTING LAB	
CO-1	Write programs using different python packages.
CO-2	Apply AI problem solving approaches to natural language processing.(Specialization 1)
CO-3	Organize Real time data processing using Hadoop. (Specialization 2)
CO-4	Develop different cryptography algorithms in java (Specialization 3)



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SYLLABUS: ENGLISH FOR RESEARCH PAPER WRITING (M19AC0001)

UNIT-I:

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II: Clarifying Who Did What, Highlighting Your Findings, Hedging And Criticizing, Paraphrasing and Plagiarism, Sections of a Paper.

UNIT-III: Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV: Key skills are needed when writing a Title, key skills are needed when writing an abstract, key skills are needed when writing an introduction, skills needed when writing a Review of the Literature, skills are needed when writing the Methods.

UNIT-V: Skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first-time submission

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0001	
Course Title: ENGLISH FOR RESEARCH PAPER WRITING	
CO-1	Understand that how to improve your writing skills and level of readability
CO-2	Learn about what to write in each section
CO-3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission



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SYLLABUS: DISASTER MANAGEMENT (M19AC0002)

UNIT-I: Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT-II: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts

UNIT-III: Disaster Prone Areas In India: Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics.

UNIT-IV: Disaster Preparedness And Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V: Risk Assessment

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.



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Course Outcomes for First Year First Semester Course	
Course Code: M19AC0002	
Course Title: DISASTER MANAGEMENT	
CO-1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO-2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO-3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO-4	Critically understand the strengths and weaknesses of disaster management approaches, planning & programming in different countries, particularly their home country or the countries they work in.



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SYLLABUS: SANSKRIT FOR TECHNICAL KNOWLEDGE (M19AC0003)

UNIT-I: Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

UNIT-II: Order, Introduction of roots, Technical information about Sanskrit Literature

UNIT-III: Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0003	
Course Title: SANSKRIT FOR TECHNICAL KNOWLEDGE	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science & technology can be understood.
CO-3	Being a logical language will help to develop logic in students.



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SYLLABUS: VALUE EDUCATION (M19AC0004)

UNIT-I: Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments.

UNIT-II: Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity, Patriotism, Love for nature, Discipline.

UNIT-III: Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labor. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation, Doing best for saving nature

UNIT-IV: Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0004	
Course Title: VALUE EDUCATION	
CO-1	Knowledge of self-development
CO-2	Learn the importance of Human values
CO-3	Developing the overall personality



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SYLLABUS: CONSTITUTION OF INDIA (M19AC0005)

UNIT-I: History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working)

UNIT-II: Philosophy of the Indian Constitution: Preamble ,Salient Features

UNIT-III: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights ,Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT-IV: Organs of Governance: Parliament, Composition, Qualifications and Disqualifications ,Powers and Functions, Executive, President , Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-V: Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0005	
Course Title: CONSTITUTION OF INDIA	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO-2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO-4	Discuss the passage of the Hindu Code Bill of 1956.



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SYLLABUS: PEDAGOGY STUDIES (M19AC0006)

UNIT-I: Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions.

Overview of methodology and Searching.

UNIT-II: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT-III: Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

UNIT-IV: Theory of change, Strength and nature of the body of evidence for effective pedagogical practices Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. Professional development: alignment with classroom practices and follow-up support

UNIT-V: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0006	
Course Title: PEDAGOGY STUDIES	
CO-1	Illustrate reference models with layers, protocols and interfaces.
CO-2	Describe Sub netting and Addressing of IP V4 and IPV6.
CO-3	Describe and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation.
CO-4	Discuss the concepts of congestion control and quality of service
CO-5	Demonstrate Data Communications System and its components.



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SYLLABUS: STRESS MANAGEMENT BY YOGA (M19AC0007)

UNIT-I: Definitions of Eight parts of yoga (Ashtanga)

UNIT-II: Yam and Niyam.

Do's and Don'ts in life.

- i) Ahinsa, satya, astheya, brahmacharya and aparigraha
- ii) Shaucha, santosh, tapa, swadhyay, ishvarapranidhana

UNIT-III: Asan and Pranayam

- i) Various yoga poses and their benefits for mind & body
- ii) Regularization of breathing techniques and its effects-Types pranayama

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0007	
Course Title: STRESS MANAGEMENT BY YOGA	
CO-1	Develop a healthy mind in a healthy body thus improving social health also.
CO-2	Improve efficiency



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SYLLABUS: PERSONALITY DEVELOPMENT THROUGH LIFEENLIGHTENMENT SKILLS (M19AC0008)

UNIT-I: Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism)

Verses- 26,28,63,65 (virtue),Verses- 52,53,59 (don'ts),Verses- 71,73,75,78 (do's).

UNIT-II: Approach to day to day work and duties. ShrimadBhagwadGeeta : Chapter 2-Verses: 41,47,48

Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,

Chapter 18-Verses 45, 46, 48.

UNIT-III: Statements of basic knowledge, Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68,

Chapter 12 -Verses 13, 14, 15, 16,17, 18, Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0008	
Course Title: PERSONALITY DEVELOPMENT THROUGH LIFEENLIGHTENMENT SKILLS	
CO-1	Study of Shrimad – Bhagwad - Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students.



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Regulation: R19				I / II - M.Tech. II - Semester					
COMPUTER SCIENCE & TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19 CST 1201	Advanced Algorithms	P C	3	3	0	0	25	75	100
M19 CST 1202	Machine Learning	P C	3	3	0	0	25	75	100
#PE-III	Program Elective-III	PE	3	3	0	0	25	75	100
#PE-IV	Program Elective-IV	PE	3	3	0	0	25	75	100
M19 CST 1213	Advance Algorithm Lab	P C	2	0	0	4	25	75	100
M19 CST 1214	Machine Learning Lab	P C	2	0	0	4	25	75	100
M19 CST 1215	Mini Project with Seminar	M P	2	0	0	4	100	--	100
#AC-2	Audit Course-2*	A C	0	2	0	0	0	0	--
Total			18	14	0	12	250	450	700
	Code	Course							
#PE-III	M19CST1203	Soft Computing							
	M19CST1204	Advanced Network Principles and Protocols							
	M19CST1205	Internet of Things							
	M19CST1206	Open Source Programming							
	M19CST1207	Pattern Recognition							
#PE-IV	M19CST1208	Natural Language Processing							
	M19CST1209	Full Stack Technologies							
	M19CST1210	Parallel Algorithms							
	M19CST1211	Object Oriented Software Engineering							
	M19CST1212	Distributed Database							



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COMPUTER SCIENCE & TECHNOLOGY

SYLLABUS : ADVANCED ALGORITHMS (M19CST1201)

UNIT-I : Sorting: Review of various sorting algorithms, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge- weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT-II : Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching : Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT-III: Flow-Networks: Max flow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT-IV: Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming. **Modulo Representation of integers/polynomials:** Chinese Remainder Theorem, Conversion between base- representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage - Strassen Integer Multiplication algorithm

UNIT-V: Linear Programming: Geometry of the feasibility region and Simplex algorithm. **NP-completeness:** Examples, proof of NP-hardness and NP-completeness. One or more of the following topics based on time and interest Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1201	
Course Title ADVANCED ALGORITHMS	
CO-1	Analyze the complexity/performance of different algorithms.
CO-2	Determine the appropriate data structure for solving a particular set of problems.
CO-3	Categorize the different problems in various classes according to their complexity.
CO-4	Students should have an insight of recent activities in the field of the advanced data structure.



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SYLLABUS : MACHINE LEARNING (M19CST1202)

UNIT-I : Introduction : Towards Intelligent Machines, Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

UNIT-II : Supervised Learning : Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Over fitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metrics for assessing classification.

UNIT-III: Statistical Learning : Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

UNIT-IV: Support Vector Machines (SVM) : Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly separable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines.

Learning with Neural Networks : Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

UNIT-V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. Decision Tree Learning: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1202	
Course Title: MACHINE LEARNING	
CO-1	Recognize the characteristics of machine learning algorithms and their applications to real world problems
CO-2	Able to write and evaluate hypothesis
CO-3	Apply kernel methods to solve real world problems.



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SYLLABUS : SOFT COMPUTING (M19CST1203)

UNIT-I : Fuzzy Set Theory: Introduction to Neuro – Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Surgeon Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT-II : Optimization: Derivative based Optimization, Descent Methods, The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing and Random Search – Downhill Simplex Search.

UNIT-III: Artificial Intelligence: Introduction, Knowledge Representation, Reasoning, Issues and Acquisition: Propositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning under Uncertainty Basic knowledge Representation Issues Knowledge acquisition, Heuristic Search: Techniques for Heuristic search Heuristic Classification State Space Search: Strategies Implementation of Graph Search based on Recursion Patent directed Search Production System and Learning.

UNIT-IV: Neuro Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference Systems, Architecture – Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT-V: Applications Of Computational Intelligence: Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Color Recipe Prediction.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1203	
Course Title: SOFT COMPUTING	
CO-1	Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory
CO-2	Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
CO-3	To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
CO-4	Understand appropriate learning paradigms and its applications rules for each of the architectures and learn several neural network
CO-5	Reveal different applications of these models to solve engineering and other problems.



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SYLLABUS : ADVANCED NETWORK PRINCIPLES AND PROTOCOLS (M19CST1204)

UNIT-I : Introduction to Networks - Application of Networks - Architecture Topology Switching - SLIP, PPP - ALOHA protocols, CSMA/CD, IEEE 802.3, 802.4, 802.5

UNIT-II : Network Layer Issues- Routing, Congestion control- Internetworking - Issues, Address Learning Bridges, Spanning tree, Source routing, Bridges, Routers, Gateway.

UNIT-III: Network Protocol- IP datagram - hop by hop routing, ARP, RARP, DHCP - Sub net Addressing, Address Masking, ICMP, RIP, RIPv2, OSPF, DNS, LAN and WAN Multicast.

UNIT-IV: Transport Layer- Design issues, Connection Management, Transmission Control Protocol (TCP) - User Datagram Protocol (UDP).

UNIT-V: Application Layer Protocol- Telnet - TFTP - FTP - SMTP - Ping Finger, Bootstrap Network Time Protocol-SNMP.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1204	
Course Title: ADVANCED NETWORK PRINCIPLES AND PROTOCOLS	
CO-1	Familiarization of the different layers of TCP/IP protocol stack
CO-2	Understanding of the working principle of different protocols at different layers



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SYLLABUS : INTERNET OF THINGS (M19CST1205)

UNIT-I : FUNDAMENTALS OF IoT: Evolution of Internet of Things, Enabling Technologies, IoT Architectures, oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT-II : IoT PROTOCOLS: IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT. Bluetooth Smart Connectivity- Overview, Key Versions, BLE-Bluetooth Low Energy Protocol, Low Energy Architecture.

UNIT-III: Data Acquiring and storage, organizing the Data and Analytics, Cloud Computing paradigm for Data Collection, Storage and computing. DESIGN AND DEVELOPMENT: Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi.

UNIT-IV: Arm Based Embedded System Design: ARM Cortex-A class processor, Embedded Devices- ARM Cortex-M Class processor, Networking-Bluetooth Smart Technology Introduction to embedded systems: CPUs vs MCU's vs Embedded Systems, Examples, Options for Building Embedded Systems, Features of Embedded Systems, Building Embedded Systems, Building Embedded Systems using MCUs, Introduction to mbed TM Platform

UNIT-V: CASE STUDIES/INDUSTRIAL APPLICATIONS: Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1205	
Course Title: INTERNET OF THINGS	
CO-1	Summarize on the term 'internet of things' in different contexts.
CO-2	Analyze various protocols for IoT.
CO-3	Design a PoC of an IoT system using Rasperry Pi/Arduino
CO-4	Apply data analytics and use cloud offerings related to IoT.
CO-5	Analyze applications of IoT in real time scenario



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SYLLABUS : OPEN SOURCE PROGRAMMING (M19CST1206)

UNIT-I : INTRODUCTION: Introduction to open source programming languages, advantages and drawbacks of open source programming, threats and vulnerabilities in open source languages, Operating System – Ubuntu Linux – Introduction to shell programming.

UNIT-II : PHP: PHP Language Basics, Functions - calling a function, variable function, and anonymous function, Strings - cleaning, encoding and escaping, and comparing strings, Arrays – storing data in arrays, extracting multiple values, traversing, and sorting arrays, Objects – creation, introspection, and serialization, Web Techniques – processing forms and maintaining state.

UNIT-III: WEB DATABASE APPLICATIONS: Three-tier architecture, Introduction to Object oriented programming with PHP 5, Database basics, MYSQL - querying web databases, writing to web databases, validation with Javascript, Form based authentication, protecting data on the web.

UNIT-IV: PERL, TCL, AND PYTHON : Numbers and Strings, Control Statements, Lists and Arrays, Files, Pattern matching, Hashes, Functions. Introduction to TCL/TK, Introduction to Python.

UNIT-V: SECURITY IN WEB APPLICATIONS : Recognizing web application security threats, Code Grinder, Building functional and secure web applications, Security problems with Javascript, vulnerable CGI scripts, Code Auditing and Reverse Engineering, types of security used in applications.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1206	
Course Title: OPEN SOURCE PROGRAMMING	
CO-1	Develop codes in open source web applications
CO-2	Understand the risks associated with the open source codes
CO-3	Write secure CGI scripts



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SYLLABUS : PATTERN RECOGNITION (M19CST1207)

UNIT-I : Introduction - Basic concepts, Applications, Fundamental problems in pattern Recognition system design, Design concepts and methodologies, Examples of Automatic Pattern recognition systems, Simple pattern recognition model, Decision and Distance Functions - Linear and generalized decision functions, Pattern space and weight space, Geometrical properties, implementations of decision functions, Minimum-distance pattern classifications.

UNIT-II : Probability-Probability of events, Random variables, Joint distributions and densities, Movements of random variables, Estimation of parameter from samples, Statistical Decision Making - Introduction, Baye's theorem, Multiple features, Conditionally independent features, Decision boundaries, Unequal cost of error, estimation of error rates, the leaving-one-out-techniques, characteristic curves, estimating the composition of populations. Baye's classifier for normal patterns.

UNIT-III: Non Parametric Decision Making - Introduction, histogram, kernel and window estimation, nearest neighbor classification techniques. Adaptive decision boundaries, adaptive discriminate functions, Minimum squared error Discriminate functions, choosing a decision making techniques. Clustering and Partitioning - Hierarchical Clustering: Introduction, agglomerative clustering algorithm, the single-linkage, complete-linkage and average-linkage algorithm. Ward's method Partition clustering-Forg's algorithm, K- means's algorithm, Isodata algorithm.

UNIT-IV: Pattern Preprocessing and Feature Selection: Introduction, distance measures, clustering transformation and feature ordering, clustering in feature selection through entropy minimization, features selection through orthogonal expansion, binary feature selection.

UNIT-V: Syntactic Pattern Recognition & Application Of Pattern Recognition: Introduction, concepts from formal language theory, formulation of syntactic pattern recognition problem, syntactic pattern description, recognition grammars, automata as pattern recognizers, Application of pattern recognition techniques in bio-metric, facial recognition, IRIS scan, Finger prints, etc.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1207	
Course Title: PATTERN RECOGNITION	
CO-1	Design systems and algorithms for pattern recognition (signal classification), with focus on sequences of patterns that are analyzed using, e.g., hidden Markov models (HMM)
CO-2	Analyze classification problems probabilistically and estimate classifier performance
CO-3	Understand and analyze methods for automatic training of classification systems,
CO-4	Apply Maximum-likelihood parameter estimation in relatively complex probabilistic models, such as mixture density models and hidden Markov models
CO-5	Understand the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models



SYLLABUS : NATURAL LANGUAGE PROCESSING (M19CST1208)

UNIT-I : Introduction: NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.

UNIT-II : N-gram Language Models: The role of language models, Simple Ngram models. Estimating parameters and smoothing. Evaluating language models. **Part of Speech Tagging and Sequence Labeling:** Lexical syntax. Hidden Markov Models. Maximum Entropy Models. Conditional Random Fields

UNIT-III: Syntactic parsing: Grammar formalisms and tree banks. Efficient parsing for context-free grammars(CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs.

UNIT-IV: Semantic Analysis: Lexical semantics and word-sense disambiguation. Compositional semantics. SemanticRole Labeling and Semantic Parsing.

UNIT-V: Information Extraction (IE) and Machine Translation (MT):

Named entity recognition and relation extraction. IE using sequence labeling. Basic issues in MT. Statistical translation, word alignment, phrase based translation, and synchronous grammars. Dialogues: Turns and utterances, grounding, dialogue acts and structures Natural Language Generation: Introduction to language generation, architecture, discourse planning (text schemata, rhetorical relations).

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1208	
Course Title: NATURAL LANGUAGE PROCESSING	
CO-1	Explain approaches to syntax and semantics in NLP.
CO-2	Demonstrate approaches to discourse, generation, dialogue and summarization within NLP.
CO-3	Explain current methods for statistical approaches to machine translation.
CO-4	Identify machine learning techniques used in NLP, including hidden Markov models and probabilistic
CO-5	Explain context-free grammars, clustering and unsupervised methods, log- linear and discriminative



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SYLLABUS : FULL STACK TECHNOLOGIES (M19CST1209)

UNIT-I : HTML: Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols -The World Wide Web-HTTP request message-responsemessage-WebClients Web Servers. Markup Languages: XHTML, an Introduction to HTML, History, Versions, Basic, XHTML Syntax and Semantics Some Fundamental HTML Elements-Relative URLs-Lists-tables-Frames-Forms-HTML 5.0.

UNIT-II : Cascading Style Sheets (CSS)

Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style Sheets and HTML-Style Rule Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout beyond the Normal Flow- CSS3.0, Bootstrap basics, Bootstrap CSS3, Introduction to Java Script, Jscript basics, JScripts objects, JSON, Don.

UNIT-III: PHP

Introduction to PHP, Language Basics, Functions, Strings, Arrays. MYSQL Installation, Accessing MySQL Using PHP, Form Handling, Cookies, Sessions, and Authentication, Tables, Inserting Data into Tables, Selecting Data from a Table, Updating Table, Deleting data from Table, Webpage creation.

UNIT-IV: Angular Js

Introducing Angular JS, Starting Out with Angular JS, Basic Angular JS, Directives and Controllers, Angular JS Modules, Creating First Controller, working with and Displaying, Arrays, more Directives, working with ng-repeat, Unit Testing in Angular JS, Forms, Inputs, and Services, Working with ng-model, Working with Forms,Leverage Data-Binding and Models, Form Validation and States, Error Handling with Forms, ng Model Options, Nested Forms with ng-form, Other Form Controls.

UNIT-V: React JS

Introduction to React, Obstacles and Roadblocks, keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, React DOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1209	
Course Title: FULL STACK TECHNOLOGIES	
CO-1	Identify the Basic Concepts of Web & Markup Languages
CO-2	Develop web Applications using Scripting Languages & Frameworks
CO-3	Creating and running applications using PHP
CO-4	Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ng-form
CO-5	Working with the Files in React JS and Constructing Elements with Data



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SYLLABUS : PARALLEL ALGORITHMS (M19CST1210)

UNIT-I :Introduction :

Computational demand in various application areas, advent of parallel processing, terminology-pipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT-II : Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT-III: Algorithms :

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT-IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Bionics, merge sort on shuffle - exchange ID, Array processor, 2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and Ladner's Algorithms for dictionary operations.

UNIT-V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and minimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1210	
Course Title: PARALLEL ALGORITHMS	
CO-1	Understand fundamental concepts of parallelism- pipeline, Amdahl's law.
CO-2	Know the physical limits of linear approach and solving problems in parallel.
CO-3	How to design & analyze parallel algorithms and implement them with parallel processors.
CO-4	Understand various approaches in parallel sorting and Searching.
CO-5	Gain knowledge on various parallel processor architectures and know how to embed one Architecture into another.



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SYLLABUS : OBJECT ORIENTED SOFTWARE ENGINEERING (M19CST1211)

UNIT-I : Introduction to Software Engineering- What is Software Engineering, Software Engineering Concepts, Software Engineering Development Activities, Managing Software Development, Case Study, **Modeling with UML-** Introduction – Overview of UML – Modeling Concepts – Deeper View into UML.

UNIT-II : Project Organization and Communications- Introduction, An Overview of Projects, Project Organization Concepts, Project Communication Concepts, Organizational Activities, **Analysis-** Introduction, Overview of Analysis, Analysis Concepts, Analysis Activities, Managing Analysis, Case study.

UNIT-III: System Design- Overview of System Design, System Design Concepts, System Design activities, Managing System Design, Case study, **Object Design-** Overview of Object design, Reuse Concepts, Reuse Activities, Managing Reuse, Case study.

UNIT-IV: Mapping Models to Code- Overview of mapping, Mapping concepts, Mapping Activities, Mapping Implementation, Case study, **Configuration Management and Project Management-** Configuration Management Overview, Concepts, Activities and Managing Configuration Management, Overview of Project management, Project Management Concepts, Project Management Activities.

UNIT-V: Software Life Cycle- Introduction, IEEE 1074, Characterizing the Maturity to Software Life Cycle Models, Life cycle Models, **Methodologies-** Introduction, Project Environment, Methodology Issues, A Spectrum of Methodologies, Case studies.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1211	
Course Title: OBJECT ORIENTED SOFTWARE ENGINEERING	
CO-1	Apply object-oriented programming principles to real-time problems..
CO-2	Analyze of a formally specified problem statement with respect to its accuracy and completeness, to effective testing of the software product.
CO-3	Examine the specialized knowledge, skill and judgment needed to develop complex software by formulating relevant responses at each stage of the software development life-cycle.
CO-4	Produce appropriate documentation accurately and to a professional standard.
CO-5	Apply skills relevant for academic progression and career development within the sector.



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SYLLABUS : DISTRIBUTED DATABASES (M19CST1212)

UNIT-I : Introductory concepts and design of (DDBMS)

Data Fragmentation; Replication; and allocation techniques for DDBMS; Methods for designing and implementing DDBMS, designing a distributed relational database; Architectures for DDBMS: cluster federated, parallel databases and client server architecture.

UNIT-II : Query processing & Transaction Management

Overview Of Query Processing: Query processing problem; Objectives of Query Processing; Complexity of Relational Algebra operations; characterization of Query processors; Layers of Query Processing
Introduction To Transaction Management: Definition of Transaction, Properties of Transaction, types of transaction ; Distributed Concurrency Control: Serializability theory; Taxonomy of concurrency control mechanisms; locking bases concurrency control algorithms.

UNIT-III: Distributed Object Database Management systems

Fundamental Object concepts and Object models; Object distribution design; Architectural issues; Object management; Distributed object storage; Object query processing.

UNIT-IV: Current trends & developments related to Distributed database applications technologies
Distributed Object/component-based DBMS; Database Interoperability including CORBA; DCOM and Java RMI; Distributed document-based systems; XML and Workflow management

UNIT-V: Emerging related database technologies

Parallel Database; Mobile database; Multimedia Database; Spatial Database and WebDatabases.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1212	
Course Title: DISTRIBUTED DATABASES	
CO-1	Identify the introductory distributed database concepts and its structures.
CO-2	Describe terms related to distributed object database design and management.
CO-3	Produce the transaction management and query processing techniques in DDBMS.
CO-4	Relate the importance and application of emerging database technology.



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SYLLABUS : ADVANCE ALGORITHMS LAB (M19CST1213)

LIST OF EXPERIMENTS

1. Write a program to implement topological sorting.
2. Write a program to find inverse of a matrix.
3. Write a program to implement Floyd-Warshall's algorithm using dynamic programming
4. Write a program to find longest common subsequence of two strings
5. Write a program to implement BFS for a Graph
6. Write a program to use DFS to find strongly connected components of a digraph.
7. Write a program to implement matrix chain multiplication.
8. Write a program to implement randomized Quick Sort.
9. Write a program to solve Travelling Salesperson Problem using twice around the tree algorithm (approximation algorithm).
10. Write a program to implement FFT.
11. Write a program to implement Krushkal's algorithm to generate a min-cost spanning tree.
12. Write a program to implement Prim's algorithm to generate a min-cost spanning tree.
13. Write a program to implement Extended Euclid algorithm to find gcd of two numbers.

Course Outcomes for First Year First Semester Course	
Course Code: M19CST1213	
Course Title: ADVANCE ALGORITHMS LAB	
CO-1	Identify classes, objects, members of a class and relationships among them needed for a specific problem.
CO-2	Examine algorithms performance using Prior analysis and asymptotic notations.
CO-3	Organize and apply to solve the complex problems using advanced data structures (like arrays, stacks, queues, linked lists, graphs and trees.)
CO-4	Apply and analyze functions of Dictionary



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SYLLABUS : MACHINE LEARNING LAB (M19CST1214)
LIST OF EXPERIMENTS

Experiments: Note: Implement using R and Python

1. Write a program to apply the following machine learning methods on any chosen dataset:
a) Linear Regression b) Logistic Regression.
2. Write a program to implement Support Vector Machines.
3. Perform Exploratory Data Analysis for Classification using Pandas and Matplotlib.
4. Write a program to implement to analyze Bias, Variance, and Cross Validation.
5. Write a program to simulate a perception network for pattern classification and function approximation.
6. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
7. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
8. Write a program to implement the naïve Bayesian classifier for Iris data set. Compute the accuracy of the classifier, considering few test data sets.
9. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
10. Apply EM algorithm to cluster a Heart Disease Data Set. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
11. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
12. Implementing data visualization using R
Find the data distributions using box and scatter plot.
Find the outliers using plot.
Plot the histogram, bar chart and pie chart on sample data.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CST1214	
Course Title: MACHINE LEARNING LAB	
CO-1	Implement procedures for the machine learning algorithms
CO-2	Apply appropriate data sets to the Machine Learning algorithms
CO-3	Identify and apply Machine Learning algorithms to solve real world problems
CO-4	Design Python programs for various Learning algorithms



Estd:1980

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SYLLABUS : MINI PROJECT WITH SEMINAR (M19CST1215)

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.



Estd:1980

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SYLLABUS : AUDIT COURSE-2 (#AC-2)

List of Audit Courses and their Syllabi are mentioned in the First Semester Syllabus.

The students can opt any one course for AC 2 from the list mentioned in first semester by not opting the course which is already taken for AC 1



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Regulation: R19				II / II - M.Tech. I - Semester					
COMPUTER SCIENCE & TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
#PE-V/ MOOCS	Program Elective-V	PE	3	3	0	0	25	75	100
#OE-I/ MOOCS	Open Elective-I	OE	3	3	0	0	25	75	100
M19CST 2105	Dissertation-I / Industrial Project	PR	10	0	0	20	50	50	100
TOTAL			16	6	0	20	100	200	300

	Code	Course
#PE-V	M19CST2101	Deep Learning
	M19CST2102	Ethical Hacking
	M19CST2103 (MOOCS-I)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course
#OE-I	OE	Students have to choose one open elective course offered by departments other than the CSE & IT departments. List of open Electives offered by other departments are enclosed.
	M19CST2104 (MOOCS-II)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS	
Code	Course
M19 CST 2106	Python Programming
M19 CST 2107	Artificial Intelligence
M19 CST 2108	Advanced Data structures



Estd:1980

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COMPUTER SCIENCE & TECHNOLOGY

SYLLABUS : DEEP LEARNING (M19CST2101)

UNIT-I : Introduction: Various paradigms of learning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. **Feed forward neural network:** Artificial Neural Network, activation function, multi-layer neural network

UNIT-II : Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. **Deep Neural Networks:** Difficulty of training deep neural networks, Greedy layer wise training.

UNIT-III: Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, and Deep Belief Network.

UNIT-IV: Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.

UNIT-V: Applications: Object recognition, sparse coding, computer vision, natural language processing.
Introduction to Deep Learning Tools: Tensor Flow, Caffe, Theano, Torch

Course Outcomes for First Year First Semester Course	
Course Code: M19CST2101	
Course Title: DEEP LEARNING	
CO-1	Demonstrate the basic concepts fundamental learning techniques and layers.
CO-2	Discuss the Neural Network training, various random models.
CO-3	Explain different types of deep learning network models.
CO-4	Classify the Probabilistic Neural Networks.
CO-5	Implement tools on Deep Learning techniques.



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SYLLABUS : ETHICAL HACKING (M19CST2102)

UNIT-I : Hacking Windows: BIOS Passwords, Windows Login Passwords, Changing Windows Visuals, Cleaning Your Tracks, Internet Explorer Users, Cookies, URL Address Bar, Netscape Communicator, Cookies URL History, The Registry, Baby Sitter Programs.

UNIT-II : Advanced Windows Hacking: Editing your Operating Systems by editing Explorer.exe, The Registry, The Registry Editor, Description of .reg file, Command Line Registry Arguments, Other System Files, Some Windows & DOS Tricks, Customize DOS, Clearing the CMOS without opening your PC, The Untold Windows Tips and Tricks Manual, Exiting Windows the Cool and Quick Way, Ban Shutdowns: A Trick to Play, Disabling Display of Drives in My Computer, Take Over the Screen Saver, Pop a Banner each time Windows Boots, Change the Default Locations, Secure your Desktop Icons and Settings.

UNIT-III: Getting Past the Password: Passwords: An Introduction, Password Cracking, Cracking the Windows Login Password, The Glide Code, Windows Screen Saver Password, XOR, Internet Connection Password, Sam Attacks, Cracking Unix Password Files, HTTP Basic Authentication, BIOS Passwords, Cracking Other Passwords.

UNIT-IV: The Perl Manual: Perl: The Basics, Scalars, Interacting with User by getting Input, Chomp() and Chop(), Operators, Binary Arithmetic Operators, The Exponentiation Operator(**), The Unary Arithmetic Operators, Other General Operators, Conditional Statements, Assignment Operators. The : Operator, Loops, The While Loop, The For Loop, Arrays, THE FOR EACH LOOP: Moving through an Array, Functions Associated with Arrays, Push() and Pop(), Unshift() and Shift(), Splice(), Default Variables, \$_, @ARGV, Input Output, Opening Files for Reading, Another Special Variables.

UNIT-V: Virus Working, Boot Sector Viruses (MBR or Master Boot Record), File or Program Viruses, Multipartite Viruses, Stealth Viruses, Polymorphic Viruses, Macro Viruses, Blocking Direct Disk Access, Recognizing Master Boot Record (MBR) Modifications, Identifying Unknown Device Drivers, making own Virus, Macro Viruses, Using Assembly to Create your own Virus, Modifying a Virus so Scan won't Catch it, Creating New Virus Strains, Simple Encryption Methods.



Estd:1980

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Course Outcomes for First Year First Semester Course	
Course Code: M19CST2102	
Course Title: ETHICAL HACKING	
CO-1	Remember various hacking methods, system security vulnerability testing.
CO-2	Apply system vulnerability attacks and demonstrate a security assessment report
CO-3	Understand various issues related to hacking



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SYLLABUS : MOOCS-I (M19CST2103)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course



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SYLLABUS : OPEN ELECTIVE

Students have to choose one open elective course offered by departments other than the CSE & IT departments.

List of open Electives offered by other departments are given below.

Offered from	Course Code	Course Name	Offered to
CIVIL ENGINEERING	M19 ST 2107	Construction Management	CST, CS, PSA,IT & CAD/CAM
	M19 ST 2108	Green Technology	
	M19 ST 2109	Analysis of Offshore Structures	
ELECTRONICS & COMMUNICATION ENGINEERING	M19 CS 2107	Signals and systems	ST, CST, PSA, IT & CAD/CAM
	M19 CS 2108	Principles of Communication	
	M19 CS 2109	Image and video Processing	
ELECTRICAL & ELECTRONICS ENGINEERING	M19PS2107	Electric And Hybrid Vehicles	ST, CST, CS, IT & CAD/CAM
	M19PS2108	Energy From Waste	
	M19PS2109	Energy Management and Auditing	
MECHANICAL ENGINEERING	M19CAD 2107	Operations Research	ST, CST, CS,PSA & IT
	M19CAD 2108	Nano Technology	
	M19CAD 2109	Product Design & Manufacturing	
SCIENCE & HUMANITIES	M19BS2101	Management and Organisational Behaviour	ST, CST, CS,PSA, IT & CAD/CAM



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SYLLABUS : MOOCS-II (M19CST2104)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course



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SYLLABUS : DISSERTATION-I/INDUSTRIAL PROJECT (M19CST2105)

The Student has to register for Dissertation-I / Industrial project in III semester. Student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

Continuous assessment of Dissertation-I during the III-Semester will be monitored by the PRC. Dissertation-I/ Industrial Project is evaluated for 50 internal marks and 50 external marks.

Internal marks 50 awarded by Project Guide and PRC jointly based on continuous assessment consisting of two seminars based on Dissertation work-I.

External marks 50 awarded by External Examiner, Supervisor and Head of the Department jointly based on a review and Viva voce on Dissertation work-I.



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Regulation: R19			II / II - M.Tech. II - Semester						
COMPUTER SCIENCE & TECHNOLOGY (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19CST220 I	Dissertation-II / Industrial Project	PR	16	0	0	32	--	100	100



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SYLLABUS : DISSERTATION-II/INDUSTRIAL PROJECT (M19CST2201)

The student has to continue his/her work from Dissertation-I / Industrial project to complete Dissertation-II in IV semester.

Continuous assessment of Dissertation-II during IV-Semester will be monitored by the PRC.

Dissertation-II is evaluated for 100 external marks based on Review and Viva Voce.

Review and Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work for 100 marks.

If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the College



ELECTRONICS AND COMMUNICATIONS ENGINEERING



Estd:1980

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Regulation: R19				I / II - M.Tech. I - Semester					
ELECTRONICS AND COMMUNICATIONS ENGINEERING COMMUNICATION SYSTEMS (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION &EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
M19CS1101	Digital Data Communications	PC	3	3	0	0	25	75	100
M19CS1102	Advanced Digital Signal Processing	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19RD1101	Research Methodology And IPR	CC	2	2	0	0	25	75	100
M19CS1109	Data Communications Lab	PC	2	0	0	4	25	75	100
M19CS1110	Advanced Digital Signal Processing Lab	PC	2	0	0	4	25	75	100
#AC-1	Audit course -1	AC	0	2	0	0	0	0	0
Total			18	16	0	8	175	525	700

	Code	Course		Code	Course
#PE-I	M19CS1103	Radar Signal Processing		M19AC0001	English for Research Paper Writing
	M19CS1104	RF Circuit Design		M19AC0002	Disaster Management
	M19CS1105	Advanced Computer Networks	# AC 1 & 2	M19AC0003	Sanskrit for Technical Knowledge
#PE-II	M19CS1106	Wireless LANs and PANs		M19AC0004	Value Education
	M19CS1107	Mobile Computing Technologies		M19AC0005	Constitution of India
	M19CS1108	Network Security & Cryptography		M19AC0006	Pedagogy Studies
				M19AC0007	Stress Management by Yoga
				M19AC0008	Personality Development through Life Enlightenment Skills.



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COMMUNICATION SYSTEMS

SYLLABUS: DIGITAL DATA COMMUNICATIONS (M19CS1101)

UNIT-I : Digital Modulation Schemes:

BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Bandwidth Efficiency, Carrier Recovery, Clock Recovery.

UNIT-II : Basic Concepts of Data Communications, Interfaces and Modems:

Data Communication Networks, Protocols and Standards, UART, USB, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.

UNIT-III: Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

Data Link Control: Line Discipline, Flow Control, Error Control

Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT-IV: Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, and DSL.

Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI. Metropolitan Area Networks: IEEE 802.6, SMDS

Switching: Circuit Switching, Packet Switching, Message Switching.

Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT-V: Multiple Access Techniques:

Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA. Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1101	
Course Title: DIGITAL DATA COMMUNICATIONS	
CO-1	Model digital communication system using appropriate mathematical techniques (error probability, constellation diagrams, phasor diagrams).
CO-2	Understanding the basic concepts of how digital data is transferred across computer networks.
CO-3	Independently understand basic computer network technology.
CO-4	Understand and explain Data Communications System and its components.
CO-5	Identify the different types of network topologies and protocols.
CO-6	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
CO-7	Identify the different types of network devices and their functions within a network
CO-8	Understand and building the skills of sub netting and routing mechanisms.
CO-9	Familiarity with the basic protocols of computer networks, and how they can be used
CO-10	To assist in network design and implementation.



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SYLLABUS: ADVANCED DIGITAL SIGNAL PROCESSING (M19CS1102)

UNIT-I: Review of DFT, FFT, IIR Filters and FIR Filters:

Multirate Signal Processing: Introduction, Decimation by a factor D, Interpolation by factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT-II: Applications of Multirate Signal Processing:

Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, Oversampling A/D and D/A Conversion

UNIT-III: Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods.

UNIT-IV: Implementation of Digital Filters:

Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT-V: Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between autocorrelation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1102	
Course Title: ADVANCED DIGITAL SIGNAL PROCESSING	
CO-1	Design and implement the digital filters (both FIR & IIR).
CO-2	Describe sampling rate conversion and multirate signal processing in the digital domain.
CO-3	Apply the concepts of sampling rate conversion in the implementation of digital filter banks, quadrature mirror filters and their use in sub band coding.
CO-4	To understand the theory of forward-backward linear prediction filters and solution of normal equations.
CO-5	Understand Adaptive filtering and the concepts of nonparametric methods of power spectrum estimation.
CO-6	To know the applications based on DSP and multirate DSP.



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SYLLABUS: RADAR SIGNAL PROCESSING (M19CS1103)

UNIT-I: Introduction:

Radar Block Diagram, Bistatic Radar, Monostatic Radar, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, MTI and Pulse Doppler Radar.

Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross- Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT-II: Detection of Radar Signals in Noise:

Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors–Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection-CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management–Schematics, Component Parts, Resources and Constraints

UNIT-III: Waveform Selection:

Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise Like Waveforms, Waveform Design Requirements, Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT-IV: Pulse Compression in Radar Signals:

Introduction, Significance, Types, Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

UNIT-V: Phase Coding Techniques:

Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.

Polyphase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Side lobe Reduction for Phase Coded PC Signals.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1103	
Course Title: RADAR SIGNAL PROCESSING	
CO-1	Understand the operation of Radar and characteristics of Matched filter for non- white noise.
CO-2	Understand the various detection criterion and types of detectors that can be used to detect the Radar signals in noise.
CO-3	Understand the waveform design requirements and optimum waveforms for the detection of signals in clutter.
CO-4	Know the significance and types of pulse compression techniques for analog and digital signals.
CO-5	Understand the requirements of phase coding in Radar and various Polyphase codes used for phase coding.



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SYLLABUS: RF CIRCUIT DESIGN (M19CS1104)

UNIT-I: Introduction to RF Electronics:

The Electromagnetic Spectrum, units and Physical Constants, Microwave bands – RF behaviour of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits – Tuned RF / IF Transformers.

UNIT-II: Transmission Line Analysis: Examples of transmission lines- Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines. Single And Multiport Networks: The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT-III: Matching and Biasing Networks: Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks. RF Passive & Active Components: Filter Basics – Lumped filter design – Distributed Filter Design – Diplexer Filters- Crystal and Saw filters- Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers – Hybrid Couplers – Isolators. RF Diodes – BJTs- FETs- HEMTs and Models.

UNIT-IV: RF Transistor Amplifier Design: Characteristics of Amplifiers - Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT-V: Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer. RF Mixers: Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1104	
Course Title: RF CIRCUIT DESIGN	
CO-1	Understand the behavior of RF passive components and model active components.
CO-2	Perform transmission linear analysis.
CO-3	Demonstrate use of Smith Chart for high frequency circuit design.
CO-4	Justify the choice/selection of components from the design aspects.
CO-5	Contribute in the areas of RF circuit design.



Estd:1980

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SYLLABUS: ADVANCED COMPUTER NETWORKS (M19CS1105)

UNIT-I: Congestion and Quality of Service (QoS):Data traffic, Congestion, Congestion Control, Two examples, Quality of Service, Techniques to improve QOS, Integrated Services and Differential services.

Queue Management: Passive-Drop trial, Drop front, Random drop, Active- early Random drop, Random Early detection.

UNIT-II: X.25 Standards: X.25 Layers, X.21 Protocol ,**Frame Relay:** Introduction, Frame relay operation, Frame relay layers, Congestion control, Leaky Bucket algorithms, **ATM:** Design goals, ATM architecture, Switching, Switch Fabric, ATM layers, Service classes, ATM applications

UNIT-III: Interconnection Networks: Introduction, Banyan Networks, Properties, Crossbar switch,Three Stage Class networks, Rearrange able Networks, Folding algorithm, Benes Networks, Lopping algorithm, Bit allocation algorithm. **SONET/SDH:** Synchronous Transport signals, Physical configuration, SONET layers, SONET Frame.

UNIT-IV: Spread Spectrum: Introduction, Basic concept, Protection against Jamming, Spreading codes(PN sequence), Generation, Properties, Types of Spread Spectrum Modulation, Application of Spread Spectrum. **Private Networks:** Virtual Private Networks, Network Address Translation **Next Generation:** IPV6 Transition from IPV4 to IPV6, Mobile **IP:** Addressing, Agents, Three phases, Inefficiency in Mobile IP.

UNIT-V: Wireless Networks: Wireless LAN: IEEE802.11, Architecture, MAC Sub Layer, Addressing Mechanism, Physical Layer. **Bluetooth:** Architecture, Bluetooth layers, Radio layer, Base band layer, L2CAP, **Wireless WAN:** The Cellular Concept, Cell, Frequency reuse, Principle, Channel Assignment Strategies, Interference and system capacity, Types of interference, Improving capacity in cellular system, Handoff, AMPS, D-AMPS, GSM, CDMA, GPRS, 3G & 4G technologies.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1105	
Course Title: ADVANCED COMPUTER NETWORKS	
CO-1	Able to Define Congestion and Quality of Service and Illustrate reference models with layers, protocols and interfaces.
CO-2	Familiar with the basic protocols of computer networks, and how they can be used to assist in network design and implementation
CO-3	Understand the general principles behind , addressing, routing, reliable transmission and other stateful protocols
CO-4	Have an informed view of both the internal workings of the Internet and of a number of common Internet applications and protocols
CO-5	Familiar with the basic cellular concepts and understand the importance of multiple accessing schemes.



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SYLLABUS: WIRELESS LANs AND PANs (M19CS1106)

UNIT-I: Wireless System & Random Access Protocols:

Introduction, First and Second Generation Cellular Systems, Cellular Communications from 1G to 3G, Wireless 4G systems, The Wireless Spectrum; Random Methods: Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).

UNIT-II: Wireless LANs:

Introduction, importance of Wireless LANs, WLAN Topologies, Transmission Techniques: Wired Networks, Wireless Networks, comparison of wired and Wireless LANs; WLAN Technologies: Infrared technology, UHF narrowband technology, Spread Spectrum technology.

UNIT-III: The IEEE 802.11 Standard for Wireless LANs:

Network Architecture, Physical layer, The Medium Access Control Layer; MAC Layer issues: Hidden Terminal Problem, Reliability, Collision avoidance, Congestion avoidance, Congestion control, Security, The IEEE 802.11e MAC protocol.

UNIT-IV: Wireless PANs:

Introduction, importance of Wireless PANs, The Bluetooth technology: history and applications, technical overview, the Bluetooth specifications, piconet synchronization and Bluetooth clocks, Master Slave Switch; Bluetooth security; Enhancements to Bluetooth: Bluetooth interference issues, Intra and Inter Pico net scheduling, Bridge selection, Traffic Engineering, QoS and Dynamics Slot Assignment, Scatter net formation.

UNIT-V: The IEEE 802.15 Working Group for WPANs:

The IEEE 802.15.3, The IEEE 802.15.4, ZigBee Technology, ZigBee components and network topologies, The IEEE 802.15.4 LR-WPAN Device architecture: Physical Layer, Data Link Layer, The Network Layer, Applications; IEEE 802.15.3a Ultra wideband

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1106	
Course Title: WIRELESS LANs AND PANs	
CO-1	Able to study the different generations of mobile networks.
CO-2	Able to understand the concepts of Wireless LANs.
CO-3	Able to understand the wireless networking IEEE 802.11 for WLAN.
CO-4	Able to understand the concepts of different wireless personal area networks
CO-5	Able to study different working group of IEEE 802.15 standards for WLAN.



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SYLLABUS: MOBILE COMPUTING TECHNOLOGIES (M19CS1107)

UNIT-I: Introduction to Mobile Computing Architecture:

Mobile Computing – Dialog Control – Networks – Middleware and Gateways – Application and Services – Developing Mobile Computing Applications – Security in Mobile Computing – Architecture for Mobile Computing – Three Tier Architecture – Design considerations for Mobile Computing – Mobile Computing through Internet – Making existing Applications Mobile Enabled.

UNIT-II: Cellular Technologies: GSM, GPS, GPRS, CDMA and 3G:

Bluetooth – Radio Frequency Identification – Wireless Broadband – Mobile IP – Internet Protocol Version 6 (IPv6) – Java Card – GSM Architecture – GSM Entities – Call Routing in GSM – PLMN Interfaces – GSM addresses and Identifiers – Network aspects in GSM – Authentication and Security – Mobile computing over SMS – GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS – Spread Spectrum technology – Is-95 – CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G

UNIT-III: Wireless Application Protocol (WAP) and Wireless LAN:

WAP – MMS – Wireless LAN Advantages – IEEE 802.11 Standards – Wireless LAN Architecture – Mobility in wireless LAN Intelligent Networks and Interworking:

Introduction – Fundamentals of Call processing – Intelligence in the Networks – SS#7 Signalling – IN Conceptual Model (INCM) – soft switch – Programmable Networks – Technologies and Interfaces for IN

UNIT-IV: Client Programming, Palm OS, Symbian OS, Win CE Architecture:

Introduction – Moving beyond the Desktop – A Peek under the Hood: Hardware Overview – Mobile phones – PDA – Design Constraints in Applications for Handheld Devices – Palm OS architecture – Application Development – Multimedia – Symbian OS Architecture – Applications for Symbian, Different flavors of Windows CE -Windows CE Architecture.

J2ME:JAVA in the Handset – The Three-prong approach to JAVA Everywhere – JAVA 2 Micro Edition (J2ME) technology – Programming for CLDC – GUI in MIDP – UI Design Issues – Multimedia – Record Management System – Communication in MIDP – Security considerations in MIDP – Optional Packages

UNIT-V: Voice Over Internet Protocol and Convergence:

Voice over IP- H.323 Framework for Voice over IP – Session Initiation Protocol – Comparison between H.323 and SIP – Real Time protocols – Convergence Technologies – Call Routing – Voice over IP Applications – IP multimedia subsystem (IMS) – Mobile VoIP

Security Issues in Mobile Computing: Introduction – Information Security – Security Techniques and Algorithms – Security Protocols– Public Key Infrastructure – Trust – Security Models – Security frameworks for Mobile Environment



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1107	
Course Title: MOBILE COMPUTING TECHNOLOGIES	
CO-1	Apply advanced data communication methods and networking protocols for wireless and mobile environments
CO-2	Utilize and employ application frameworks for developing mobile applications including under disconnected and weakly connected environment
CO-3	Create web sites suitable for mobile environments
CO-4	Select components and networks for particular application
CO-5	Creatively analyse mobile and wireless networks
CO-6	Critically analyse security issues of mobile and wireless computing systems



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SYLLABUS: NETWORK SECURITY & CRYPTOGRAPHY (M19CS1108)

UNIT-I: Introduction:

Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security.
Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.
Modern Techniques:
Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT-II: Encryption Algorithms:

Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block ciphers. Conventional Encryption : Placement of Encryption function, Traffic confidentiality, Key distribution, RandomNumber Generation.

UNIT-III: Public Key Cryptography:

Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography. Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT-IV: Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications: Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT-V: IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and Worms: Intruders, Viruses and Related threats. Fire Walls: Firewall Design Principles, Trusted systems.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1108	
Course Title: NETWORK SECURITY & CRYPTOGRAPHY	
CO-1	Identify and utilize different forms of cryptography techniques.
CO-2	Incorporate authentication and security in the network applications.
CO-3	Distinguish among different types of threats to the system and handle the same.
CO-4	To become familiar with Security issues in Electronic transaction.



SYLLABUS: RESEARCH METHODOLOGY AND IPR (M19RD1101)

UNIT-I: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-III: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Course Outcomes for First Year First Semester Course	
Course Code: M19RD1101	
Course Title: : RESEARCH METHODOLOGY AND IPR	
CO-1	Analyze research related information
CO-2	Formulate a Research Proposals and Publish papers with research ethics
CO-3	Award for Intellectual Property Rights like Patents, Trade and Copyrights
CO-4	Analyze Various Intellectual Property Rights



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SYLLABUS: DATA COMMUNICATIONS LAB (M19CS1109)

List of Experiments

1. Study of serial interface RS – 232
2. Study of pc to pc communication using parallel port
3. To establish pc-pc communication using LAN
4. Study of LAN using star topology, bus topology and tree topology
5. Study and configure modem of a computer
6. To configure a hub/switch
7. To study the interconnections of cables for data communication
8. Study of a wireless communication system
9. Set up of time division multiplexing using fiber optics
10. Digital Fibre Optical Transmitter and Receiver

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1109	
Course Title: DATA COMMUNICATIONS LAB	
CO-1	Students can identify the type of fibre optical cable and test their applications
CO-2	Understand the fundamental concepts of data communications and networking
CO-3	Identify different components and their respective roles in a computer communication system.
CO-4	Acquaint them-selves with networking simulation tools, configuring of networking devices and understand their functionality.



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SYLLABUS: ADVANCED DIGITAL SIGNAL PROCESSING LAB (M19CS1110)

LIST OF EXPERIMENTS

1. Basic Signal Representation
2. Correlation Auto And Cross
3. Stability Using Hurwitz Routh Criteria
4. Sampling FFT Of Input Sequence
5. Butterworth Low pass And High pass Filter Design
6. Chebychev Type I,II Filter
7. State Space Matrix from Differential Equation
8. Normal Equation Using Levinson Durbin
9. Decimation And Interpolation Using Rational Factors
10. Maximally Decimated Analysis DFT Filter
11. Cascade Digital IIR Filter Realization
12. Convolution And M Fold Decimation & PSD Estimator
13. Estimation Of PSD
14. Inverse Z Transform
15. Group Delay Calculation
16. Separation of T/F
17. Parallel Realization of IIR filter

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1110	
Course Title: ADVANCED DIGITAL SIGNAL PROCESSING LAB	
CO-1	Design different digital filters in software
CO-2	Apply various transforms in time and frequency
CO-3	Perform decimation and interpolation



SYLLABUS: ENGLISH FOR RESEARCH PAPER WRITING (M19AC0001)

UNIT-I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II: Clarifying Who Did What, Highlighting Your Findings, Hedging And Criticizing, Paraphrasing and Plagiarism, Sections of a Paper.

UNIT-III: Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV: Key skills are needed when writing a Title, key skills are needed when writing an abstract, key skills are needed when writing an introduction, skills needed when writing a Review of the Literature, skills are needed when writing the Methods.

UNIT-V: Skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0001	
Course Title: ENGLISH FOR RESEARCH PAPER WRITING	
CO-1	Understand that how to improve your writing skills and level of readability
CO-2	Learn about what to write in each section
CO-3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission



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SYLLABUS: DISASTER MANAGEMENT (M19AC0002)

UNIT-I: Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster;
Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT-II: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts

UNIT-III: Disaster Prone Areas In India: Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics.

UNIT-IV: Disaster Preparedness And Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V: Risk Assessment

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0002	
Course Title: DISASTER MANAGEMENT	
CO-1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO-2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO-3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO-4	Critically understand the strengths and weaknesses of disaster management approaches, planning & programming in different countries, particularly their home country or the countries they work in.



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SYLLABUS: SANSKRIT FOR TECHNICAL KNOWLEDGE (M19AC0003)

UNIT-I: Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

UNIT-II: Order, Introduction of roots, Technical information about Sanskrit Literature

UNIT-III: Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0003	
Course Title: SANSKRIT FOR TECHNICAL KNOWLEDGE	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science & technology can be understood.
CO-3	Being a logical language will help to develop logic in students.



SYLLABUS: VALUE EDUCATION (M19AC0004)

UNIT-I: Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments.

UNIT-II: Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity, Patriotism, Love for nature, Discipline.

UNIT-III: Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labor. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation, Doing best for saving nature

UNIT-IV: Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0004	
Course Title: VALUE EDUCATION	
CO-1	Knowledge of self-development
CO-2	Learn the importance of Human values
CO-3	Developing the overall personality



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SYLLABUS: CONSTITUTION OF INDIA (M19AC0005)

UNIT-I: History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working)

UNIT-II: Philosophy of the Indian Constitution: Preamble, Salient Features

UNIT-III: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights ,Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT-IV: Organs of Governance:

Parliament, Composition, Qualifications and Disqualifications ,Powers and Functions, Executive, President , Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Local Administration:

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-V: Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0005	
Course Title: CONSTITUTION OF INDIA	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO-2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO-4	Discuss the passage of the Hindu Code Bill of 1956.



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SYLLABUS: PEDAGOGY STUDIES (M19AC0006)

UNIT-I: Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions.
Overview of methodology and Searching.

UNIT-II: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT-III: Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage:quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

UNIT-IV: Theory of change, Strength and nature of the body of evidence for effective pedagogical practices Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. Professional development: alignment with classroom practices and follow-up support

UNIT-V: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0006	
Course Title: PEDAGOGY STUDIES	
CO-1	Illustrate reference models with layers, protocols and interfaces.
CO-2	Describe Sub netting and Addressing of IP V4andIPV6.
CO-3	Describe and Analysis of basic protocols of computer networks, and how they can be used to assist in network design and implementation.
CO-4	Discuss the concepts of congestion control and quality of service
CO-5	Demonstrate Data Communications System and its components.



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SYLLABUS: STRESS MANAGEMENT BY YOGA (M19AC0007)

UNIT-I: Definitions of Eight parts of yoga (Ashtanga)

UNIT-II: Yam and Niyam.

Do's and Don'ts in life.

- i) Ahinsa, satya, astheya, brahmacharya and aparigraha
- ii) Shaucha, santosh, tapa, swadhyay, ishvarapranidhana

UNIT-III: Asan and Pranayam

- i) Various yoga poses and their benefits for mind & body
- ii) Regularization of breathing techniques and its effects-Types pranayama

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0007	
Course Title: STRESS MANAGEMENT BY YOGA	
CO-1	Develop a healthy mind in a healthy body thus improving social health also.
CO-2	Improve efficiency

**SYLLABUS: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT
SKILLS (M19AC0008)**

UNIT-I: Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism)

Verses- 26,28,63,65 (virtue),Verses- 52,53,59 (don'ts),Verses- 71,73,75,78 (do's).

UNIT-II: Approach to day to day work and duties. ShrimadBhagwadGeeta : Chapter 2-

Verses: 41,47,48

Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.

UNIT-III: Statements of basic knowledge, Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68,

Chapter 12 -Verses 13, 14, 15, 16,17, 18, Personality of Role model. Shrimad Bhagwad Geeta:

Chapter2-

Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0008	
Course Title: PERSONALITY DEVELOPMENT THROUGH LIFEENLIGHTENMENT SKILLS	
CO-1	Study of Shrimad – Bhagwad - Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students.



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Regulation: R19				I / II - M.Tech. II - Semester					
ELECTRONICS AND COMMUNICATIONS ENGINEERING COMMUNICATION SYSTEMS (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19CS1201	Wireless Communications and Networks	PC	3	3	0	0	25	75	100
M19CS1202	Image and Video Processing	PC	3	3	0	0	25	75	100
#PE-III	Elective-III	PE	3	3	0	0	25	75	100
#PE-IV	Elective-IV	PE	3	3	0	0	25	75	100
M19CS1209	Advanced Communications Lab	PC	2	0	0	4	25	75	100
M19CS1210	Advanced Digital Image and Video Processing Laboratory	PC	2	0	0	4	25	75	100
M19CS1211	Mini Project with Seminar	PC	2	0	0	4	100	0	100
#AC-2	Audit Course 2	AC	0	2	0	0	0	0	0
Total			18	14	0	12	250	450	700

	Code	Course
#PE-III	M19 CS 1203	Soft Computing Techniques
	M19 CS 1204	Internet Protocols
	M19 CS 1205	Cyber Security
#PE-IV	M19 CS 1206	Optical Networks
	M19 CS 1207	Digital Signal Processors and Architectures
	M19 CS 1208	Radio Navigational Aids



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SYLLABUS: WIRELESS COMMUNICATIONS AND NETWORKS (M19CS1201)

UNIT-I: The Cellular Concept-System Design Fundamentals:

Introduction, Frequency Reuse, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference, Power Control for Reducing interference, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Trunking and Grade of Service

UNIT-II: Mobile Radio Propagation: Large-Scale Path Loss:

Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, Basic Propagation Mechanisms, Reflection: Reflection from Dielectrics, Brewster Angle, Reflection from perfect conductors, Ground Reflection (Two-Ray) Model, Diffraction: Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT-III: Mobile Radio Propagation: Small –Scale Fading and Multipath

Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels- Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT-IV: Equalization and Diversity

Introduction, Fundamentals of Equalization, Training a Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization- Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization- Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity - Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE



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Receiver.

UNIT-V: Wireless Networks: Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hyper Lan, WLL.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1201	
Course Title: WIRELESS COMMUNICATIONS AND NETWORKS	
CO-1	At the end of this course the student will be able to:
CO-2	Understand Cellular communication concepts
CO-3	Study the mobile radio propagation
CO-4	Study the wireless networks and different types of MAC protocols



SYLLABUS: IMAGE AND VIDEO PROCESSING (M19CS1202)

UNIT-I: Fundamentals of Image Processing and Image Transforms:

Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms.

UNIT-II: Image Enhancement:

Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

Image Restoration:

Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution.

UNIT-III: Image Segmentation: Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour Image Compression: Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards.

UNIT-IV: Basic Steps of Video Processing:

Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT-V: 2-D Motion Estimation:

Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Videocoding.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1202	
Course Title: IMAGE AND VIDEO PROCESSING	
CO-1	Defining the digital image, representation of digital image, importance of image resolution, applications in image processing.
CO-2	Know the advantages of representation of digital images in transform domain, application of various image transforms
CO-3	Know how an image can be enhanced by using histogram techniques, filtering techniques etc.
CO-4	Understand image degradation, image restoration techniques using spatial filters and frequency domain
CO-5	Know the detection of point, line and edges in images, edge linking through local processing, global processing.
CO-6	Understand the redundancy in images, various image compression techniques.
CO-7	Know the video technology from Analog colour TV systems to digital video systems, how video signal is sampled and filtering operations in video processing.
CO-8	Know the general methodologies for 2D motion estimation, various coding used in video processing



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SYLLABUS: SOFT COMPUTING TECHNIQUES (M19CS1203)

UNIT-I: Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT-II: Artificial Neural Networks: Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelettransformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT-III: Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modelling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modelling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT-IV: Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and ant-colony search techniques for solving optimization problems.

UNIT-V: Applications: GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1203	
Course Title: SOFT COMPUTING TECHNIQUES	
CO-1	Understand the basic concepts of Artificial neural network systems.
CO-2	Understand the McCulloch-Pitts neuron model, simple and multilayer Perception, Adeline and Madeline concepts
CO-3	Data processing, Hopfield and self-organizing network.
CO-4	Difference between crisp sets to fuzzy sets, fuzzy models, fuzzification, inference, membership functions, rule based approaches and defuzzification.
CO-5	Self – organizing fuzzy logic control, nonlinear time delay systems.
CO-6	Understand the concept of Genetic Algorithm steps. Tabu, ant-colony search techniques for solving optimization problems.
CO-7	GA applications to power system optimization problems, identification and control of linear and nonlinear dynamic systems using MATLAB-Neural network toolbox.
CO-8	Know the application and importance of stability analysis



SYLLABUS: INTERNET PROTOCOLS (M19CS1204)

UNIT-I: Internetworking Concepts:

Principles of Internetworking, Connectionless Internetworking, Application level Interconnections, Network level Interconnection, Properties of the Internet, Internet Architecture, Wired LANS, Wireless LANs, Point-to-Point WANs, Switched WANs, Connecting Devices, TCP/IP Protocol Suite.

IP Address:

Class full Addressing: Introduction, Class full Addressing, Other Issues, Sub-netting and Super-netting Classless Addressing: Variable length Blocks, Sub-netting, Address Allocation. Delivery, Forwarding, and Routing of IP Packets: Delivery, Forwarding, Routing, Structure of Router. ARP and RARP: ARP, ARP Package, RARP.

UNIT-II: Internet Protocol (IP):

Datagram, Fragmentation, Options, Checksum, IP V.6.

Transmission Control Protocol (TCP):

TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control, TCP Times.

Stream Control Transmission Protocol (SCTP):

SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, CongestionControl.

Mobile IP:

Addressing, Agents, Three Phases, Inefficiency in Mobile IP.

Classical TCP Improvements:

Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/ Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

UNIT-III: Unicast Routing Protocols (RIP, OSPF, and BGP):

Intra and Inter-domain Routing, Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP.

Multicasting and Multicast Routing Protocols:

Unicast - Multicast- Broadcast, Multicast Applications, Multicast Routing, Multicast LinkState Routing: MOSPF, Multicast Distance Vector: DVMRP.

UNIT-IV: Domain Name System (DNS): Name Space, Domain Name Space, Distribution of Name Space, and DNS in the internet.

Remote Login TELNET:Concept, Network Virtual Terminal (NVT). File Transfer FTP and TFTP: File Transfer Protocol (FTP).



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Electronic Mail: SMTP and POP.

Network Management-SNMP: Concept, Management Components, World Wide Web-HTTP Architecture.

UNIT-V: Multimedia:

Digitizing Audio and Video, Network security, security in the internet firewalls. Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real- Time Interactive Audio/Video, RTP, RTCP, Voice Over IP. Network Security, Security in the Internet, Firewalls.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1204	
Course Title: INTERNET PROTOCOLS	
CO-1	Understanding basic network routing concepts and algorithms
CO-2	Understanding how to apply them into given topologies
CO-3	Understanding how the Internet protocol suite operates and describe the functions of various protocols
CO-4	Explain the concept and usage of node addressing and classify addresses into network layers.



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SYLLABUS: CYBER SECURITY (M19CS1205)

UNIT-I: Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II: Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT-III: Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT-IV: IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V: Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1205	
Course Title: CYBER SECURITY	
CO-1	Understand Cyber Security architecture principles
CO-2	Identify System and application security threats and vulnerabilities
CO-3	Identify different classes of attacks
CO-4	Cyber Security incidents to apply appropriate response
CO-5	Describing risk management processes and practices
CO-6	Evaluation of decision making outcomes of Cyber Security scenario



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SYLLABUS: OPTICAL NETWORKS (M19CS1206)

UNIT-I: Client Layers of Optical Networks:

SONET / SDH – Multiplexing, Frame Structure, Physical Layer, Infrastructure, ATM – Functions, Adaptation layers, QoS, Flow Control Signaling and Routing, IP – Routing, QoS, MPLS, Storage Area Networks – ESCON, Fiber Channel, HIPPI, Gigabit Ethernet.

UNIT-II: WDM network Elements and Design:

Optical Line Terminals and Amplifiers, Add/Drop Multiplexers, Optical Cross Connects, Cost trade-offs in Network Design, LTD and RWA Problems, Dimensioning – Wavelength Routing Networks, Statistical and Maximum Load Dimensioning Models.

UNIT-III: Network Control and Management:

Network Management Functions, Optical Layer Services and Interfacing, Layers within Optical Layer, Multivendor Interoperability, Performance and Fault Management, Configuration Management, Optical Safety.

UNIT-IV: Network Survivability:

Basic Concepts of Survivability, Protection in SONET/SDH Links and Rings, Protection in IP Networks, Optical Layer Protection – Service Classes, Protection Schemes, Interworking between Layers.

UNIT-V: Access Networks and Photonic Packet Switching:

Network Architecture, Enhanced HFC, FTTC, Photonic Packet Switching – OTDM, Synchronization, Header Processing, Buffering, Burst Switching, Test Beds.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1206	
Course Title: OPTICAL NETWORKS	
CO-1	Able to Contribute in the areas of optical network and WDM network design.
CO-2	Able to Implement simple optical network and understand further technology developments for future enhanced network.



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SYLLABUS: DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (M19CS1207)

UNIT-I: Introduction to Digital Signal Processing:

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations:

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II: Architectures for Programmable DSP Devices:

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-III: Programmable Digital Signal Processors:

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT-IV: Analog Devices Family of DSP Devices:

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT-V: Interfacing Memory and I/O Peripherals to Programmable DSP Devices:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS1207	
Course Title: DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES	
CO-1	Identify and formalize architectural level characterization of P-DSP hardware
CO-2	Ability to design, programming (assembly and C), and testing code using Code Composer Studio environment
CO-3	Deployment of DSP hardware for Control, Audio and Video Signal processing applications
CO-4	Understanding of major areas and challenges in DSP based embedded systems.



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SYLLABUS: RADIO NAVIGATIONAL AIDS (M19CS1208)

UNIT-I: Navigational Systems:

Review of Navigational Systems: Aircraft navigational system, Geometry of the earth. Navigation equation, Navigation errors, Radio navigation system types and Performance parameters, ILS System, Hyperbolic navigation systems, Loran, Omega, Decca Radio direction finding, DME, TACAN and VORTAC.

UNIT-II: Inertial Navigation:

Inertial navigation system ,Sensing instruments: Accelerometer. Gyro- scopes, Analytic and Gimbaled platforms, Mechanization, Error analysis, Alignment.

UNIT-III: Global Positioning System (GPS) for Navigation:

Overview of GPS, Reference systems ,Satellite orbits, Signal structure, Geometric dilution of precision (GDOP), or Precision dilution of recision (PDOP), Satellite ephemeris, Satellite clock, Ionospheric group delay ,Tropospheric group delay, Multipath errors and Receiver measurement errors.

UNIT-IV: Differential GPS and WAAS:

Standard and precise positioning service local area DGPS and Wide area DGPS errors, Wide Area Augmentation System (WAAS) architecture, Link budget and Data Capacity, Ranging function, Precision approach and error estimates.

UNIT-V: GPS Navigational Applications:

General applications of GPS, DGPS, Marine, Air and Land Navigation, Surveying, Mapping and Geographical information systems, Military and Space

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1208	
Course Title: RADIO NAVIGATIONAL AIDS	
CO-1	Acquire knowledge about Navigational systems
CO-2	Analyse the concepts of GPS and its applications in Navigation
CO-3	Foster ability to work using Instrument Landing System.
CO-4	Acquire knowledge about Satellite Navigation System.



SYLLABUS: ADVANCED COMMUNICATIONS LAB (M19CS1209)

NOTE:

- A. Minimum of 10 Experiments have to be conducted
- B. All Experiments may be Simulated using MATLAB and to be verified using related training kits

LIST OF EXPERIMENTS

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in Hamming code
3. Determination of output of Convolutional Encoder for a given sequence
4. Determination of output of Convolutional Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique
6. Simulation of Frequency Hopping (FH) system
7. Effect of Sampling and Quantization of Digital Image
8. Verification of Various Transforms (FT / DCT/ Walsh / Hadamard) on a given Image (Finding Transform and Inverse Transform)
9. Point, Line and Edge detection techniques using derivative operators.
10. Implementation of FIR filter using DSP Trainer Kit (C-Code/ Assembly code)
11. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code)
12. Determination of Losses in Optical Fibre
13. Observing the Waveforms at various test points of a mobile phone using Mobile Phone Trainer
14. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSS-BER Trainer
15. Study of ISDN Training System with Protocol Analyser
16. Characteristics of LASER Diode.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1209	
Course Title: ADVANCED COMMUNICATIONS LAB	
CO-1	Apply the concepts of measurement of bit error rate, Hamming distance and coding techniques.
CO-2	Simulate and calculate efficiency of spread spectrum techniques.
CO-3	Implement filter response on DSP trainer kit.
CO-4	Analyse the characteristics of Optical Fibre and Laser Diode.



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**SYLLABUS: ADVANCED DIGITAL IMAGE AND VIDEO PROCESSING LABORATORY
(M19CS1210)**

LIST OF EXPERIMENTS

1. Perform basic operations on images like addition, subtraction etc.
2. Plot the histogram of an image and perform histogram equalization
3. Implement segmentation algorithms
4. Perform video enhancement
5. Perform video segmentation
6. Perform image compression using lossy technique
7. Perform image compression using lossless technique
8. Perform image restoration
9. Convert a colour model into another
10. Calculate boundary features of an image
11. Calculate regional features of an image
12. Detect an object in an image/video using template matching/Bayes classifier

Course Outcomes for First Year First Semester Course	
Course Code: M19CS1210	
Course Title: ADVANCED DIGITAL IMAGE AND VIDEO PROCESSING LABORATORY	
CO-1	Perform image and video enhancement
CO-2	Perform image and video segmentation
CO-3	Detect an object in an image/video



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SYLLABUS: MINI PROJECT WITH SEMINAR (M19CS1211)

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.



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SYLLABUS: AUDIT COURSE-2 (#AC-2)

List of Audit Courses and their Syllabi are mentioned in the First Semester Syllabus.

The students can opt any one course for AC 2 from the list mentioned in first semester by not opting the course which is already taken for AC 1



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Regulation: R19			II / II - M.Tech. I - Semester						
ELECTRONICS AND COMMUNICATIONS ENGINEERING COMMUNICATION SYSTEMS (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
#PE-V	Program Elective	PE	3	3	--	--	25	75	100
#OE-I	Open Elective	OE	3	3	--	--	25	75	100
M19CS2106	Dissertation-I /Industrial Project	PR	10	--	---	20	50	50	100
Total			16	6	0	20	100	200	300

	Code	Course
#PE-V/ MOOC S	M19CS2101	Detection and Estimation Theory
	M19CS2102	Coding Theory and Applications
	M19CS2103	Software Defined Radio
	M19CS2104 (MOOCS-I)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course
#OE-I/ MOOC S	#OE-I	Students have to choose one open elective course offered by departments other than the parent department. List of open Electives offered by other departments are enclosed.
	M19CS2105 (MOOCS-II)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS	
Code	Course
M19CS2107	Signals and systems
M19CS2108	Principles of Communication
M19CS2109	Image and video Processing



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DETECTION AND ESTIMATION THEORY

COMMUNICATION SYSTEMS

SYLLABUS: DETECTION AND ESTIMATION THEORY (M19CS2101)

UNIT-I : Random Processes: Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNIT-II : Detection Theory: Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal a priori probabilities, Neyman- Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses

UNIT-III: Linear Minimum Mean-Square Error Filtering: Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, and Kalman Filters.

UNIT-IV: Statistics: Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT-V: Estimating the Parameters of Random Processes from Data: Tests for Stationarity and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Spectral Density Functions.

Course Outcomes for First Year First Semester Course	
Course Code: M19CS2101	
Course Title: DETECTION AND ESTIMATION THEORY	
CO-1	Understand the basic concepts of signal detection and estimation
CO-2	Understand different hypotheses in detection and estimation problems
CO-3	Understand the conceptual basics of detection and estimation of signals in white and non-white Gaussian noise
CO-4	Understand the detection of random signals
CO-5	Understand the time varying waveform detection and its estimation



SYLLABUS: CODING THEORY AND APPLICATIONS (M19CS2102)

UNIT-I : Coding for Reliable Digital Transmission and Storage:

Mathematical model of Information, A Logarithmic Measure of Information, Average Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes:

Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system.

UNIT-II : Cyclic Codes:

Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes.

UNIT-III: Convolutional Codes:

Encoding of Convolutional Codes, Structural and Distance Properties of Convolutional codes, maximum likelihood decoding, Sequential decoding, Majority-logic decoding of Convolution codes, Applications of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT-IV: Burst –Error-Correcting Codes:

Decoding of Single-Burst Error Correcting Cyclic codes, Single – Burst – Error – Correcting Codes, Phased – Burst – Error – Correcting Codes, Burst – Error – Correcting Convolutional Codes, Bounds on Burst Error Correcting Capability, Interleaved Cyclic and Convolutional Codes.

UNIT-V: BCH- CODES

Binary Primitive BCH Codes – Decoding of BCH Codes – Syndrome Computation and Iterative Algorithms for finding the Error Location Polynomial, Error location polynomial for single and double error correction, Computation of Error Location Numbers and Error Correction.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS2102	
Course Title: CODING THEORY AND APPLICATIONS	
CO-1	Analyze the information theoretic problems from various disciplines like computer science, mathematics, statistics and communication engineering.
CO-2	Apply coding techniques in various communication systems like wireless communications to achieve coding gain at low SNR values.
CO-3	Build new structures for encoder and decoder to address the issues in evaluating performance of communication system.
CO-4	Implement coding techniques in real time systems.
CO-5	Encode and decode information by applying algorithms associated with well-known codes.



SYLLABUS : SOFTWARE DEFINED RADIO (M19CS2103)

UNIT-I : Introduction:

The Need for Software Radios, What is Software Radio, Characteristics and benefits of software radio- Design Principles of Software Radio, RF Implementation issues- The Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design – RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios-Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion.

UNIT-II : Multi Rate Signal Processing:

Introduction- Sample Rate Conversion Principles- Polyphase Filters- Digital Filter Banks- Timing Recovery in Digital Receivers Using Multirate Digital Filters.

Digital Generation of Signals:

Introduction- Comparison of Direct Digital Synthesis with Analog Signal Synthesis- Approaches to Direct Digital Synthesis- Analysis of Spurious Signals- Spurious Components due to Periodic jitter- Band Pass Signal Generation- Performance of Direct Digital Synthesis Systems- Hybrid DDS-PLL Systems- Applications of direct Digital Synthesis- Generation of Random Sequences- ROM Compression Techniques.

UNIT-III: Analog to Digital and Digital to Analog Conversion:

Parameters of ideal data converters- Parameters of Practical data converters- Analog to Digital and Digital to Analog Conversion- Techniques to improve data converter performance-Common ADC and DAC architectures.

UNIT-IV: Digital Hardware Choices:

Introduction- Key Hardware Elements- DSP Processors- Field Programmable Gate Arrays- Trade-Offs in Using DSPs, FPGAs, and ASICs- Power Management Issues- Using a Combination of DSPs, FPGAs, and ASICs.

UNIT-V: Object – Oriented Representation of Radios and Network Resources:

Networks- Object Oriented Programming- Object Brokers- Mobile ApplicationEnvironments-Joint Tactical Radio System. Case Studies in Software Radio Design: Introduction and Historical Perspective, SPEAK easy-JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT.



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Course Outcomes for First Year First Semester Course	
Course Code: M19CS2103	
Course Title: SOFTWARE DEFINED RADIO	
CO-1	Understanding of analog RF components as front end block in implementation of SDR.
CO-2	Design circuits at different Multirate signaling technique for frequency conversion and Sampling issues.
CO-3	Understanding of ADC and DAC technology.
CO-4	Knowledge of Hardware and software development methods for embedded wireless systems
CO-5	Make system-level decisions for software defined radio technology and products.



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SYLLABUS: MOOCS-I (M19CS2104)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course.



SYLLABUS: OPEN ELECTIVE

Students have to choose one open elective course offered by departments other than the parent departments.

List of open Electives offered by other departments are given below.

Offered from	Course Code	Course Name	Offered to
CIVIL ENGINEERING	M19 ST 2107	Construction Management	CST, CS, PSA,IT & CAD/CAM
	M19 ST 2108	Green Technology	
	M19 ST 2109	Analysis of Offshore Structures	
COMPUTER SCIENCE & ENGINEERING	M19 CST 2106	Python Programming	ST, CS, PSA & CAD/CAM
	M19 CST 2107	Artificial Intelligence	
	M19 CST 2108	Advanced Data structures	
ELECTRICAL & ELECTRONICS ENGINEERING	M19PS2107	Electric And Hybrid Vehicles	ST, CST, CS, IT & CAD/CAM
	M19PS2108	Energy From Waste	
	M19PS2109	Energy Management and Auditing	
INFORMATION TECHNOLOGY	M19IT2108	Web Technologies	ST, CS, PSA & CAD/CAM
	M19IT2109	Internet of Things	
	M19IT2110	Machine Learning	
MECHANICAL ENGINEERING	M19CAD 2107	Operations Research	ST, CST, CS,PSA & IT
	M19CAD 2108	Nano Technology	
	M19CAD 2109	Product Design & Manufacturing	
SCIENCE & HUMANITIES	M19BS2101	Management and Organisational Behaviour	ST, CST, CS,PSA, IT & CAD/CAM



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SYLLABUS : MOOCS-II (M19CS2105)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course



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SYLLABUS: DISSERTATION-I/INDUSTRIAL PROJECT (M19CS2106)

The Student has to register for Dissertation-I / Industrial project in III semester. Student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

Continuous assessment of Dissertation-I during the III-Semester will be monitored by the PRC. Dissertation-I/ Industrial Project is evaluated for 50 internal marks and 50 external marks.

Internal marks 50 awarded by Project Guide and PRC jointly based on continuous assessment consisting of two seminars based on Dissertation work-I.

External marks 50 awarded by External Examiner, Supervisor and Head of the Department jointly based on a review and Viva voce on Dissertation work-I.



ELECTRICAL AND ELECTRONICS ENGINEERING



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Regulation: R19				I / I - M.Tech. I - Semester					
ELECTRICAL AND ELECTRONICS ENGINEERING (POWER SYSTEM&AUTOMATION) (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19 PS1101	Advanced Power systemoperation and control	PC	3	3	0	0	25	75	100
M19 PS1102	Power system dynamicsand stablity	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19RD 1101	Research Methodologyand IPR	CC	2	2	0	0	25	75	100
M19 PS1109	Power System Simulation Laboratory-I	PC	2	0	0	4	25	75	100
M19 PS1110	Power system Laboratory	PC	2	0	0	4	25	75	100
#AC-1	Audit course -1	AC	0	2	0	0	0	0	0
TOTAL			18	16	0	8	175	525	700



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#PE-I	M19 PS1103	Electric Power Distribution System
	M19 PS1104	HVDC Transmission
	M19 PS1105	EHVAC Transmission
#PE-II	M19 PS1106	Artificial Intelligence Techniques
	M19 PS1107	Optimization Techniques
	M19 PS1108	Advanced Digital Signal Processing
#AC-1 & 2	M19AC0001	English for Research Paper Writing
	M19AC0002	Disaster Management
	M19AC0003	Sanskrit for Technical Knowledge
	M19AC0004	Value Education
	M19AC0005	Constitution of India
	M19AC0006	Pedagogy Studies
	M19AC0007	Stress Management by Yoga
	M19AC0008	Personality Development through Life Enlightenment Skills.



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POWER SYSTEM & AUTOMATION

ADVANCED POWER SYSTEM OPERATION & CONTROL (M19PS1101)

UNIT-I : Generation with limited Energy supply: Take-or-pay fuel supply contract, composite generation production cost function. Solution by gradient search techniques, Base point and participation factor method, hard limits and slack variables, Fuel scheduling by linear programming. Hydroelectric plant models –short term hydrothermal scheduling problem – Gradient approach.

UNIT-II : Unit commitment problem: Constraints in UCP,UC solutions. UC Methods-priority list method, Forward Dynamic programming Approach and Lagrange Relaxation method.

UNIT-III: Optimal power flow: Solution of OPF, gradient method, Newton's method, linear programming method with only realpower variables, linear programming with AC power flow variables.

UNIT-IV: Single area &Two areas Load Frequency Control: concept of single & two area Load frequency control: uncontrolled case and controlled case, tie-line bias control. Optimal two- area LF control-steady state representation, performance Index and optimal parameter adjustment.

UNIT-V: Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation, Interchange Evaluation with unit commitment, Multiple Interchange contracts after the fact production costing, Transmission Losses in transaction Evaluation,other types of interchange power pools.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1101	
Course Title: ADVANCED POWER SYSTEM OPERATION & CONTROL	
CO-1	Understand the effect of generation with limited energy supply.
CO-2	Solve generation dispatching scheme for thermal and hydrounits.
CO-3	Solve the unit commitment problem for economic load dispatch.
CO-4	Get knowledge on load frequency control of single area and two area systems with and without control.
CO-5	Solve the interchange evaluation in interconnected power systems.
CO-6	Solve the optimal power flow problems with different solutions



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SYLLABUS: POWER SYSTEM DYNAMICS & STABILITY (M19PS1102)

UNIT-I: Basic Concepts: Power system stability states of operation and system security – system dynamics – system model analysis of steady State stability and transient stability –Modeling of Synchronous Machine: Synchronous machine – park's Transformation of Flux Linkages, Stator Voltage equation and torque equation-analysis of steady state performance.

UNIT-II: Excitation System: Excitation system modeling-excitation systems block Diagram- Dynamics of a synchronous generator connected to infinite bus – system model Synchronous machine model-stator equations rotor equations – Synchronous machine model with field circuit – one equivalent damper winding on q axis (model 1.1).

UNIT-III: Analysis of Single Machine System: Small signal analysis with block diagram – Computation of Heffron –Phillips constants - Representation Characteristic equation and application of Routh Hurwitz criterion synchronizing and damping torque analysis- Stability by Eigen value Approach.

UNIT-IV: Application of Power System Stabilizers: Basic concepts in applying PSS – Control signals – Structure and tuning of PSS – Washout circuit – Dynamic compensator analysis of single machine infinite bus system with and without PSS.

UNIT-V: Digital Simulation of Transient Stability: Swing equation, machine equations – Direct method of solution – Solution Techniques: Modified Euler method – RungeKutta method – Concept of multi machine stability

Course Outcomes for First Year First Semester Course	
Course Code: M19 PS 1102	
Course Title: POWER SYSTEM DYNAMICS & STABILITY	
CO-1	Choose the fundamental dynamic behavior and controls of power systems to perform basic stability analysis.
CO-2	Comprehend concepts in modeling and simulating the dynamic phenomena of power systems
CO-3	Interpret results of system stability studies Analyze theory and practice of modeling main power system components, such as synchronous machines, excitation systems and governors.



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SYLLABUS: ELECTRIC POWER DISTRIBUTION SYSTEM (M19PS1103)

UNIT-I: Distribution of Power, Management, Power Loads, Load Forecasting Short-term & Long-term, Power System Loading, Technological Forecasting. Advantages of Distribution Management System (D.M.S.) Distribution Automation: Definition, Restoration / Reconfiguration of Distribution Network, Different Methods and Constraints, Power Factor Correction

UNIT-II: Distribution system - reliability analysis – reliability concepts – Markov model – distribution network reliability – reliability performance

UNIT-III: Distribution system expansion - planning – load characteristics – load forecasting – design concepts – optimal location of substation – design of radial lines – solution technique

UNIT-IV: Calculation of Optimum Number of Switches, Capacitors, Optimum Switching Device Placement in Radial, Distribution Systems, Sectionalizing Switches – Types, Benefits, Bellman's Optimality Principle, Remote Terminal Units, Energy efficiency in electrical distribution & Monitoring

UNIT-V: Maintenance of Automated Distribution Systems, Difficulties in Implementing Distribution. Automation in Actual Practice, Urban/Rural Distribution, Energy Management, AI techniques applied to Distribution Automation

Course Outcomes for First Year First Semester Course	
Course Code: : M19PS1103	
Course Title ELECTRIC POWER DISTRIBUTION SYSTEM	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science & technology can be understood.
CO-3	Being a logical language will help to develop logic in students.



SYLLABUS: HVDC TRANSMISSION (M19PS1104)
(ELECTIVE-I)

UNIT-I: Limitation of EHVAC Transmission, Advantages of HVDC Technical economical reliability aspects. HVDC Transmission: General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration.

Types of HVDC links- Apparatus and its purpose.

UNIT-II: Static Power Converters: 6-pulse bridge circuit and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers. Performance comparison of diametrical connection with 6-pulse bridge circuit.

UNIT-III: Control of HVDC Converters and systems : Constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control.

Factors responsible for generation of Harmonics, voltage and current harmonics, effect of variation of α and μ . Filters for harmonic elimination.

UNIT-IV: Interaction between HVAC and DC systems – Voltage interaction, Harmonic instability problems and DC power modulation. Development of DC circuit Breakers, Multi-terminal DC links and systems; series, parallel and series-parallel systems, their operation and control.

UNIT-V: Transient over voltages in HVDC systems : Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults. Converter faults and protection in HVDC

Systems: Converter faults, over current protection - valve group and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1104	
Course Title: HVDC TRANSMISSION	
CO-1	Summarize various merits and schemes of HVDC transmission.
CO-2	Understand the basic HVDC transmission equipment and their operation.
CO-3	Apply the control of HVDC systems and to employ filters of given specifications.
CO-4	Demonstrate the interaction between HVAC and HVDC system, and to illustrate the circuit breakers and MTDC systems.
CO-5	Understand the various protection schemes of HVDC transmission.



SYLLABUS: EHVAC TRANSMISSION (M19PS1105)
(ELECTIVE-I)

UNIT-I: Foundation Structures & Design of Centrally Loaded Isolated Footings and Column Pedestals – Introduction, Rigid and Flexible Foundations, Loads and their Effects, Design Requirements, Geotechnical Design, Empirical and Exact Methods of Analysis of foundations, Design Loads for Foundations, Recommended Approach to Structural Design of Foundations. Introduction, General Procedure for Design, Design of Square Footing of Uniform Depth (Pad Footing), Design of sloped Rectangular Footings, Design Procedure, Detailing of Steel, Design of Rectangular Pad Footings, Design of Plain Concrete Footings, Design of Pedestals, Design Calculation for Pedestals.

UNIT-II: Wall Footings – Introduction Simple Plain Concrete Wall Footings, Reinforced Concrete Continuous Strip Wall Footings, Design of continuous Strip Wall Footings, Design for Longitudinal Steel, R.C.T Beam Footings in Shrinkable Soils, Foundations of Partition Wall in Ground Floors, Summary.Strip Footings Under Several Columns – Introduction, Design Procedure for Equally loaded and Equally Spaced Columns, Analysis of Continuous Strip Footing for Unsymmetrical Loading, Analysis of Strip Footing with Unsymmetrical Loads, Detailing of Members.

UNIT-III: Raft Foundations – Introduction, Rigid and Flexible Foundations, common Types of Rafts, Deflection Requirements of Beams and Slabs in Rafts, General considerations in Design of Rigid Rafts, Types of Loadings and Choice of Rafts, Record of Contact Pressures Measured Under Rafts, Modern Theoretical Analysis. **Design of Flat Slab Rafts-Mat Foundations –** Introduction, Components of Flat Slabs, Preliminary Planning of Flat Slab Rafts, Analysis of Flat Slab by Direct Design Method, Method of Analysis, Values for Longitudinal Distribution and Transverse, Redistribution, Shear in Flat Slabs, Bending of Columns in flat Slabs, Limitations of Direct Design Method for Mats, Detailing of Steel, Design of Edge Beam in Flat Slabs. **Beam and Slab Rafts –** Introduction, Planning of the Raft, Action of the Raft, Approximate Dimensioning of the Raft, Design of the Beam and Slab Raft under Uniform Pressure, Structural Analysis for the Main Slab, Design of Secondary and Main Beams, Analysis by Winkler Model, Detailing of Steel.

UNIT-IV: Combined Piled Raft Foundations (CPRF) – Introduction, Types and uses of Piled Rafts, , Interaction of Pile and Raft, Ultimate Capacity and Settlement of Piles, Estimation of Settlement of Raft in Soils, Allowable Maximum and Differential Settlement in Buildings, Design of CPRF System, conceptual Method of Design, Conceptual Method of Analysis, Distribution of Piles in the Rafts, Theoretical Methods of Analysis. Circular and Annular Rafts – Introduction, Positioning of chimney Load on Annular Raft, Forces Acting on Annular Rafts, Pressures Under Dead Load and Moment, Methods of Analysis, Conventional Analysis of Annular



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Rafts, Analysis of Ring Beams Under circular Layout of Columns, Analysis of Ring Beam Transmitting Column Load to Annular Rafts, Detailing of Annular Raft Under Columns of a Circular Water Tank.

UNIT-V: Under-reamed Pile Foundations – Introduction, Safe Loads on Under-reamed Piles, Design of Under-reamed Pile Foundation for Load Bearing Walls of Buildings, Design of Grade Beams, Design of Under-reamed Piles Under Columns of Buildings, Use of Under-reamed Piles for Expansive Soils. Design of cantilever and Basement Retaining Walls – Introduction, Earth Pressure and Rigid Walls, Calculation of Earth Pressure on Retaining Walls, Design of Rigid Walls, Design of Ordinary R.C. cantilever Walls, Design of cantilever Walls without Toe, Design of Basement Walls, Calculation of Earth Pressures in Clays, Design of Free Standing Basement Walls.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1105	
Course Title: EHVAC TRANSMISSION	
CO-1	Calculate the transmission line parameters.
CO-2	Calculate the field effects on EHV and UHV AC lines.
CO-3	Determine the corona, RI and audible noise in EHV and UHV lines.
CO-4	Analyze voltage control and compensation problems in EHV and UHV transmission systems.



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SYLLABUS: ARTIFICIAL INTELLIGENCE TECHNIQUES (M19PS1106)

UNIT-I: Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT-II: Fuzzy Logic System:

Introduction to classical sets - properties, operations and relations; Fuzzy sets, membership, Uncertainty, operations, properties, fuzzy relations, cardinalities, membership functions. Fuzzy Logic System Components- Fuzzification, Membership value assignment, development of rule base and decision making system, defuzzification to crisp sets, defuzzification methods.

UNIT-III: Artificial Neural Networks: Humans and Computers, Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network using error back propagation training, Perceptron convergence theorem, Limitations and applications of the Perceptron model, Generalized delta learning rule, Hopfield network, Self-organizing network and Recurrent network.

UNIT-IV: Genetic algorithms & Modelling

Introduction-encoding-fitness function-reproduction operators-genetic operators-cross over and mutation-generational cycle-convergence of genetic algorithm.

UNIT-V: Application of AI Techniques-load forecasting-load flow studies-economic load dispatch- load frequency control-reactive power control-speed control of dc and ac motors

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1106	
Course Title: ARTIFICIAL INTELLIGENCE TECHNIQUES (ELECTIVE-II)	
CO-1	Analyze and design fuzzy logic systems.
CO-2	Understand the neural networks and analyze the different problems using training algorithms in neural networks.
CO-3	Develop algorithms using genetic algorithm for optimization.
CO-4	Apply AI Techniques in electrical engineering.



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UG Programmes CE, CSE, ECE, EEE, IT & ME are Accredited by NBA

ChinnaAmiram, Bhimavaram-534204. (AP)

SYLLABUS: OPTIMIZATION TECHNIQUES (M19PS1107)

UNIT-I: Introduction to Optimization: Introduction, Historical Development, Engineering applications of Optimization, Statement of Optimization Problem.

UNIT-II: Classical Optimization Techniques: Introduction, Single variable optimization, Multi variable optimization with no constraints; Multivariable optimization with Equality constraints -Solution by Direct Substitution method, Method of Lagrangian multipliers; Multivariable optimization with inequality constraints: Kuhn-Tucker conditions.

UNIT-III: Linear Programming: Introduction, Applications of Linear Programming, Standard Form of a Linear Programming, Basic Terminology and Definitions, Exceptional cases, Simplex method, Big-M method, Two-phase method, Revised Simplex method, Duality, Degeneracy Principle.

UNIT-IV: Non-Linear Programming-I: Unconstrained One Dimensional Minimization Methods- Fibonacci Method, Quadratic Interpolation Method Non- Linear Programming: Unconstrained Optimization: Univariate Method, Pattern Directions, Powell's Method, Cauchy's Method Or Steepest Descent Method, Powell's Conjugate Direction Method.

UNIT-V: Non-Linear Programming-II: Constrained Optimization- Characteristics Of A Constrained Problem, Classification- Direct Methods, Indirect Methods- Interior Penalty Function Method, Exterior Penalty Function Method.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1107	
Course Title: OPTIMIZATION TECHNIQUES (ELECTIVE-II)	
CO-1	To learn the essential optimization techniques for the application of engineering problems.
CO-2	To study the optimization techniques for linear and non-linear programming problems.



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SYLLABUS: ADVANCED DIGITAL SIGNAL PROCESSING (M19PS1108)
(ELECTIVE-II)

UNIT-I: Overview of DSP, Digital filter design and structures: Basic FIR/IIR filter design & structures, design techniques of linear phase FIR filters, IIR filters by impulse invariance, bilinear transformation, FIR/IIR Cascaded lattice structures, and Parallel all pass realization of IIR.

UNIT-II: Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in subband coding.

UNIT-III: Linear prediction & optimum linear filters, stationary random process, forward-backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice- Ladder Filters, Wiener Filters for Filtering and Prediction.

UNIT-IV: Introduction to multi resolution analysis and wavelets, wavelet properties, The Haar Wavelet, Wavelet decomposition and reconstruction, applications to denoising, KL Transform: Derivation, properties and applications.

UNIT-V: Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation, Minimum Variance Spectral Estimation, Eigenanalysis Algorithms for Spectrum Estimation.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1108	
Course Title: ADVANCED DIGITAL SIGNAL PROCESSING(ELECTIVE-II)	
CO-1	Understand theory of different filters and algorithms
CO-2	Apply the multirate DSP in subband coding
CO-3	Estimate the optimal parameters of the signals based on the linear equations
CO-4	Apply wavelet and KL transforms for multiresolution analysis
CO-5	Estimate the power spectral parameters of given signals using different methods



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SYLLABUS: RESEARCH METHODOLOGY AND IPR (M19RD1101)
(Common to CST,CS,PSA, IT & CAD)

UNIT-I: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-III: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Course Outcomes for First Year First Semester Course	
Course Code: M19RD1101	
Course Title: RESEARCH METHODOLOGY AND IPR	
CO-1	Analyze research related information
CO-2	Formulate a Research Proposals and Publish papers with research ethics
CO-3	Award for Intellectual Property Rights like Patents, Trade and Copyrights
CO-4	Analyze Various Intellectual Property Rights
CO-5	Assess New Developments of IPRs in National and International level



SYLLABUS: POWER SYSTEM SIMULATION LABORATORY-I (M19PS1109)

List of Experiments

1. To write MATLAB programs for solving the given electrical networks.
2. To solve the given non-linear equation using Gauss Seidel and Newton-Raphson Techniques.
3. To find the Y-Bus of given power system by Direct Inspection method.
4. Obtain the power flow solution for the given system using Gauss-Seidel method.
5. Obtain the power flow solution for the given system using Newton-Raphson method.
6. Obtain the power flow solution for the given system using Fast Decoupled method.
7. Formation of Z-Bus by building Algorithm.
8. To verify the frequency and power deviations due to step-load changes in a two-area system using SIMULINK.
9. To obtain the swing curve for the given system and determine the stability using SIMULINK model.
10. Obtain the sequence components for the line currents using SIMULINK & MATLAB.
11. To design a state feedback controller for the load frequency control of an isolated power system using pole-placement technique and verify its effects.
12. To verify the effects of PID control on Automatic Voltage Regulator System of the generator by obtaining its terminal voltage step response.
To find the optimal dispatch and total cost of generation for three thermal power plants by neglecting transmission losses.
- 13.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1109	
Course Title: POWER SYSTEM SIMULATION LABORATORY-I	
CO-1	Verify the theoretical concepts of various aspects of Power System analysis.
CO-2	Demonstrate the ability to identify, formulate and solve Power System engineering problems.
CO-3	Design and conduct experiments, analyze and interpret data.
CO-4	Design a electrical systems or process as per needs and specifications.
CO-5	Use modern engineering tools, software's and equipment to analyze problem.



SYLLABUS: POWER SYSTEM LABORATORY (M19ST1110)

List of Experiments

1. Determination of positive, negative and zero sequence impedances of a 3 - phase transformer
2. Determination of positive, negative and zero sequence reactances of a synchronous machine through symmetrical components method
3. Determination of positive, negative and zero sequence reactances of a synchronous machine through fault analysis
4. Power angle characteristics of a salient pole synchronous machine
5. Determination of dielectric strength of insulating oil
6. Determination of equivalent circuit of a 3-winding transformer
7. Determination of ABCD parameters of transmission lines
8. Characteristics of electro-magnetic type over current relay
9. DMT and IDMT characteristics of a static overvoltage relay
10. DMT and IDMT characteristics of a static undervoltage relay
11. Protection of a transformer with differential relay
12. Characteristics of a negative sequence current relay

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1110	
Course Title: POWER SYSTEM LABORATORY	
CO-1	Evaluate the theoretical concepts of power systems.
CO-2	Demonstrate the modeling of key components of the power systems.
CO-3	Understand the working of power system protection systems.
CO-4	Compare the results of theoretical analyses with the practical ones.
CO-5	Design protection systems of specified requirements.



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SYLLABUS: ENGLISH FOR RESEARCH PAPER WRITING (M19AC0001)

UNIT-I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II: Clarifying Who Did What, Highlighting Your Findings, Hedging And Criticizing Paraphrasing and Plagiarism, Sections of a Paper.

UNIT-III: Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV: Key skills are needed when writing a Title, key skills are needed when writing an abstract, key skills are needed when writing an introduction, skills needed when writing a Review of the Literature, skills are needed when writing the Methods.

UNIT-V: skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases how to ensure paper is as good as it could possibly be the first-time submission

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0001	
Course Title: ENGLISHFORRESEARCHPAPERWRITING	
CO-1	Understand that how to improve your writing skills and level of readability
CO-2	Learn about what to write in each section
CO-3	UnderstandtheskillsneededwhenwritingaTitleEnsurethegoodqualityof paper at very first time submission



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SYLLABUS: DISASTERMANAGEMENT (M19AC0002)

UNIT-I: Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude

UNIT-II: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts

UNIT-III: Disaster Prone Areas In India: Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics

UNIT-IV: Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V: Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival. Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

Course Outcomes for First Year First Semester Course	
Course Code: : M19AC0002	
Course Title: DISASTER MANAGEMENT	
CO-1	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO-2	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO-3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO-4	Critically understand the strengths and weaknesses of disaster management approaches, planning & programming in different countries, particularly their home country or the countries they work in.



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SYLLABUS: SANSKRIT FOR TECHNICAL KNOWLEDGE (M19AC0003)

UNIT-I: Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

UNIT-II: Order, Introduction of roots, Technical information about Sanskrit Literature

UNIT-III: Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Course Outcomes for First Year First Semester Course	
Course Code: M19AC 0003	
Course Title: SANSKRIT FOR TECHNICAL KNOWLEDGE	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science& technology can be understood.
CO-3	Being a logical language will help to develop logic in students.



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SYLLABUS: VALUE EDUCATION (M19AC0004)

UNIT-I: Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism.Moral and non- moral valuation. Standards and principles. Value judgements.

UNIT-II: Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity, Patriotism, Love for nature ,Discipline

UNIT-III: Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation, Doing best for saving nature

UNIT-IV: Character and Competence –Holy books vs Blind faith.Self-management and Good health. Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0004	
Course Title: VALUE EDUCATION	
CO-1	Knowledge of self-development
CO-2	Learn the importance of Human values
CO-3	Developing the overall personality



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SYLLABUS: CONSTITUTION OF INDIA (M19AC0005)

UNIT-I: History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working)

UNIT-II: Philosophy of the Indian Constitution: Preamble ,Salient Features

UNIT-III: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy ,Fundamental Duties

UNIT-IV: Organs of Governance: Parliament, Composition, Qualifications and Disqualifications ,Powers and Functions, Executive, President , Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-V Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0005	
Course Title: CONSTITUTION OF INDIA	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO-2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
CO-4	Discuss the passage of the Hindu Code Bill of 1956.



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SYLLABUS: PEDAGOGY STUDIES (M19AC0006)

UNIT-I: Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT-II: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT-III: Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

UNIT-IV: Theory of change, Strength and nature of the body of evidence for effective pedagogical practices Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. Professional development: alignment with classroom practices and follow-up support

UNIT-V: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.



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SYLLABUS: STRESS MANAGEMENT BY YOGA (M19AC0007)

UNIT-I: Definitions of Eight parts of yoga(Ashtanga)

UNIT-II: Yam and Niyam.

Do's and Don'ts in life.

i) Ahinsa,satya,astheya,brahmacharya and aparigraha
Shaucha, santosh,tapa, wadhyay,ishvarapranidhana

UNIT-III: Asan and Pranayam

i) Various yog poses and their benefits for mind & body ii)Regularization of breathing techniques and its effects-Types pranayama

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0007	
Course Title: STRESSMANAGEMENTBY YOGA	
CO-1	Develop a healthy mind in a healthy body thus improving social health also.
CO-2	Improve efficiency



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SYLLABUS: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (M19AC0008)

UNIT-I: Neetisatakam-Holistic development of personality Verses-19,20,21,22 (wisdom),Verses-29,31,32(pride & heroism) Verses-26,28,63,65(virtue),Verses-52,53,59(don'ts),Verses-71,73,75,78(do's)

UNIT-II: Approach today work and duties. Shrimad Bhagwad Geeta: Chapter2-Verses:41,47,48
Chapter3-Verses13,21, 27,35, Chapter6-Verses5,13,17,23,35,
Chapter18-Verses45,46,48.

UNIT-III: Statements of basic knowledge, Shrimad Bhagwad Geeta: Chapter2-Verses56,62,68,
Chapter12-Verses13,14,15,16,17,18, Personality of Rolemodel .Shrimad Bhagwad Geeta: Chapter2-Verses 17,
Chapter 3-Verses 36,37,42, Chapter 4-Verses18,38,39,Chapter18-Verses37,38,63

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0008	
Course Title: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	
CO-1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students



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Regulation: R19			I / I - M.Tech. II - Semester						
ELECTRICAL AND ELECTRONICS ENGINEERING (POWER SYSTEM &AUTOMATION) (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	C r.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19 PS1201	Real Time Control of Power Systems	PC	3	3	0	0	25	75	100
M19PS 1202	AdvancedPower Electronic Converters	PC	3	3	0	0	25	75	100
#PE-III	Program Elective-III	PE	3	3	0	0	25	75	100
#PE-IV	Program Elective-IV	PE	3	3	0	0	25	75	100
M19PS 1209	Power System Simulation Laboratory-II	PC	2	0	0	4	25	75	100
M19PS 1210	Power Electronics for Renewable Integration Laboratory	PC	2	0	0	4	25	75	100
M19PS 1211	Mini Projectwith Seminar	MP	2	0	0	4	100	--	100
#AC-2	Audit Course-2*	AC	0	2	0	0	0	0	--
TOTAL			18	14	0	12	250	450	700

	Code	Course
#PE-III	M19 PS1203	Power Quality Issues and Remedies
	M19 PS1204	Digital Protection of Power Systems
	M19 PS1205	Power System Transients
#PE-IV	M19 PS1206	Smart Grids Technologies
	M19 PS1207	Renewable Energy Systems
	M19 PS1208	Advanced Control Theory



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POWER SYSTEM & AUTOMATION

SYLLABUS : REAL TIME CONTROL OF POWER SYSTEMS (M19ST1201)

UNIT-I: State Estimation: Different types of State Estimations, Formulation of state Estimation problem, Various criterion's of state estimation, Theory of WLS state estimation, Network observability, Pseudo measurements, Bad data observability, Bad data detection, identification and elimination

UNIT-II: Security and Contingency Evaluation : Security concept, Security Analysis and monitoring, Types of contingency, Contingency Analysis of power system network by using AC Power flow and DC power flow methods, Contingency selection, Network sensitivity factors and their calculation, Concentric relaxation, Bounding.

UNIT-III: Computer Control of Power Systems : Need for real time and computer control of power systems, operating states of a power system-state transition diagram, SCADA - functions of Supervisory control and Data Acquisition systems and implementation considerations, Energy Control Centers (ECS/EMS), software requirements for implementing the above functions.

UNIT-IV: Voltage Stability: Voltage collapse, Voltage security, Relation of voltage stability to rotor angle stability. Types of voltage stability, Static Voltage stability analysis, 'P-V' curves and 'Q-V' curves, Voltage stability static indices, Improvement of voltage stability, Reactive power optimization.

UNIT-V: PMU: Wide Area Monitoring Systems (WAMS), Placement of Phasor Measurement Units (PMUs), Phasor and Frequency Estimation, Enhanced State Estimation, observability analysis, Voltage Stability assessment and fault detection using Phasor Measurement.

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1201	
Course Title: REAL TIME CONTROL OF POWER SYSTEMS	
CO-1	Understand Supervisory control and data acquisition and EMS.
CO-2	Analyze the voltage stability of the power system network.
CO-3	Apply knowledge in placement of PMU for power system network
CO-4	Solve the state estimation, and contingency in power system.



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SYLLABUS: ADVANCED POWER ELECTRONIC CONVERTERS (M19PS1202)

UNIT-I: Single Phase AC Voltage Controllers-Introduction –Principle of ON-OFF control, Principle of phase angle control, Single phase Bidirectional controllers with Resistive Loads, Single phase controllers with Inductive loads, Three Phase AC Voltage controllers-Analysis of Controllers with star and delta connected resistive, resistive–inductive loads, single phase transformer tap changers -Effects of source and load inductances- numerical problems.

UNIT-II: AC-DC converters- Introduction -Single phase and three phase dual Converters, Power factor improvements: Extinction angle control-symmetrical angle control - single phase sinusoidal PWM-Single phase series converters- Effects of source and load inductances - numerical problems

UNIT-III: Switch-Mode Converter Power Supplies- high-frequency switching- push–pull converter, single-switch forward converter, single-switch fly-back converter, Comparison of Continuous and Discontinuous Conduction Performance, numerical problems.

UNIT-IV: Voltage control of single-phase inverters - sinusoidal PWM –modified PWM – phase displacement Control, PWM Techniques- SHE PWM, Space Vector PWM (SVM), Hysteresis band current control PWM, Advanced modulation techniques-Trapezoidal, staircase, stepped, harmonic injection and delta modulation.

UNIT-V: Multi-level inverters, Types of Multilevel Inverters- Diode-Clamped Multilevel Inverter, Features of Diode-Clamped Inverter, Improved Diode-Clamped Inverter- Flying-Capacitors Multilevel Inverter-Features of Flying-Capacitors Inverter- Cascaded Multilevel Inverter- Principle of Operation- Features of Cascaded Inverter- Comparisons of Multilevel Converters.

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1202	
Course Title: ADVANCED POWER ELECTRONIC CONVERTERS	
CO-1	Analyze and design of AC-AC Converters for various types of loads.
CO-2	Evaluate the power factor correction methods in AC-DC Converters.
CO-3	Acquire knowledge about analysis and design of SMPS, PWM techniques.
CO-4	Summarize the features of different multilevel inverter.



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SYLLABUS: POWER QUALITY ISSUES AND MITIGATION (M19PS1203)

UNIT-I: Introduction

Overview of Power Quality - Concern about the Power Quality - General Classes of Power Quality Problems – Transients -Long-Duration Voltage Variations - Short-Duration Voltage Variations - Voltage Unbalance - Waveform Distortion - Voltage fluctuation - Power Frequency Variations - Power Quality Terms - Voltage Sags and Interruptions - Sources of Sags and Interruptions – Nonlinear loads.

UNIT-II: Transient Over Voltages

Source of Transient Over Voltages - Principles of Over Voltage Protection - Devices for Over Voltage Protection - Utility Capacitor Switching Transients - Utility Lightning Protection – Load Switching Transient Problems

Long Duration Voltage Variations

Principles of Regulating the Voltage - Device for Voltage Regulation - Utility Voltage Regulator Application - Capacitor for Voltage Regulation - End-user Capacitor Application

UNIT-III: Harmonic Distortion and solutions

Voltage vs. Current Distortion - Harmonics vs. Transients - Power System Quantities under Non-sinusoidal Conditions - Harmonic Indices – Sources of harmonics - Locating Sources of Harmonics – System Response Characteristics - Effects of Harmonic Distortion – Interharmonics- Harmonic Solutions Harmonic Distortion Evaluation - Devices for Controlling Harmonic Distortion - Harmonic Filter Design - Standards on Harmonics

UNIT-IV: Distributed Generation and Power Quality

Resurgence of Distributed Generation - DG Technologies - Interface to the Utility System Power Quality Issues - Operating Conflicts - Wiring and Grounding - Typical Wiring and Grounding Problems -Solution to Wiring and grounding Problems

UNIT-V: Power Quality Enhancement Using Custom Power Devices

Introduction to Custom Power Devices - Static Var Compensation for Distribution Systems

– Static Series Compensator - Static Shunt Compensator(DSTATCOM)-Application of Custom Power Devices in Power Systems--P-Q theory – Control of P and Q – Dynamic

Voltage Restorer (DVR) – Operation and control – Operation and control – Unified PowerQuality Conditioner (UPQC) – Operation and control.



Estd:1980

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Course Outcomes for First Year First Semester Course	
Course Code: M19PS1203	
Course Title: POWER QUALITY ISSUES AND MITIGATION	
CO-1	Acquire the knowledge on causes of power quality, power quality parameters.
CO-2	Understand sources of transient over voltages and providing protection to transient over voltages and study devices for voltage regulation
CO-3	Understand effects and sources of harmonics, and design filter for controlling harmonic distortion.
CO-4	Describe power quality aspects in distributed generation and develop solutions to wiring and grounding problems.
CO-5	Analyze the effect of various power quality issues in distribution system and their mitigation principles.



SYLLABUS: DIGITAL PROTECTION OF POWER SYSTEMS (M19PS1204)

UNIT-I: Basic Block diagram – Advantages of Static Relays – Comparators – Phase and amplitude Comparators – General Equations of Comparators – Analysis of Amplitude and Phase Comparators – Operating principles – Static Overcurrent relays – Differential relays – distance relays.

UNIT-II: Pilot relaying and Carrier current protection schemes – Protection of Transmission lines – 3–zone protection schemes – carrier aided distance schemes – switched distance schemes – Transformer protection – mal operation of relays – Harmonic Restraint relay – Wavelet applications in transformer protection – Multi Input Comparator circuits – realization of Elliptical and Quadrilateral characteristics

UNIT-III: Digital Protection: Developments in computer relaying – mathematical basis for protective relaying algorithms, Fourier Transforms – Discrete Fourier transforms – Wavelet transforms – Kalman filtering.

UNIT-IV: Digital protection of transformers – Fourier based algorithms – finite duration impulse response filter based algorithms – least square curve fitting based algorithms – flux restrained current differential relay.

UNIT-V: Digital protection of transmission lines – current based differential schemes – composite voltage and current based schemes – New developments in relaying principles – fundamentals of travelling wave protection – principle of travelling wave distance relay adaptive relaying – fault location algorithms.

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1204	
Course Title: DIGITAL PROTECTION OF POWER SYSTEMS	
CO-1	Understand the various types of comparators and their realization using static circuits.
CO-2	Understand the realization of over current, distance and differential relays using comparators.
CO-3	Estimate the current and voltage magnitudes from the sampled measurements.
CO-4	Realize the various dynamic characteristics of digital relays for protection of transmission lines, transformers.



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SYLLABUS: POWER SYSTEM TRANSIENTS (M19PS1205)

UNIT-I: INTRODUCTION AND SURVEY: Review and importance of the study of transients - causes for transients. RL circuit transient with sine wave excitation - double frequency transients - basic transforms of the RLC circuit transients. Different types of power system transients - effect of transients on power systems - role of the study of transients in system planning.

UNIT-II: SWITCHING TRANSIENTS: Over voltages due to switching transients - resistance switching and the equivalent circuit for interrupting the resistor current - load switching and equivalent circuit - waveforms for transient voltage across the load and the switch - normal and abnormal switching transients. Current suppression - current chopping - effective equivalent circuit. Capacitance switching - effect of source regulation - capacitance switching with a restrike, with multiple restriks. illustration for multiple restriking transients - ferro resonance.

UNIT-III: LIGHTNING TRANSIENTS: Review of the theories in the formation of clouds and charge formation - rate of charging of thunder clouds - mechanism of lightning discharges and characteristics of lightning strokes - model for lightning stroke - factors contributing to good line design - protection using ground wires - tower footing resistance - Interaction between lightning and power system.

UNIT-IV: TRAVELING WAVES ON TRANSMISSION LINE COMPUTATION OF TRANSIENTS: Computation of transients - transient response of systems with series and shunt lumped parameters and distributed lines. Traveling wave concept - step response - Bewley's lattice diagram - standing waves and natural frequencies - reflection and refraction of travelling waves.

UNIT-V: TRANSIENTS IN INTEGRATED POWER SYSTEM:

The short line and kilometric fault - distribution of voltages in a power system - Linedropping and load rejection - voltage transients on closing and reclosing lines - over voltage induced by faults - switching surges on integrated system Qualitative application of EMTP for transient computation..

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1205	
Course Title: POWER SYSTEM TRANSIENTS	
CO-1	Ability to understand and analyze power system operation, stability, control and protection.
CO-2	To limit the effects of lightning over voltages in power systems
CO-3	Understand the concepts of travelling wave theory for transient signals
CO-4	Understand the various transient over voltages and their effects on integrated power system.



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SYLLABUS: SMART GRID TECHNOLOGIES (M19PS1206)

UNIT-I: Introduction to Smart Grid: Definition, justification for smart grids, smart grid conceptual model, smart grid architectures, Interoperability, communication technologies, role of smart grids standards, intelligrid initiative, national smart grid mission (NSGM) by Govt. of India

UNIT-II: Smart Transmission Technologies: Substation automation, Supervisory control and data acquisition (SCADA), energy management system (EMS), phasor measurement units (PMU), Wide area measurement systems (WAMS)

UNIT-III: Smart Distribution Technologies: Distribution automation, outage management systems, automated meter reading (AMR), automated metering infrastructure (AMI), fault location isolation and service restoration (FLISR), Outage Management Systems (OMS), EnergyStorage, Renewable Integration.

UNIT-IV: Distributed Generation and Smart Consumption: Distributed energy resources (DERs), smart appliances, low voltage DC (LVDC) distribution in homes / buildings, home energy management system (HEMS), Net Metering, Building to Grid B2G, Vehicle to Grid V2G, Solar to Grid, Microgrid

UNIT-V: Regulations and Market Models for Smart Grid: Demand Response, Tariff Design, Time of the day pricing (TOD), Time of use pricing (TOU), Consumer privacy and data protection, consumer engagement etc. Cost benefit analysis of smart grid projects.

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1206	
Course Title: SMART GRID TECHNOLOGIES	
CO-1	Understand technologies for smart grid
CO-2	Appreciate the smart transmission as well distribution systems
CO-3	Realize the distribution generation and smart consumption
CO-4	Know the regulations and market models for smart grid



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SYLLABUS: RENEWABLE ENERGY SYSTEMS (M19PS1207)

UNIT-I: Effects of Conventional Energy methods: Reserves of energy resources – Environmental aspects of conventional power plants- Impact of energy on economy – Renewable energy scenario in India – Potentials – Achievements.

UNIT-II: Solar Energy: Systems: Solar thermal – Flat plate and concentrating collectors – Solar Photo Voltaic Conversion System – Working and design of Solar Cells and Panels – PV applications- MPPT methods- New avenues for growth of solar like floating Solar and Solartrees- Power electronic interface with Solar PV systems.

UNIT-III: Wind Energy Systems: Basics of Wind Energy conversion system -Types of wind energy systems – Performance – Energy storage- Applications of Wind energy- Inter connected System – Safety and Environmental Aspects- modern trends in wind turbine technology.

UNIT-IV: Biomass – Cogeneration– Biomass applications - Tidal energy – Wave energy – Mini and Micro hydro – Geothermal energy – Fuel cell systems - Modern trends in Renewable technology.

UNIT-V: Distributed Generation in power systems: Distributed Generation, Voltage effects, Thermal Limits, Impact of Embedded Generation on the power System Power Quality Disturbances, Islanding- Economics of distributed Generation.

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1207	
Course Title: RENEWABLE ENERGY SYSTEMS	
CO-1	Understand world energy scenario and different Renewable energy systems.
CO-2	Understand the different technologies available in Renewable energy systems.
CO-3	Understand the need for Renewable energy technologies.
CO-4	Get knowledge on New and upcoming renewable energy technologies



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Estd:1980

SYLLABUS: ADVANCED CONTROL THEORY (M19PS1208)

UNIT-I: State Space Analysis & Techniques : The Concept of State and State Models, State Diagram, State Space and State Trajectory, State Space Representation using Phase Variable and Canonical Variables, Solution of State Equation, State Transition Matrix and its Properties, Eigen Values, Eigen Vectors, Model Matrix, Diagonalization, Generalized Eigen vectors, Computation of State Transition Matrix using Laplace Transformation, Power Series Method, Cayley-Hamilton Method, Similarity Transformation Method. Controllability and Observability Tests: Kalman's test, Gilbert's Test, Controllability and Observability Canonical Forms.

UNIT-II: Pole Placement Techniques : Controller Design by State Feedback, Necessary and Sufficient Condition for Arbitrary Pole Placement-State Regulator Problem and State Regulator Design, Evaluation of State Feedback Gain Matrix K, Selection of Location of Desired Closed Loop Poles, State Observer Design, Full Order/Reduced Order Observer Design, Observer Based State Feedback Control, Separation Principle.

UNIT-III: Non-Linear Control System: Introduction, Properties of Nonlinear System, Behavior of Non-Linear System, Classification of Nonlinearities, Common Physical Nonlinearities: Saturation, Friction, Backlash, Dead-Zone, Relay, On-Off Nonlinearity, Nonlinear Spring, Limit cycle, Jump resonance. Phase-Plane Method, Singular points, Stability of Nonlinear System, Construction of Phase Trajectories, Describing Functions Method, Stability Analysis by Describing Function Method. Lyapunov's Stability Analysis, Stability Criterion, Direct Method of Lyapunov and the Linear Systems, Method of Construction of Lyapunov Functions for Nonlinear Systems.

UNIT-IV: Optimal Control: Introduction to Optimal Control, Parameter Optimization: Servomechanism, Optimal Control Problem: Transfer Function and State Variable Approach, State Regulator Problem, Infinite Time Regulator Problem, Output Regulator and the Tracking Problem, Parameter Optimization: Regulators.

UNIT-V: Digital Control Systems: Introduction to Discrete Time Systems, Necessary for Digital Control System, Spectrum Analysis of Sampling Process, Signal Reconstruction, Difference Equations, Z transforms, and the Inverse Ztransform, Pulse Transfer Function, Time Response of Sampled Data Systems, Stability using Jury Criterion, Bilinear Transformation.



Estd:1980

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Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1208	
Course Title: ADVANCED CONTROL THEORY	
CO-1	Understanding the state variable approach is suitable for higher order.
CO-2	Analyze the concepts of controllability and observability.
CO-3	Analyze the various non-linearities through describing functions and phase plane analysis.
CO-4	Analyze typical issues of stability and instability of continuous time invariant systems.
CO-5	Know how to use the simulation software to design a real time power system .



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SYLLABUS: POWER SYSTEM SIMULATION LABORATORY-II (M19PS1209)

LIST OF EXPERIMENTS:

1. ANN based Load Flow Analysis using Back Propagation Algorithm.
2. Economic load dispatch using Neural network.
3. State estimation of power systems using Neural network.
4. Contingency Analysis using Neural Network
5. Genetic Algorithm Program for maximization of $\sin(x)$ function using all basic operators.
6. Genetic Algorithm for Economic Load Dispatch of Thermal Units including losses (Use B-coefficients for computation of losses).
7. Simulation and verification of fuzzy Logic experiments using fuzzy logic trainer.
8. Single area and Two area Load Frequency Control using Fuzzy Logic Toolbox.
9. Fuzzy Logic based small signal stability analysis
10. Simulation of HVDC systems

Course Outcomes for First Year Second Semester Course	
Course Code: M19PS1209	
Course Title: POWER SYSTEM SIMULATION LABORATORY-II	
CO-1	Acquire programming skills by utilizing neural networks.
CO-2	Solve the different problems using training algorithms in neural networks.
CO-3	Develop algorithms using genetic algorithm for optimization using MATLAB/SIMULINK software
CO-4	Analyze and design fuzzy logic systems.



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SYLLABUS: POWER ELECTRONICS FOR RENEWABLE INTEGRATION LABORATORY (M19PS1210)

LIST OF EXPERIMENTS:

1. Study of 1- ϕ dual converter.
2. Study of 3- ϕ inverter with 120° and 180° mode of operation.
3. Study of 5-level cascaded H-bridge inverter.
4. Determination of input p.f. and harmonic factor for 3- ϕ full converter (Inductive load).
5. Study of 3-level NPC inverter.
6. Experiment on "VI-Characteristics and Efficiency of 1kWp Solar PV System".
7. Experiment on "Shadowing effect & diode based solution in 1kWp Solar PV System".
8. Experiment on Performance assessment of Grid connected and Standalone 1kWp Solar Power System.
9. Experiment on Performance assessment of micro Wind Energy Generator.
10. Experiment on Performance Assessment of Hybrid (Solar-Wind) Power System.
11. Study the characteristics of IGBT, MOSFET & GTO's.
12. Design of gate drive circuits for IGBT & MOSFET's.

Course Outcomes for First Year First Semester Course	
Course Code: M19PS1210	
Course Title: POWER ELECTRONICS FOR RENEWABLE INTEGRATION LABORATORY	
CO-1	Evaluate the theoretical concepts of renewable energy systems
CO-2	Demonstrate the modeling of PWM controlled converters
CO-3	Understand the working of IGBT, MOSFET & GTO's. and their gate drive circuits.
CO-4	Compare the Performance of Grid connected and Standalone Solar and wind Power System..



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SYLLABUS: MINI PROJECT WITH SEMINAR (M19PS1211)

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.



Estd:1980

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AUDIT COURSE-2(#AC-2)

List of Audit Courses and their Syllabi are mentioned in the First Semester Syllabus.

The students can opt any one course for AC 2 from the list mentioned in first semester by not opting the course which is already taken for AC 1



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Regulation: R19			II / II - M.Tech. I - Semester							
ELECTRICAL AND ELECTRONICS ENGINEERING (POWER SYSTEM &AUTOMATION) (Under Choice Based Credit System / Elective Course System)										
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)										
Course Code	Course Name	Ca	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks	
#PE -V	Program Elective – V	P E	3	3	0	0	25	75	100	
#Open Elective	Open Elective	O E	3	3	0	0	25	75	100	
M19PS2106	Dissertation-I / Industrial Project	P R	10	0	0	20	50	50	100	
TOTAL			16	6	0	20	100	200	300	

	Course Code	Course
#PE-V/ MOOCS	M19PS2101	Power System Automation.
	M19PS2102	Restructured Power System
	M19PS2103	Flexible AC Transmission systems
	M19 PS2104 (MOOCS-I)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course
#OE-I/ MOOCS	#OE-I	Students have to choose one open elective course offered by departments other than the parent department. List of open Electives offered by other departments are enclosed.
	M19 PS 2105 (MOOCS-II)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS	
M19PS2107	Electric And Hybrid Vehicles
M19PS2108	Energy From Waste
M19PS2109	Energy Management and Auditing



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Estd:1980

POWER SYSTEM &AUTOMATION

SYLLABUS : POWER SYSTEM AUTOMATION (M19PS2101)

(Programme Elective-V)

UNIT-I : Evolution of Automation systems, History of Power system automation, Supervisory Control And Data Acquisition(SCADA) Systems, Components of SCADA systems, SCADA Applications, SCADA in power systems, SCADA basic functions, SCADA application functions in Generation, Transmission and Distribution.

UNIT-II : Advantages of SCADA in Power Systems, The Power system 'Field', Types of data & signals in the Power system, Flow of Data from the field to the SCADA Control center. Building blocks of SCADA systems, Classification of SCADA systems.

UNIT-III: Remote Terminal Unit (RTU), Evolution of RTUs, Components of RTU, Communication, Logic, Termination and Test/HMI Subsystems, Power supplies, Advanced RTU Functionalities.

UNIT-IV: Intelligent Electronic Devices (IEDs), Evolution of IEDs , IED functional block diagram, The hardware and software architecture of IED, IED Communication subsystem, IED advanced functionalities, Typical IEDs, Data Concentrators and Merging Units, SCADA Communication Systems.

UNIT-V: Master Station, Master station software and hardware configurations, Server systems in the master station, Small, medium and large master station configurations, Global Positioning Systems, Master station performance, Human Machine Interface (HMI), HMI components, Software functionalities, Situational awareness, Case studies in SCADA.

Course Outcomes for Second Year First Semester Course	
Course Code: M19PS2101	
Course Title: POWER SYSTEM AUTOMATION	
CO-1	Understand the concepts of power system automation.
CO-2	Understand the components of SCADA systems.
CO-3	Comprehend the RTU, IED and other components of automation systems
CO-4	Understand the transfer of signals from the field to an operator control terminal.
CO-5	Design an interoperable powers automation system.



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SYLLABUS: RESTRUCTURED POWER SYSTEMS (M19PS2102)
(Programme Elective-V)

UNIT-I: Deregulation, Need and conditions for deregulation, Different Entities in Deregulated Electricity Markets, Problems with Deregulating Electricity, Background to Deregulation and the Current Situation around the World, Benefits from a Competitive Electricity Market, After-Effects of Deregulation.

UNIT-II: Market Structure and Operation, Spot market, forward markets and settlements. Review of Concepts marginal cost of generation. Different structure model like Monopoly model, Purchasing agency model, wholesale competition model, Retail competition model.

UNIT-III: Role of the Independent System Operator (ISO), Operational Planning Activities of ISO, Operational Planning Activities of a Genco, Genco in Pool Markets, Genco in Bilateral Markets, Market Participation Issues, Unit Commitment in Deregulated Environment, Competitive Bidding.

UNIT-IV: Power exchange (PX), Market clearing price (MCP,) Market operations, Market power, Transmission pricing, contract path method, MW-mile method, LMP, Congestion management methods- market splitting, counter-trading, effect of LMP on Congestion..

UNIT-V: Ancillary Services and System Security in Deregulation, Classifications and definitions, Ancillary Services Management in Various Countries, Reactive Power as an Ancillary Service.

Course Outcomes for Second Year First Semester Course	
Course Code: M19PS2102	
Course Title: RESTRUCTURED POWER SYSTEMS	
CO-1	Understand of operation of deregulated electricity market systems.
CO-2	Identify the Typical issues in electricity markets and importance of the Independent System Operator in Deregulation.
CO-3	Analyze various types of electricity market operational and control issues using new mathematical models.
CO-4	Understand the importance of Unit commitment and Ancillary services in Deregulation.



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SYLLABUS: FLEXIBLE AC TRANSMISSION SYSTEMS (M19PS2103)
(Programme Elective-V)

UNIT-I: Introduction to FACTS - Concept, power flow and stability, basic theory of line compensation; Thyristor controlled and converter-based FACTS controller - Power Electronic Controllers: Basic types of FACTS controllers, benefits from FACTS Controllers.

UNIT-II: Static Shunt Compensators: Midpoint voltage regulation; Variable impedance type and switching converter type static Var generators, SVC and STATCOM - TCR, TSC, V-I and V-Q characteristics, system stability, Static versus passive VAR compensator, Comparison between SVC and STATCOM.

UNIT-III: Static Series Compensators: Concept of series compensation, voltage stability, variable impedance type series compensators, GCSC, TSSC, TCSC and SSSC, control techniques, control range and VA rating.

UNIT-IV: SSR and its damping, Unified Power Flow Controller, Circuit Arrangement, Operation and control of UPFC. Basic Principle of P and Q control- Independent real and reactive power flow control- Applications.-Interline Power Flow Controller (IPFC) – Operation and control

UNIT-V: Static Voltage and Phase Angle Regulators: Power flow control, TCVR and TCPAR, improvement of transient stability-Modelling of FACTS devices, optimization of FACTS, transient and dynamic stability enhancement

Course Outcomes for Second Year First Semester Course	
Course Code: M19PS2103	
Course Title: FLEXIBLE AC TRANSMISSION SYSTEMS (Elective-V)	
CO-1	Acquire knowledge about the fundamental principles of Passive and Active Reactive Power Compensation Schemes at Transmission level in Power Systems.
CO-2	Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled.
CO-3	Explain the need of Reactive Power Systems, PWM Inverter based Reactive Power Systems and their controls.
CO-4	Analyze the effect of Voltage and Phase Angle Regulators on power system stability.



Estd:1980

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SYLLABUS: MOOCS-I (M19PS2104)

Students Going or Industrial Project/ Thesis will complete these courses through MOOCS. Students can

Also choose SWAYAM or NPTE with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M.Tech Course



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OPENELECTIVE

Offered from	Course Code	Course Name	Offered to
CIVIL ENGINEERING	M19 ST 2107	Construction Management	CST, CS, PSA,IT & CAD/CAM
	M19 ST 2108	Green Technology	
	M19 ST 2109	Analysis of Offshore Structures	
COMPUTER SCIENCE & ENGINEERING	M19 CST 2106	Python Programming	ST, CS, PSA & CAD/CAM
	M19 CST 2107	Artificial Intelligence	
	M19 CST 2108	Advanced Data structures	
ELECTRONICS & COMMUNICATION ENGINEERING	M19 CS 2107	Signals and systems	ST, CST, PSA, IT & CAD/CAM
	M19 CS 2108	Principles of Communication	
	M19 CS 2109	Image and video Processing	
INFORMATION TECHNOLOGY	M19IT2108	Web Technologies	ST, CS, PSA & CAD/CAM
	M19IT2109	Internet of Things	
	M19IT2110	Machine Learning	
MECHANICAL ENGINEERING	M19CAD 2107	Operations Research	ST, CST, CS,PSA & IT
	M19CAD 2108	Nano Technology	
	M19CAD 2109	Product Design & Manufacturing	
SCIENCE & HUMANITIES	M19BS2101	Management and Organisational Behaviour	ST, CST, CS, PSA, IT & CAD/CAM



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SYLLABUS: MOOCS-II (M19PS2105)

Students Going or Industrial Project/ Thesis will complete these courses through MOOCS. Students can

Also choose SWAYAM or NPTE with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M.Tech Course



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SYLLABUS: DISSERTATION-I/INDUSTRIALPROJECT (M19PS2106)

The Student has to register for Dissertation-I / Industrial project in III semester. Student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

Continuous assessment of Dissertation-I during the III- Semester will be monitored by the PRC. Dissertation-I/ Industrial Project is evaluated for 50 internal marks and 50 external marks.

Internal marks 50 awarded by Project Guide and PRC jointly based on continuous assessment consisting of two seminars based on Dissertation work-I.

External marks 50 awarded by External Examiner, Supervisor and Head of the Department jointly based

On a review and Vivavoce on Dissertation work-I.



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Regulation: R19			II / II - M.Tech. II - Semester						
ELECTRICAL AND ELECTRONICS ENGINEERING (POWER SYSTEM &AUTOMATION) (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION &EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19PS2201	Dissertation-II /Industrial Project	PR	16	0	0	32	--	100	100



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POWER SYSTEM &AUTOMATION

SYLLABUS : DISSERTATION-II/INDUSTRIALPROJECT (M19PS2201)

The student has to continue his/her work from Dissertation-I / Industrial project to complete Dissertation-II in IV semester.

Continuous assessment of Dissertation-II during IV-Semester will be monitored by the PRC.

Dissertation-II is evaluated for 100 external marks based on Review and Viva Voce.

Review and Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work for 100 marks.

If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the College.



INFORMATION TECHNOLOGY



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Regulation: R19			I / II - M.Tech. I - Semester						
INFORMATION TECHNOLOGY INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Categor y	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
M19 IT1101	Discrete Mathematical Structures	PC	3	3	0	0	25	75	100
M19 IT1102	Advanced Data Structures	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19 RD 1101	Research Methodology andIPR	CC	2	2	0	0	25	75	100
M19 IT1113	Advanced Data Structures Lab	PC	2	0	0	4	25	75	100
M19 IT1114	Computing Lab	PC	2	0	0	4	25	75	100
#AC-1	Audit course -1	AC	0	2	0	0	0	0	0
TOTAL			18	16	0	8	175	525	700

	Code	Course		Code	Course
#PE-I	M19IT1103	Artificial Intelligence	#A C 1 & 2	M19AC0001	English for Research Paper Writing
	M19IT1104	Service Oriented Architectures And Web Security		M19AC0002	Disaster Management
	M19IT1105	Internet of Things		M19AC0003	Sanskrit for Technical Knowledge
	M19IT1106	Optimization Techniques		M19AC0004	Value Education
	M19IT1107	Parallel Computer Architecture		M19AC0005	Constitution of India
#PE-II	M19IT1108	Bigdata Analytics		M19AC0006	Pedagogy Studies
	M19IT1109	Principles Of Cryptography		M19AC0007	Stress Management by Yoga
	M19IT1110	Cluster And Grid Computing		M19AC0008	Personality Development through Life Enlightenment Skills.
	M19IT1111	Imaging and Multimedia Systems			
	M19IT1112	Advanced Graph Theory			



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INFORMATION TECHNOLOGY

SYLLABUS : DISCRETE MATHEMATICAL STRUCTURES (M19IT1101)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I : Review on basic Probability concepts- sample space -Addition and Multiplication theorems- Bay's theorem- Random variables (Discrete & Continuous). Probability mass, density and cumulative distribution functions(for discrete & continuous random variables)-Joint distribution function- discrete & continuous random variables- conditional distribution- Expected value, Variance- Conditional expectation- Central limit theorem, probabilistic inequalities- Chebychev's inequality, Jenson's inequality- Cauchy – Schwartz inequatlity- Convergence in probability- Markov chains.

UNIT-II : Parametric families of distributions: Binomial, Poisson, Normal, Uniform, exponential and Gamma distribution, derivation of basic characteristics, Hyper geomentric & multinomial distributions.

UNIT-III: Statistical inference, introduction to multivariate Statistical models: Scatter diagram, fitting of straight line, parabola, power and exponential curves: ax^b , ab^x , ae^{bx} using method of least square approximation, multiple regression (linear equations)- principal component analysis.

Random Samples: Sampling distributions of Estimators, efficient and unbiased estimation, point & interval estimator: Method of moments and maximum likelihood estimator.

UNIT-IV: Graph Theory: Isomorphism, Planar graphs, Euler's and Hamiltonian circuits or Euler'scycles: graph coloring- Choramotic number.

Trees: Introduction- Trees- Labeled tree- some diagrams on directed and undirected trees,Review of Basic properties of a tree- Sequential representation of a binary tree.

UNIT-V: Counting Methods: Permutation & Combination with & without repetition: Principalinclusion & exclusion: Specials technique to solve combinational enumerator problem.

Recurrence relation: Order & Degree of recurrence relation, Solution of Linear homogeneous and non-homogeneous recurrence relation with constant coefficient using methods of generating function, characteristic roots & particular solution by method of undeterment coefficients.



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Course Outcomes for First Year First Semester Course	
Course Code: M19IT1101	
Course Title: DISCRETE MATHEMATICAL STRUCTURES	
CO-1	Utilize basic concepts of discrete and continuous probability theory.
CO-2	Make use of parametric families of distributions in analyzing problems
CO-3	Apply least squares method to fit best suitable curve for a given data
CO-4	Identify population parameters using different methods of estimation
CO-5	Utilize the concepts of graph theory and trees in solving problems.
CO-6	Make use of counting techniques to solve combinational enumerator problem. Also solve recurrence relations by the use of different methods



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SYLLABUS: ADVANCED DATA STRUCTURES (M19 IT 1102)

UNIT-I: Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.

Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT-II: Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists

UNIT-III: Trees: Binary Search Trees, AVL Trees, Red Black Trees, Trees, B-Trees, Splay Trees

UNIT-IV: Text Processing: String Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

UNIT-V: Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k- D Trees. Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1102	
Course Title: ADVANCED DATA STRUCTURES	
CO-1	Analyze programming problem statements.
CO-2	Apply divide and conquer strategy to searching using iterative and/or recursive solutions.
CO-3	Analyze algorithms for text processing applications and develop algorithms for computational geometry problems.
CO-4	Analyze applications using data structure algorithms.



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SYLLABUS: ARTIFICIAL INTELLIGENCE (M19 IT 1103)

UNIT-I: Introduction to artificial intelligence: Introduction , history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends in AI.

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction

UNIT-II: Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games.

Logic concepts: Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic

UNIT-III: Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web.

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-IV: Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

UNIT-V: Machine learning paradigms: Introduction, machine learning systems, supervised and unsupervised learnings, inductive learning, deductive learning, clustering, support vector machines, case based reasoning and learning.

Artificial neural networks: Introduction, artificial networks, single layer feed forward networks, multi layered forward networks, design issues of artificial neural networks.



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Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1103	
Course Title: ARTIFICIAL INTELLIGENCE	
CO-1	Able to design & construct knowledge using representation tools & use of problem solving strategies for real time problem solving in terms intelligent agents
CO-2	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO-3	Able to apply various reasoning techniques to solve the uncertain & incomplete problems using probability theory
CO-4	Able to solve problems by designing the ANN models for classification & prediction



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SYLLABUS: SERVICE ORIENTED ARCHITECTURES AND WEB SECURITY (M19 IT 1104)

UNIT-I: XML Technology: XML – XML and Web - Name Spaces – XML Document Structure -Structuring with Schemas and DTD - Modeling Databases in XML – XQuery

UNIT-II: SOA Basics : Service Oriented Architecture (SOA) – Comparing SOA with Client-Server and Distributed architectures - Characteristics of SOA – Benefits of SOA -- Principles of Service orientation – Service layers - Business Process management

UNIT-III: Web Services (WS) : SOA and Web Services – Web Services Protocol Stack – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI. Service-Level Interaction patterns – XML and Web Services - Enterprise Service Bus - .NET and J2EE Interoperability.

UNIT-IV: WS Technologies and Standards :Web Services Technologies - JAX-RPC, JAX-WS. Web Service Standards – WS-RM, WS-Addressing, WS-Policy. Service Orchestration and Choreography – Composition Standards - BPEL. Service Oriented Analysis and Design.

UNIT-V: XML and WS Security :XML Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Signature – XKMS Structure. Web Services Security - XACML - WS-Security.

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1104	
Course Title: SERVICE ORIENTED ARCHITECTURES AND WEB SECURITY	
CO-1	Demonstrate XML Technology and modelling databases in XML
CO-2	Analyze SOA and Web services, some of the prevailing
CO-3	Analyze standards and technologies of Web Services and Security Frame Works



SYLLABUS: INTERNET OF THINGS (M19IT1105)

UNIT-I: FUNDAMENTALS OF IoT: Evolution of Internet of Things, Enabling Technologies, IoT Architectures, oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT-II: IoT PROTOCOLS: IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT-III: DESIGN AND DEVELOPMENT: Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.

UNIT-IV: DATA ANALYTICS AND SUPPORTING SERVICES: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning – No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics and Network Analytics, Xively Cloud for IoT, Python Web Application Framework, Django, AWS for IoT, System Management with NETCONF-YANG.

UNIT-V: CASE STUDIES/INDUSTRIAL APPLICATIONS: Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1105	
Course Title: INTERNET OF THINGS	
CO-1	Evaluate the concept of 'internet of things' in different contexts.
CO-2	Analyze various protocols for IoT.
CO-3	Design a PoC of an IoT system using Raspberry Pi/Arduino.
CO-4	Apply data analytics and use cloud offerings related to IoT.
CO-5	Analyze applications of IoT in real time scenario.



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SYLLABUS: OPTIMIZATION TECHNIQUES (M19 IT 1106)

UNIT-I: Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

UNIT-II: Formulation of a LPP - Graphical solution revised simplex method - duality theory – dual simplex method - sensitivity analysis - parametric programming.

UNIT-III: Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem – max flow problem - CPM/PERT.

UNIT-IV: Scheduling and sequencing - single server and multiple server models – deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-V: Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1106	
Course Title: OPTIMIZATION TECHNIQUES	
CO-1	Students should be able to Apply the dynamic programming to solve problems of discrete and continuous variables.
CO-2	Students should be able to Apply the concept of non-linear programming
CO-3	Students should be able to Analyze out sensitivity
CO-4	Student should be able to Analyze the real world problem and simulate it.



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SYLLABUS: PARALLEL COMPUTER ARCHITECTURE (M19 IT 1107)

UNIT-I: Fundamentals of Computer Design: Defining Computer Architecture – Trends in Technology – Trends in Power in Integrated Circuits– Trends in Cost – Dependability – Measuring, Reporting and Summarizing Performance – Quantitative Principles of Computer Design – Basic and Intermediate concepts of pipelining – Pipeline Hazards – Pipelining Implementation issues.

UNIT-II: Instruction-Level Parallelism and Its Exploitation: Instruction-Level Parallelism: Concepts and Challenges – Basic Compiler Techniques for Exposing ILP – Reducing Branch Costs with Prediction – Overcoming Data Hazards with Dynamic Scheduling – Dynamic Scheduling: Algorithm and Examples – Hardware-Based Speculation – Exploiting ILP Using Multiple Issue and Static Scheduling – Exploiting ILP Using Dynamic Scheduling, Multiple Issue and Speculation – Studies of the Limitations of ILP – Limitations on ILP for Realizable Processors – Hardware versus Software Speculation – Using ILP Support to Exploit Thread- Level Parallelism

UNIT-III: Data-Level and Thread-Level Parallelism: Vector Architecture – SIMD Instruction Set Extensions for Multimedia – Graphics Processing Units – Detecting and Enhancing Loop- Level Parallelism – Centralized Shared-Memory Architectures – Performance of Shared- Memory Multiprocessors – Distributed Shared Memory and Directory Based Coherence – Basics of Synchronization – Models of Memory Consistency – Programming Models and Workloads for Warehouse-Scale Computers – Computer Architecture of Warehouse-Scale Computers – Physical Infrastructure and Costs of Warehouse-Scale Computers

UNIT-IV: Memory Hierarchy Design: Cache Performance – Six Basic Cache Optimizations – Virtual Memory – Protection and Examples of Virtual Memory – Ten Advanced Optimizations of Cache Performance – Memory Technology and Optimizations – Protection: Virtual Memory and Virtual Machines – The Design of Memory Hierarchies

UNIT-V: Storage Systems & Case Studies: Advanced Topics in Disk Storage – Definition and Examples of Real Faults and Failures – I/O Performance, Reliability Measures and Benchmarks – Designing and Evaluating an I/O System – The Internet Archive Cluster Case Studies / Lab Exercises: INTEL i3, i5, i7 processor cores, NVIDIA GPUs, AMD, ARM processor cores – Simulators – GEM5, CACTI, SIMICS, Multi2sim and INTEL Software development tools.



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Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1107	
Course Title: PARALLEL COMPUTER ARCHITECTURE	
CO-1	Assume representation of data, addressing modes, and instructions sets.
CO-2	Identify parallelism both in terms of a single processor and multiple processors
CO-3	Analyze parallel hardware constructs to include instruction-level parallelism formulti core processor design



SYLLABUS: BIG DATA ANALYTICS (M19 IT 1108)

UNIT-I: Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; **Generics:** Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization.

UNIT-II: Working with Big Data: Google File System, Hadoop Distributed File System (HDFS), Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III: Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), **Basic programs of Hadoop Map Reduce:** Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV: Hadoop I/O: The Writable Interface, Writable Comparable and comparators, **Writable Classes:** Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V: Pig: Hadoop Programming Made Easier, Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin, **Applying Structure to Hadoop Data with Hive:** Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1108	
Course Title: BIG DATA ANALYTICS	
CO-1	Identify the programming requirements viz., generic types and methods to perform data analysis
CO-2	Apply the existing technologies in distributed files systems to analyze the bigdata
CO-3	To analyze the Map-Reduce programming model for better optimization
CO-4	Collect, manage, store, query, and analyze big data; and identify the need of interfaces to perform I/O operations in Hadoop



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SYLLABUS: PRINCIPLES OF CRYPTOGRAPHY (M19 IT 1109)

UNIT-I: Algebra: Group, cyclic group, cyclic subgroup, field, probability. Number Theory: Fermat's theorem, Cauchy's theorem, Chinese remainder theorem, primality testing algorithm, Euclid's algorithm for integers, quadratic residues, Legendre symbol, Jacobisymbol etc.

UNIT-II: Cryptography and cryptanalysis, Classical Cryptography, substitution cipher, different type of attack: CMA, CPA, CCA etc, Shannon perfect secrecy, OTP, Pseudo random bit generators, stream ciphers and RC4.

UNIT-III: Block ciphers: Modes of operation, DES and its variants, AES, linear and differential cryptanalysis.

UNIT-IV: One-way function, trapdoor one-way function, Public key cryptography, RSA cryptosystem, DiffieHellman key exchange algorithm, Elgamal Cryptosystem.

UNIT-V: Cryptographic hash functions, secure hash algorithm, Message authentication, digital signature, RSA digital signature, Elgamal digital signature.

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1109	
Course Title: PRINCIPLES OF CRYPTOGRAPHY	
CO-1	Identify classical cryptosystems to security problems
CO-2	Apply the existing cryptographic algorithms with the existing communication protocols
CO-3	Analyzing the application of cryptography for secure eCommerce and other secret transactions



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SYLLABUS: CLUSTER AND GRID COMPUTING (M19 IT 1110)

UNIT-I: Introduction: Cluster and Grid computing, Meta-computing, Web services and Grid Computing, e-Governance and the Grid Technologies and Architectures for Grid Computing: Issues in Data Grids, Functional requirements in Grid Computing, Standards for Grid Computing, Recent technology trends in Large Data Grids. Web Services and the Service Oriented Architecture: Service Oriented Architecture, SOAP and WSDL, Creating Web Services, Server Side.

UNIT-II: OGSA and WSRF: OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF, WSRF Specification, Globus Toolkit: History, version, Applications, Approaches and Benefits, Infrastructure Management, Monitoring and Discovery, Security, Data Choreography and Coordination, GT4 Architecture, GT4 Containers. The Grid and Databases: Requirements, Storage Request Broker, Integration of Databases with the Grid, Architecture of OGSADAI for offering Grid Database services.

UNIT-III: Cluster Computing: Approaches to Parallel Computing, Definition and Architecture of a Cluster, Categories of clusters. Cluster Middleware: Levels and Layers of Single System Image, Design objectives, Resource Management and Scheduling, Cluster programming Environment and Tools. Networking, Protocols & I/O for clusters: Networking and Interconnection/Switching Devices, Design Issues, Design Architecture, HiPPI, ATM, Myrinet, Memory Channel

UNIT-IV: Setting Up and Administering a Cluster: Setup of simple cluster, setting up nodes, clusters of clusters, System monitoring, Global Clocks Sync. Cluster Technology for High Availability: High availability clusters, high availability parallel computing, types of failures and errors, cluster architectures and configurations for high availability, Failure/Recovery clusters.

UNIT-V: Process Scheduling: Job management System, Resource management system, policies of resource utilization, Scheduling policies. Load Sharing and Load Balancing: Introduction, Strategies for load balancing, Modelling parameters. Recent trends: technologies and attributes in Cluster and Grid computing. Case study of various cluster architectures, load balancing and scheduling policies.



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Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1110	
Course Title: CLUSTER AND GRID COMPUTING	
CO-1	Identify the Functionalities & Applications of Grid Computing, Web Services, and Service-oriented architecture.
CO-2	Apply and Analyze Resource management and Scheduling in Grid computing & Cluster Computing.
CO-3	Develop how to setup a cluster, Apply various Process Scheduling Algorithms and load balancing.



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SYLLABUS: IMAGING AND MULTIMEDIA SYSTEMS (M19 IT 1111)

UNIT-I: Introduction to Image Processing: Steps in Image Processing Systems –Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models. Introduction to Multimedia: Multimedia Elements – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases.

UNIT-II: Compression and Decompression: Need for Data Compression – Types of Compression – Binary Image Compression Schemes – Image Compression – Video Compression – Audio Compression. Data and File Format Standards: Rich Text Format – TIFF File Format – Resource Interface File Format – MIDI File Format - JPEG DIB File Format – AVI Indeo File Format – MPEG Standards

UNIT-III: Image computing: The basics of processing 2D images- Thresholding -Convolution-Edge detection- Mathematical Morphology and Shape Descriptors-Noise Reduction- Image Fusion. Image Security: Image Forensics - Steganography -Image Cryptography Techniques-Chaos based and Non-Chaos based methods.

UNIT-IV: Input and Output Technologies: Multimedia I/O Technologies: Image Scanners – DigitalVoice and Audio – Digital Camera – Video Images and Animation – Full Motion Video - Video Motion Analysis.

UNIT-V: Multimedia Application Classes – Types of Multimedia Systems – Virtual Reality – Components of Multimedia Systems -Multimedia Authoring Systems – Multimedia Authoring Tools - User Interface Design- Mobile Messaging – Hypermedia Message Components -Hypermedia Linking and embedding.

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1111	
Course Title: IMAGING AND MULTIMEDIA SYSTEMS	
CO-1	Able to design the models for new compression standards
CO-2	Acquire skill set to handle all multimedia components & able to save the images in various formats
CO-3	Able to develop Integrated and Collaborative multimedia systems
CO-4	Able to apply various information security methods like stenography
CO-5	Able to design an effective user interface using HTML & XML



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SYLLABUS: ADVANCED GRAPH THEORY (M19 IT 1112)

UNIT-I: Basic Concepts- Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group, **Trees-** Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem

UNIT-II: Connectivity- Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem, **Paths and Cycles-** Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, circumference, the Chinese Postman Problem, the Travelling Salesman problem, diameter and maximum degree.

UNIT-III: Matchings- Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartite and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f- factor theorem, **Extremal problems-** Independent sets and covering numbers

UNIT-IV: Colorings- Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem, **Graphs on surfaces-** Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces.

UNIT-V: Directed graphs- Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, Networks and flows- Flow cuts, max flow min cut theorem, Selected topics- Dominating sets, the reconstruction problem.

Course Outcomes for First Year First Semester Course	
Course Code: M19 IT 1112	
Course Title: ADVANCED GRAPH THEORY	
CO-1	Evaluate precise and accurate mathematical definitions of objects in graph theory.
CO-2	Analyze and solve some real time problems using concepts of graph theory (e.g., scheduling problems).
CO-3	Develop some classical graph algorithms in order to find sub graphs with desirable properties.



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SYLLABUS: RESEARCH METHODOLOGY AND IPR (M19RD1101)

UNIT-I: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-III: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Course Outcomes for First Year First Semester Course	
Course Code: M19RD1101	
Course Title: RESEARCH METHODOLOGY AND IPR	
CO-1	Analyze research related information
CO-2	Formulate a Research Proposals and Publish papers with research ethics
CO-3	Award for Intellectual Property Rights like Patents, Trade and Copyrights
CO-4	Analyze Various Intellectual Property Rights
CO-5	Assess New Developments of IPRs in National and International level



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SYLLABUS: ADVANCED DATA STRUCTURES LAB (MTIT1113)

1. Perform various operations on AVL Trees
2. Perform various operations on BST
3. Implementation of Static Hashing
4. Implementation of Huffman coding
5. Implementation of B Tree.
6. Consider telephone book database of N clients. Make use of a hash table implementation to quickly look up client's telephone number.
7. Implement all the functions of a dictionary (ADT) using hashing. Data: Set of (key, value) pairs, Keys are mapped to values, Keys must be comparable, Keys must be unique
Standard Operations: Insert(key, value), Find(key), Delete(key)
8. For given set of elements create skip list. Find the element in the set that is closest to some given value.
9. Implement KMP algorithm for Pattern Matching
10. Implement Boyer-Moore algorithm for Pattern Matching
11. Implement Naïve string matching algorithm.
12. Implement insertion, deletion, display and search operation in m-way B tree (i.e. a nonleafnode can have atmost m children) for the given data as integers (Test the program for m=3, 5, 7).
13. Implementation of Skiplists

Course Outcomes for First Year First Semester Course	
Course Code: MTIT1113	
Course Title: ADVANCED DATA STRUCTURES LAB	
CO-1	Be capable to Develop solutions for a range of problems using object oriented programming.
CO-2	Be capable to Identity the appropriate data structure for given problem
CO-3	Be capable to Analyze performance of algorithms.



SYLLABUS: COMPUTING LAB (M19IT1114)

1. Write a python program to print the multiplication table for the given number.
2. Write a python program to check whether the given number is prime or not.
3. Write a python program to find factorial of the given number.
4. Write a python program to implement simple Chatbot.
5. Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing).
6. Write a python program to implement List methods (Add, Append, Extend & Delete).
7. Write a python program to Illustrate Different Set Operations.
8. Write a python program to generate Calendar for the given month and year.
9. Write a python program to implement Simple Calculator program.
10. Write a python program to Add Two Matrices.
11. Write a python program to Transpose a Matrix.
12. Write a python program to remove punctuations from the given string?
13. Implementation Write a python program to sort the sentence in alphabetical order.
14. Write a python program to implement Breadth First Search Traversal.
15. Write a python program to implement Water Jug Problem.
16. Write a program to implement Hangman game using python.
17. Write a program to implement Tic-Tac-Toe game using python.
18. Write a python program to remove stop words for a given passage from a text file using NLTK.
19. Write a python program to implement stemming for a given sentence using NLTK.
20. Write a python program to POS (Parts of Speech) tagging for the give sentence using NLTK?

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1114	
Course Title: COMPUTING LAB	
CO-1	Design real life situational problems and think creatively about solutions of them.
CO-2	Formulate a solution clearly and accurately in a program using Python.
CO-3	Inspect the best features of Python to program real life problems using AI.



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SYLLABUS: ENGLISH FOR RESEARCH PAPER WRITING (M19AC0001)

UNIT-I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.

UNIT-II: Clarifying Who Did What, Highlighting Your Findings, Hedging And Criticizing, Paraphrasing and Plagiarism, Sections of a Paper.

UNIT-III: Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check.

UNIT-IV: Key skills are needed when writing a Title, key skills are needed when writing an abstract, key skills are needed when writing an introduction, skills needed when writing a Review of the Literature, skills are needed when writing the Methods.

UNIT-V: skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions, useful phrases, how to ensure paper is as good as it could possibly be the first-time submission

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0001	
Course Title: ENGLISH FOR RESEARCH PAPER WRITING	
CO-1	Understand that how to improve your writing skills and level of readability
CO-2	Learn about what to write in each section
CO-3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission



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SYLLABUS: DISASTER MANAGEMENT (M19AC0002)

UNIT-I: Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT-II: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts

UNIT-III: Disaster Prone Areas In India:

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics.

UNIT-IV: Disaster Preparedness And Management

Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

UNIT-V: Risk Assessment

Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.

Disaster Mitigation

Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.



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SYLLABUS: SANSKRIT FOR TECHNICAL KNOWLEDGE (M19AC0003)

UNIT-I: Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences

UNIT-II: Order, Introduction of roots, Technical information about Sanskrit Literature

UNIT-III: Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0003	
Course Title: SANSKRIT FOR TECHNICAL KNOWLEDGE	
CO-1	Understanding basic Sanskrit language.
CO-2	Ancient Sanskrit literature about science & technology can be understood.
CO-3	Being a logical language will help to develop logic in students.



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SYLLABUS: VALUE EDUCATION (M19AC0004)

UNIT-I: Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism.Moral and non- moral valuation. Standards and principles. Value judgements.

UNIT-II: Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, NationalUnity, Patriotism, Love for nature ,Discipline

UNIT-III: Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free fromanger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits.Association and Cooperation, Doing best for saving nature

UNIT-IV: Character and Competence –Holy books vs Blind faith.Self-management and Good health.Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women.

All religions and same message. Mind your Mind, Self-control. Honesty, Studyingeffectively.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0004	
Course Title: VALUE EDUCATION	
CO-1	Knowledge of self-development
CO-2	Learn the importance of Human values
CO-3	Developing the overall personality



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SYLLABUS: CONSTITUTION OF INDIA (M19AC0005)

UNIT-I: History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working)

UNIT-II: Philosophy of the Indian Constitution: Preamble ,Salient Features

UNIT-III: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties

UNIT-IV: Organs of Governance:

Parliament, Composition, Qualifications and Disqualifications ,Powers and Functions, Executive, President , Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level:

Organizational Hierarchy (Different departments),Village

level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-V: Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0005	
Course Title: CONSTITUTION OF INDIA	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO-2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO-4	Discuss the passage of the Hindu Code Bill of 1956.



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SYLLABUS: PEDAGOGY STUDIES (M19AC0006)

UNIT-I: Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions.

Overview of methodology and Searching.

UNIT-II: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT-III: Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

UNIT-IV: Theory of change, Strength and nature of the body of evidence for effective pedagogical practices Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. Professional development: alignment with classroom practices and follow-up support

UNIT-V: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.



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SYLLABUS: STRESS MANAGEMENT BY YOGA (M19AC0007)

UNIT-I: Definitions of Eight parts of yoga (Ashtanga)

UNIT-II: Yam and Niyam.

Do's and Don'ts in life.

- i) Ahinsa, satya, astheya, brahmacharya and aparigraha
- ii) Shaucha, santosh, tapa, swadhyay, ishvarapranidhana

UNIT-III: Asan and Pranayam

- i) Various yog poses and their benefits for mind & body
- ii) Regularization of breathing techniques and its effects-Types pranayama

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0007	
Course Title: STRESS MANAGEMENT BY YOGA	
CO-1	Develop a healthy mind in a healthy body thus improving social health also.
CO-2	Improve efficiency



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SYLLABUS: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS (M19AC0008)

UNIT-I: Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism)

Verses- 26,28,63,65 (virtue),Verses- 52,53,59 (don'ts),Verses- 71,73,75,78 (do's)

UNIT-II: Approach to day to day work and duties. ShrimadBhagwadGeeta : Chapter 2-Verses: 41,47,48

Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,

Chapter 18-Verses 45, 46, 48.

UNIT-III: Statements of basic knowledge, ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68,

Chapter 12 -Verses 13, 14, 15, 16,17, 18, Personality of Role model. ShrimadBhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63

Course Outcomes for First Year First Semester Course	
Course Code: M19AC0008	
Course Title: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	
CO-1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students.



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Regulation: R19			I / II - M.Tech. II - Semester						
M.TECH (INFORMATION TECHNOLOGY) (Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Categor y	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
M19IT1201	Advanced Algorithms	PC	3	3	0	0	25	75	100
M19IT1202	Full Stack Technologies	PC	3	3	0	0	25	75	100
#PE-III	Program Elective-III	PE	3	3	0	0	25	75	100
#PE-IV	Program Elective-IV	PE	3	3	0	0	25	75	100
M19IT1213	Advance AlgorithmsLab	PC	2	0	0	4	25	75	100
M19IT1214	Full Stack Technologies Lab	PC	2	0	0	4	25	75	100
M19IT1215	Mini Project withSeminar	MP	2	0	0	4	100	--	100
#AC-2	Audit course -2*	AC	0	2	0	0	0	0	0
TOTAL			18	14	0	12	250	450	700

	Code	Course
#PE-III	M19IT1203	Machine Learning
	M19IT1204	DevOps
	M19IT1205	Advanced Network Principles and Protocols
	M19IT1206	Distributed Computing
	M19IT1207	Social Network Analytics
#PE-IV	M19IT1208	Digital Image Processing
	M19IT1209	Block Chain Technologies
	M19IT1210	Data Science
	M19IT1211	Soft Computing
	M19IT1212	Natural Language Processing



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INFORMATION TECHNOLOGY

SYLLABUS : ADVANCED ALGORITHMS (M19IT1201)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I :Sorting: Review of various sorting algorithms, topological sorting **Graph:** Definitions and **Elementary Algorithms:** Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis.

UNIT-II : Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST. Greedy Algorithms: Theoretical foundations for greedy methods, A Task scheduling problem.

UNIT-III: Flow-Networks: Max flow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm. **Matrix Computations:** Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix.

UNIT-IV: Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming. **Modulo Representation of integers/polynomials:** Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Application: Interpolation problem. Polynomials and the FFT:Representation of polynomials, The DFT and FFT, Efficient FFT Implementation

UNIT-V: Linear Programming: Geometry of the feasibility region and Simplex algorithm **Completeness:** Examples, proof of NP-hardness and NP-completeness. One or more of the following topics based on time and interest Approximation algorithms, Randomized Algorithms, Interior Point Method.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1201	
Course Title: ADVANCED ALGORITHMS	
CO-1	Analyze advanced algorithms and solve practical problem using them.
CO-2	Categorize the different problems in various classes according to their complexity.
CO-3	Design and build solutions for a real world problem by applying relevant distributions



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SYLLABUS : FULL STACK TECHNOLOGIES (M19IT1202)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I : HTML : Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet Protocols - The World Wide Web-HTTP request message-response message-Web Clients Web Servers. Markup Languages: XHTML an Introduction to HTML, History, Versions, Basic, XHTML Syntax and Semantics Some Fundamental HTML Elements-Relative URLs-Lists-tables- Frames-Forms-HTML 5.0.

UNIT-II : Cascading Style Sheets (CSS) : Style Sheets: CSS-Introduction to Cascading Style Sheets- Features- Core Syntax-Style Sheets and HTML- Style Rule Cascading and Inheritance-Text Properties-Box Model Normal Flow Box Layout beyond the Normal Flow-CSS3.0, Boot strap basics, Boot strap CSS3, Introduction to Java Script, Jscript basics, JScripts objects, JSON, Don.

UNIT-III: Jscript : Separating Programming and Presentation: JSP Technology, Introduction to JSP andServlets- Running JSP Applications, Basic JSP-JavaBeans Classes and JSP-Tag Libraries andFiles-Support for the Model-View-Controller Paradigm- Mongo DB, JQuery, Mean stack Fundamentals.

UNIT-IV: Angular Js : Introducing AngularJS, Starting Out with AngularJS, Basic AngularJS, Directives and Controllers, AngularJS Modules, Creating First Controller, working with and Displaying, Arrays, more Directives, working with ng-repeat, Unit Testing in AngularJS, Forms, Inputs, and Services, Working with ng-model, Working with Forms, Leverage Data-Binding and Models, Form Validation and States, Error Handling with Forms, ngModelOptions, Nested Forms with ng-form, Other Form Controls.

UNIT-V: PHP Programming: Back – end- Scripts PHP, Working with PHP- Using variables, Using constants, Data types, Operators. Conditional & Control statements, Arrays, functions. Working with forms and Databases such as MySQL.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1202	
Course Title: FULL STACK TECHNOLOGIES	
CO-1	Identify the Basic Concepts of Web & Markup Languages
CO-2	Develop web Applications using Scripting Languages & Frameworks
CO-3	Creating & Running Applications using JSP libraries
CO-4	Creating Our First Controller Working with and Displaying in Angular Js and Nested Forms with ng-form
CO-5	Creating & Running Back-end scripts & Connecting to Databases



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SYLLABUS : MACHINE LEARNING (M19IT1203)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I : Introduction-Towards Intelligent Machines, Well posed Problems, Example of Applications in diverse fields, Data Representation, Domain Knowledge for Productive use of Machine Learning, Diversity of Data: Structured / Unstructured, Forms of Learning, Machine Learning and Data Mining, Basic Linear Algebra in Machine Learning Techniques.

UNIT-II : Supervised Learning- Rationale and Basics: Learning from Observations, Bias and Why Learning Works: Computational Learning Theory, Occam's Razor Principle and Over fitting Avoidance Heuristic Search in inductive Learning, Estimating Generalization Errors, Metrics for assessing regression, Metrics for assessing classification.

UNIT-III: Statistical Learning- Machine Learning and Inferential Statistical Analysis, Descriptive Statistics in learning techniques, Bayesian Reasoning: A probabilistic approach to inference, K-Nearest Neighbor Classifier. Discriminant functions and regression functions, Linear Regression with Least Square Error Criterion, Logistic Regression for Classification Tasks, Fisher's Linear Discriminant and Thresholding for Classification, Minimum Description Length Principle.

UNIT-IV: Support Vector Machines (SVM)- Introduction, Linear Discriminant Functions for Binary Classification, Perceptron Algorithm, Large Margin Classifier for linearly separable data, Linear Soft Margin Classifier for Overlapping Classes, Kernel Induced Feature Spaces, Nonlinear Classifier, Regression by Support vector Machines. Learning with Neural Networks: Towards Cognitive Machine, Neuron Models, Network Architectures, Perceptrons, Linear neuron and the Widrow-Hoff Learning Rule, The error correction delta rule.

UNIT-V: Multilayer Perceptron Networks and error back propagation algorithm, Radial Basis Functions Networks. Decision Tree Learning: Introduction, Example of classification decision tree, measures of impurity for evaluating splits in decision trees, ID3, C4.5, and CART decision trees, pruning the tree, strengths and weakness of decision tree approach.



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Course Outcomes for First Year First Semester Course	
Course Code: M19IT1203	
Course Title: MACHINE LEARNING	
CO-1	Domain Knowledge for Productive use of Machine Learning and Diversity of Data.
CO-2	Demonstrate on Supervised and Computational Learning
CO-3	Analyze on Statistics in learning techniques and Logistic Regression
CO-4	Illustrate on Support Vector Machines and Perceptron Algorithm
CO-5	Design a Multilayer Perceptron Networks and classification of decision tree



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SYLLABUS : DEVOPS (M19IT1204)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I : Phases of Software Development life cycle. Values and principles of agile software development.

UNIT-II : Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

UNIT-III: DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

UNIT-IV: CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment, Benefits of CI/CD, Metrics to track CICD practices

UNIT-V: Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1204	
Course Title: DEVOPS	
CO-1	Apply the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility
CO-2	Identity DevOps & DevSecOps methodologies and their key concepts
CO-3	List out the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
CO-4	Set up complete private infrastructure using version control systems and CI/CD tools



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SYLLABUS : ADVANCED NETWORK PRINCIPLES AND PROTOCOLS (M19IT1205)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I : Introduction to Networks - Application of Networks - Architecture Topology Switching -SLIP, PPP -ALOHA protocols, CSMA/CD, IEEE 802.3, 802.4, 802.5

UNIT-II : Network Layer Issues- Routing, Congestion control- Internetworking - Issues, Address Learning Bridges, Spanning tree, Source routing, Bridges, Routers, Gateway.

UNIT-III: Network Protocol- IP datagram - hop by hop routing, ARP, RARP, DHCP -Sub net Addressing, Address Masking, ICMP, RIP, RIPv2, OSPF, DNS, LAN and WAN Multicast.

UNIT-IV: Transport Layer- Design issues, Connection Management, Transmission Control Protocol(TCP) - User Datagram Protocol (UDP).

UNIT-V: Transport Layer- Design issues, Connection Management, Transmission Control Protocol(TCP) - User Datagram Protocol (UDP).

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1205	
Course Title: ADVANCED NETWORK PRINCIPLES AND PROTOCOLS	
CO-1	Identify the different layers of TCP/IP protocol stack
CO-2	Analyze the Concepts of Network media and topologies, Network security concepts and Network management
CO-3	Identify the working principle of different protocols at different layers



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SYLLABUS : DISTRIBUTED COMPUTING (M19IT1206)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I : INTRODUCTION: Definition, Relation to computer system components, Motivation, Relation to parallel systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges. A model of distributed computations: A distributed program, A model of distributed executions, Models of communication networks, Global state, Cuts, Past and future cones of an event, Models of process communications. Logical Time: A framework for a system of logical clocks, Scalar time, Vector time, Physical clock synchronization: NTP.

UNIT-II : MESSAGE ORDERING & SNAPSHOTS: Message ordering and group communication: Message ordering paradigms, Asynchronous execution with synchronous communication, Synchronous program order on an asynchronous system, Group communication, Causal order (CO), Total order. Global state and snapshot recording algorithms: Introduction, System model and definitions, Snapshot algorithms for FIFO channels

UNIT-III: DISTRIBUTED MUTEX & DEADLOCK: Distributed mutual exclusion algorithms: Introduction, Preliminaries, Lamport's algorithm, RicartAgrawala algorithm, Maekawa's algorithm, Suzuki-Kasami's broadcast algorithm. Deadlock detection in distributed systems: Introduction, System model, Preliminaries, Models of deadlocks, Knapp's classification, Algorithms for the single resource model, the AND model and the OR model.

UNIT-IV: RECOVERY & CONSENSUS: Check pointing and rollback recovery: Introduction, Background and definitions, Issues in failure recovery, Checkpoint-based recovery, Log- based rollback recovery, coordinated check pointing algorithm, Algorithm for asynchronous check pointing and recovery. Consensus and agreement algorithms: Problem definition, Overview of results, Agreement in a failure –free system, Agreement in synchronous systems with failures.

UNIT-V: P2P & DISTRIBUTED SHARED MEMORY: Peer-to-peer computing and overlay graphs: Introduction, Data indexing and overlays, Chord – Content addressable networks, Tapestry. Distributed shared memory: Abstraction and advantages, Memory consistency models, Shared memory Mutual Exclusion.



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Course Outcomes for First Year First Semester Course	
Course Code: M19IT1206	
Course Title: DISTRIBUTED COMPUTING	
CO-1	Elucidate the foundations and issues of distributed systems
CO-2	Analyze various synchronization issues and global state for distributed systems.
CO-3	Analyze the Mutual Exclusion and Deadlock detection algorithms in distributed systems
CO-4	Analyze the agreement protocols and fault tolerance mechanisms in distributed systems.
CO-5	Analyze the features of peer-to-peer and distributed shared memory systems



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SYLLABUS : SOCIAL NETWORK ANALYTICS (M19IT1207)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: INTRODUCTION: Social Network Analysis: Preliminaries and definitions, Erdos Number Project, Centrality measures, Balance and Homophily.

UNIT-II: Random graph models: Random graphs and alternative models, Models of network growth, Navigation in social Networks, Cohesive subgroups, Multidimensional Scaling, Structural equivalence, roles and positions.

UNIT-III: Network topology and diffusion, Contagion in Networks, Complex contagion, Percolation and information, Navigation in Networks Revisited.

UNIT-IV: Small world experiments, small world models, origins of small world, Heavy tails, Small Diameter, Clustering of connectivity, The ErdosRenyi Model, Clustering Models.

UNIT-V: Network structure -Important vertices and page rank algorithm, towards rational dynamics in networks, basics of game theory, Coloring and consensus, biased voting, network formation games, network structure and equilibrium, behavioral experiments, Spatial and agent-based models.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1207	
Course Title: SOCIAL NETWORK ANALYTICS	
CO-1	Identify social network analysis and measures
CO-2	Analyze random graph models and navigate social networks data
CO-3	Apply the network topology and Visualization tools.
CO-4	Analyze the experiment with small world models and clustering models.
CO-5	Compare the application driven virtual communities from social network Structure.



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SYLLABUS : DIGITAL IMAGE PROCESSING (M19IT1208)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: Introduction: Fundamental steps in Image Processing System, Components of Image Processing System, Elements of Visual Perception, Image Sensing and acquisition, Image sampling & Quantization, Basic Relationship between pixels. **Image Enhancement Techniques:** Spatial Domain Methods: Basic grey level transformation, Histogram equalization, Image subtraction, image averaging.

UNIT-II: Spatial filtering: Smoothing, sharpening filters, Laplacian filters, Frequency domain filters, Smoothing and sharpening filters, Homomorphism is filtering. **Image Restoration & Reconstruction:** Model of Image Degradation/restoration process, Noise models, Spatial filtering, Inverse filtering, Minimum mean square Error filtering, constrained least square filtering, Geometric mean filter, Image reconstruction from projections. Color Fundamentals, Color Models, Color Transformations.

UNIT-III: Image Compression: Redundancies- Coding, Interpixel, Psycho visual; Fidelity, Source and Channel Encoding, Elements of Information Theory; Loss Less and Lossy Compression; Run length coding, Differential encoding, DCT, Vector quantization, Entropy coding, LZW coding; Image Compression Standards- JPEG, JPEG 2000, MPEG; Video compression.

UNIT-IV: Wavelet Based Image Compression: Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous, Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding.

UNIT-V: Image Segmentation: Discontinuities, Edge Linking and boundary detection, Thresholding, Region Based Segmentation, Watersheds; Introduction to morphological operations; binary morphology- erosion, dilation, opening and closing operations, applications; basic gray-scale morphology operations; Feature extraction; Classification; Object recognition. **Digital Image Watermarking:** Introduction, need of Digital Image Watermarking, applications of watermarking in copyright protection and Image quality analysis.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1208	
Course Title: DIGITAL IMAGE PROCESSING	
CO-1	Identify the components of image processing
CO-2	Classify various filtration techniques.
CO-3	Apply image compression techniques.
CO-4	Simplify the concepts of wavelet transforms
CO-5	Analyze the concept of morphological image processing.



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SYLLABUS : BLOCK CHAIN TECHNOLOGIES (M19IT1209)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: The consensus problem ,Asynchronous Byzantine Agreement ,AAP protocol and its analysis ,Nakamoto Consensus on permission-less, nameless, peer-to-peer network - Abstract Models for BLOCKCHAIN - GARAY model ,RLA Model - Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS).

UNIT-II: Cryptographic basics for cryptocurrency - a short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography.

UNIT-III: Bitcoin, Wallet, Blocks, Merkle Tree, hardness of mining, transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bitcoin.

UNIT-IV: Ethereum - Ethereum Virtual Machine (EVM), Wallets for Ethereum - Solidity, Smart Contracts, some attacks on smart contracts.

UNIT-V: (Trends and Topics) - Zero Knowledge proofs and protocols in Blockchain, Succinct non interactive argument for Knowledge (SNARK), pairing on Elliptic curves, Zcash.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1209	
Course Title: BLOCK CHAIN TECHNOLOGIES	
CO-1	Analyse the foundation of the Block chain technology and understand the processes in payment and funding.
CO-2	Identify the risks involved in building Block chain applications
CO-3	Analyse the legal implications using smart contracts.
CO-4	Choose the present landscape of Blockchain implementations and Understand Crypto currency markets
CO-5	Examine how to profit from trading crypto currencies.



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SYLLABUS : DATA SCIENCE (M19IT1210)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

UNIT-II: Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources

UNIT-III: Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

UNIT-IV: Data visualization-Introduction, Types of data visualization, Data for Visualization- Datatypes, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

UNIT-V: Applications of Data Science, Technologies for visualization, Bokeh (Python), Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1210	
Course Title: DATA SCIENCE	
CO-1	Analyse how data is collected, managed and stored for data science.
CO-2	Identify the key concepts in data science, including their real-world applications and the toolkit used by data scientists.
CO-3	Apply data collection and management scripts using MongoDB.



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SYLLABUS : SOFT COMPUTING (M19IT1211)

(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: Introduction to Neuro – Fuzzy and Soft Computing, Fuzzy Sets, Basic Definition and Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Surgeon Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT-II: Derivative based Optimization, Descent Methods, The Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing and Random Search – Downhill Simplex Search.

UNIT-III: Introduction, Knowledge Representation, Reasoning, Issues and Acquisition: Propositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning under Uncertainty Basic knowledge Representation Issues Knowledge acquisition, Heuristic Search: Techniques for Heuristic search Heuristic Classification State Space Search: Strategies Implementation of Graph Search based on Recursion Patent directed Search Production System and Learning.

UNIT-IV: Adaptive Neuro-Fuzzy Inference Systems, Architecture – Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT-V: Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Color Recipe Prediction.



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Course Outcomes for First Year First Semester Course	
Course Code: M19IT1211	
Course Title: SOFT COMPUTING	
CO-1	Classify the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
CO-2	Simplify the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
CO-3	Identify fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
CO-4	Identify appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
CO-5	Analyze different applications of these models to solve engineering and other problems..



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SYLLABUS : NATURAL LANGUAGE PROCESSING (M19IT1212)
(Common to CE, CSE, ECE, EEE, IT&ME)

UNIT-I: Introduction: NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.

UNIT-II: N-gram Language Models: The role of language models, Simple Ngram models. Estimating parameters and smoothing. Evaluating language models. Part of Speech Tagging and Sequence Labeling: Lexical syntax. Hidden Markov Models. Maximum Entropy Models. Conditional Random Fields.

UNIT-III: Syntactic parsing: Grammar formalisms and tree banks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs.

UNIT-IV: Semantic Analysis: Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.

UNIT-V: Information Extraction (IE) and Machine Translation (MT): Named entity recognition and relation extraction. IE using sequence labeling. Basic issues in MT. Statistical translation, word alignment, phrase based translation, and synchronous grammars. Dialogues: Turns and utterances, grounding, dialogue acts and structures Natural Language Generation: Introduction to language generation, architecture, discourse planning (text schemata, rhetorical relations).

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1212	
Course Title: NATURAL LANGUAGE PROCESSING	
CO-1	Identify approaches to syntax and semantics in NLP
CO-2	Classify approaches to discourse, generation, dialogue and summarization within NLP.
CO-3	Identify current methods for statistical approaches to machine translation.
CO-4	Identify machine learning techniques used in NLP, including hidden Markov models and probabilistic
CO-5	Distinguish context-free grammars, clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied within NLP



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SYLLABUS : ADVANCE ALGORITHMS LAB (M19IT1213)

(Common to CE, CSE, ECE, EEE, IT&ME)

1. Write a program to implement topological sorting.
2. Write a program to implement Quick Sort of given elements
3. Write a program to Implement DFS for a Graph.
4. Write a program to implement BFS for a Graph
5. Write a program Implement Krushkal's algorithm to generate a min-cost spanning tree
6. Write a program Implement Prim's algorithm to generate a min-cost spanning tree.
7. Write a program to implement dijkstra's greedy algorithm for single source shortest path problem
8. Write a program to implement Ford-Fulkerson algorithm for computing a maximum flow in a Network.
9. Write a program to implement Dynamic Programming algorithm for the chained matrix Multiplication.
10. Write a program to implement Floyd's dynamic programming algorithm for the all pair shortest path Problem.
11. Write a program to implement Approximate algorithm for Vertex-Cover Problem.
12. Write a program to implement Approximate algorithm solve Travelling Salesperson Problem.

Course Outcomes for First Year First Semester Course	
Course Code: M19IT1213	
Course Title: ADVANCE ALGORITHMS LAB	
CO-1	Identify different classes of problems concerning their computation difficulties
CO-2	Analyze the performance of the Advanced Algorithm
CO-3	Apply advanced algorithm techniques to solve real world problems.



SYLLABUS : FULL STACK TECHNOLOGIES LAB (M19IT1214)
(Common to CE, CSE, ECE, EEE, IT&ME)

1. Implementation of 'get' and 'post' methods.
2. CSS implementation in colors, boarder padding.
3. CSS3 implementation button frames tables, navigation bars.
4. Create registration and login forms with validations using Jscript query.
5. Jscript to retrieve student information from student database using database connectivity.
6. Angular Js data binding
7. Angular JS directives and Events
8. Using angular Js fetching data from MySQL.
9. Write a PHP program for registering users of a website and login.
10. User Authentication:
Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.
Write a program to create a Cookie and add these four user id's and passwords to this Cookie.
b. Read the user id and passwords entered in the Login form (exp1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ". Use init-parameters to do this.
11. Install a database (Mysql or Oracle):
Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).
 - a) Write a PHP program to connect to that database and extract data from the tables and display them.
 - b) Experiment with various SQL queries.
 - c) Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.
12. Write a PHP program which does the following job:
Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (Similar to week8 instead of cookies).



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Course Outcomes for First Year First Semester Course	
Course Code: M19IT1214	
Course Title: FULL STACK TECHNOLOGIES LAB	
CO-1	Identify the Basic Concepts of Web & Markup Languages
CO-2	Develop web Applications using Scripting Languages & Frameworks
CO-3	Creating & Running Applications using JSP libraries
CO-4	Creating Our First Controller Working with and Displaying in Angular Js andNested Forms with ng-form
CO-5	Creating & Running Back-end scripts & Connecting to Databases



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SYLLABUS : MINI PROJECT WITH SEMINAR (M19IT1215)

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.



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SYLLABUS : AUDIT COURSE-2 (#AC-2)

List of Audit Courses and their Syllabi are mentioned in the First Semester Syllabus.

The students can opt any one course for AC 2 from the list mentioned in first semester by not opting the course which is already taken for AC 1



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Regulation: R19			II/ II - M.Tech. I - Semester						
INFORMATION TECHNOLOGY INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION &EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Categor y	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
#PE-V/ MOOCS	Program Elective-V	PE	3	3	--	--	25	75	100
#OE-I/ MOOCS	Open Elective-I	OE	3	3	--	--	25	75	100
M19IT2107	Dissertation-I /Industrial Project#	PR	10	--	--	20	50	50	100
TOTAL			16	6	--	20	100	200	300

	Code	Course
#PE-V/ MOOCS	M19IT2101	Deep Learning
	M19IT2102	Embedded Computing
	M19IT2103	Ethical Hacking
	M19IT2104	Digital Marketing
	M19IT2105 (MOOCS-I)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course
#OE-I/ MOOCS	#OE-I	Students have to choose one open elective course offered by departments other than the IT & CSE departments. List of open Electives offered by other departments are enclosed.
	M19IT2106 (MOOCS-II)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course
OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS		
Code	Course	
M19IT2108	Web Technologies	
M19IT2109	Internet of Things	
M19IT2110	Machine Learning	



Estd:1980

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INFORMATION TECHNOLOGY

SYLLABUS : DEEP LEARNING (M19IT2101)

UNIT-I : Introduction: Various paradigms of learning problems, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. **Feed forward neural network:** Artificial Neural Network, activation function, multi-layer neural network

UNIT-II : Training Neural Network: Risk minimization, loss function, back propagation, regularization, model selection, and optimization. **Deep Neural Networks:** Difficulty of training deep neural networks, Greedy layer wise training.

UNIT-III: Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network, Recurrent Neural Network, and Deep Belief Network.

UNIT-IV: Probabilistic Neural Network: Hopfield Net, Boltzmann machine, RBMs, Sigmoid net, Auto encoders.

UNIT-V: Applications: Object recognition, sparse coding, computer vision, natural language processing. **Introduction to Deep Learning Tools:** Tensor Flow, Caffe, Theano, Torch.

Course Outcomes for Second Year First Semester Course	
Course Code: M19IT2101	
Course Title: DEEP LEARNING	
CO-1	Demonstrate the basic concepts fundamental learning techniques and layers.
CO-2	Discuss the Neural Network training, various random models.
CO-3	Explain different types of deep learning network models.
CO-4	Classify the Probabilistic Neural Networks.
CO-5	Implement tools on Deep Learning techniques.



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SYLLABUS: EMBEDDED COMPUTING (M19IT2102) **(LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)** **(Common to All Branches)**

UNIT-I: Linux and Embedded Systems: An Introduction- What is an Embedded System?, Embedded system components, Basic software, Operating systems for embedded systems, Why Linux- based embedded systems?, Linux evolution, **Linux-based Embedded System Component Stack-** Linux-based embedded system components, Reference hardware model, Reference hardware model implementations, CPU memory map, The role of the bootloader, Possible scenarios, An example of bootloader operations.

UNIT-II: Linux kernel, Device tree, System programs, Application, Typical layout of the root filesystem, **Anatomy of a Linux-based System** - Linux architecture, Conceptual view of the kernel, Process scheduler, Memory manager, Memory manager external interfaces, Memory manager architecture, Virtual file system, i-node, i-node interface, File interface, Virtual file system architecture, Inter-process communication, Inter-process communication architecture

UNIT-III: Introduction to Linux kernel modules- Introduction, CPU – I/O interface, CPU – I/O interface with polling, CPU – I/O interface with interrupt, CPU – I/O interface, CPU – I/O interface latency, Direct memory access (DMA) architecture, DMA transfer modes, I/O taxonomy, Typical operations, Linux devices, The Virtual File System (VFS) abstraction, VFS– an example, VFS functions– include/linux/fs.h, The device file concept, Linux kernel modules – the initialization function, the cdev data structure, the initialization function, the clean-up function, custom VFS functions

UNIT-IV: File Handling: Memory Mapping- Page Alignment, Establishing Memory Mappings, Unmapping Regions, Syncing Memory Regions to Disk, Locking Memory Regions, File Locking, Lock Files, Record Locking, Mandatory Locks, Leasing a File.

UNIT-V: Networking with Sockets: Protocol Support, Nice Networking, Real Networking, Making Reality Play Nice, Addresses, Utility Functions, Basic Socket Operations, Creating a Socket, Establishing Connections, Binding an Address to a Socket, Waiting for Connections, Connecting to a Server, Finding Connection Addresses, Networking Machines with TCP/IP, Byte Ordering, IPv4 Addressing, IPv6 Addressing, Manipulating IP Addresses, Turning Names into Addresses, Turning Addresses into Names, Listening for TCP Connection, TCP Client Applications



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Course Outcomes for Second Year First Semester Course	
Course Code: M19IT2102	
Course Title: EMBEDDED COMPUTING	
CO-1	Knowledge and understanding of Embedded Linux OS Architecture, LinuxKernel Modules
CO-2	Describes the differences between the general computing system and the embedded computing system.
CO-3	Write client server program using TCP sockets



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SYLLABUS: ETHICAL HACKING (M19IT2103)

UNIT-I: Hacking Windows: BIOS Passwords, Windows Login Passwords, Changing Windows Visuals, Cleaning Your Tracks, Internet Explorer Users, Cookies, URL Address Bar, Netscape Communicator, Cookies URL History, The Registry, Baby Sitter Programs.

UNIT-II: Advanced Windows Hacking: Editing your Operating Systems by editing Explorer.exe, The Registry, The Registry Editor, Description of .reg file, Command Line Registry Arguments, Other System Files, Some Windows & DOS Tricks, Customize DOS, Clearing the CMOS without opening your PC, The Untold Windows Tips and Tricks Manual, Exiting Windows the Cool and Quick Way, Ban Shutdowns: A Trick to Play, Disabling Display of Drives in My Computer, Take Over the Screen Saver, Pop a Banner each time Windows Boots, Change the Default Locations, Secure your Desktop Icons and Settings.

UNIT-III: Getting Past the Password: Passwords: An Introduction, Password Cracking, Cracking the Windows Login Password, The Glide Code, Windows Screen Saver Password, XOR, Internet Connection Password, Sam Attacks, Cracking Unix Password Files, HTTP Basic Authentication, BIOS Passwords, Cracking Other Passwords.

UNIT-IV: The Perl Manual: Perl: The Basics, Scalars, Interacting with User by getting Input, Chomp() and Chop(), Operators, Binary Arithmetic Operators, The Exponentiation Operator(**), The Unary Arithmetic Operators, Other General Operators, Conditional Statements, Assignment Operators. The : Operator, Loops, The While Loop, The For Loop, Arrays, THE FOR EACH LOOP: Moving through an Array, Functions Associated with Arrays, Push() and Pop(), Unshift() and Shift(), Splice(), Default Variables, \$_, @ARGV, Input Output, Opening Files for Reading, Another Special Variables.

UNIT-V: Virus Working, Boot Sector Viruses (MBR or Master Boot Record), File or Program Viruses, Multipartite Viruses, Stealth Viruses, Polymorphic Viruses, Macro Viruses, Blocking Direct Disk Access, Recognizing Master Boot Record (MBR) Modifications, Identifying Unknown Device Drivers, making own Virus, Macro Viruses, Using Assembly to Create your own Virus, Modifying a Virus so Scan won't Catch it, Creating New Virus Strains, Simple Encryption Methods.



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Course Outcomes for Second Year First Semester Course	
Course Code: M19IT2103	
Course Title: ETHICAL HACKING	
CO-1	Remember various hacking methods, system security vulnerability testing.
CO-2	Apply system vulnerability attacks and demonstrate a security assessment report
CO-3	Understand various issues related to hacking



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SYLLABUS: DIGITAL MARKETING (M19IT2104)

UNIT-I: HTML: Introduction, HTML5, Audio Elements, Video Elements, Organizing Elements. **Scripting Documents:** Dynamic Document content, Document properties, Legacy DOM, Document Collections, Overview of the W3C DOM, Traversing a Document, Finding Elements in a Document, Modifying a Document, Adding Content to a Document Example

UNIT-II: Cascading Style Sheets and Dynamic HTML: Overview of CSS, CSS for DHTMLScripting inline Styles, Scripting computed styles, Scripting CSS Classes, Scripting Style Sheets, Java Script and XML: Obtaining XML Documents, Manipulating XML with the DOM API, Transforming XML with XSLT querying XML with X path, Serializing XML, Example, XML and Web services.

UNIT-III: Search Engine Optimization (SEO): Searching Engine Marketing, Search Engine Optimization, Measuring SEO Success, Mapping with SEO Journey, **Search Advertising:** Online Advertising Payment Models, Search Advertising (Desktop & Mobile Devices), Planning & Executing a search Advertising Campaign, Strategic Implications of Advertising on the search Network.

UNIT-IV: Search Media Marketing: What is Social Media? Social Media Marketing, Social Media Marketing Strategy, Adopting Social Media in Organizations: Internal Learning, Paid-Owned-Earned Media, Social CRM, **Mobile Marketing:** Mobile Internet in India, What is Mobile Marketing? Email Marketing Strategy, Forms of Mobile Marketing, Mobile Advertising, M-Commerce.

UNIT-V: E-Mail Marketing: E-Mail Marketing in India, What is E-Mail Marketing? E-Mail Marketing Strategy, Executing E-Mail Marketing, **Internet Marketing:** Internet Marketing Strategy, Content Marketing, Content Marketing in India.

Course Outcomes for Second Year First Semester Course	
Course Code: M19IT2104	
Course Title: DIGITAL MARKETING	
CO-1	Explain about web pages with basic HTML5, DHTML tags using CSS and XML, the overview of W3C DOM.
CO-2	Student can apply digital Java Scripts to applications
CO-3	Apply search engine optimization techniques to a website.
CO-4	Illustrate how the effectiveness of a digital marketing campaign can be measured
CO-5	Apply advanced practical skills in common digital marketing tools such as SEO,SEM, Social media and Blogs



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SYLLABUS: MOOCS-I (Program Elective-V) (M19IT2105)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course



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Offered from	Course Code	Course Name	Offered to
CIVIL ENGINEERING	M19 ST 2107	Construction Management	CST, CS, PSA,IT & CAD/CA M
	M19 ST 2108	Green Technology	
	M19 ST 2109	Analysis of Offshore Structures	
ELECTRONICS & COMMUNICATION ENGINEERING	M19 CS 2107	Signals and systems	ST, CST, PSA, IT & CAD/CA M
	M19 CS 2108	Principles of Communication	
	M19 CS 2109	Image and video Processing	
ELECTRICAL & ELECTRONICS ENGINEERING	M19PS2107	Electric And Hybrid Vehicles	ST, CST, CS, IT & CAD/CA M
	M19PS2108	Energy From Waste	
	M19PS2109	Energy Management and Auditing	
MECHANICAL ENGINEERING	M19CAD 2107	Operations Research	ST, CST, CS,PSA & IT
	M19CAD 2108	Nano Technology	
	M19CAD 2109	Product Design & Manufacturing	
SCIENCE & HUMANITIES	M19BS210 1	Management and Organisational Behaviour	ST, CST, CS,PSA, IT & CAD/CAM



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SYLLABUS: MOOCS-II (M19IT2106)

Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course



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SYLLABUS: DISSERTATION-I/INDUSTRIAL PROJECT (M19IT2107)

The Student has to register for Dissertation-I / Industrial project in III semester. Student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

Continuous assessment of Dissertation-I during the III-Semester will be monitored by the PRC. Dissertation-I/ Industrial Project is evaluated for 50 internal marks and 50 external marks.

Internal marks 50 awarded by Project Guide and PRC jointly based on continuous assessment consisting of two seminars based on Dissertation work-I.

External marks 50 awarded by External Examiner, Supervisor and Head of the Department jointly based on a review and Viva voce on Dissertation work-I.



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Regulation: R19				II / II - M.Tech. I I I - Semester					
INFORMATION TECHNOLOGY INFORMATION TECHNOLOGY (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION &EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Mark s	Ext. Mark s	Total Mark s
M19IT2201	Dissertation-II /Industrial Project#	PR	16	0	0	32	--	100	100



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SYLLABUS: DISSERTATION-II/INDUSTRIAL PROJECT (M19IT2201)

The student has to continue his/her work from Dissertation-I / Industrial project to complete Dissertation-II in IV semester.

Continuous assessment of Dissertation-II during IV-Semester will be monitored by the PRC.

Dissertation-II is evaluated for 100 external marks based on Review and Viva Voce.

Review and Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work for 100 marks.

If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the College.



MECHANICAL ENGINEERING



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Regulation: R19			I / II - M.Tech. I - Semester						
MECHANICAL ENGINEERING									
CAD/CAM									
(Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION									
(With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19CAD 1101	Geometric Modeling	PC	3	3	0	0	25	75	100
M19CAD 1102	Computer Aided Manufacturing	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19CAD 1109	Advanced CAD Lab	PC	2	0	0	4	25	75	100
M19CAD 1110	Advanced Manufacturing Lab	PC	2	0	0	4	25	75	100
M19 RD 1101	Research Methodology and IPR	RD	2	2	0	0	25	75	100
M19 AC 1109	Writing Skills forScientific Communication	AC	0	2	0	0	0	0	0
Total			18	16	0	8	175	525	700

	Course Code	Course
#PE-I	M19CAD 1103	Computational Methods in Engineering
	M19CAD 1104	Material Technology
	M19CAD 1105	Mechanical Vibrations
#PE-II	M19CAD 1106	Mechatronics
	M19CAD 1107	Industrial Robotics
	M19CAD 1108	Modelling and Simulation of Manufacturing Systems



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CAD/CAM

SYLLABUS : GEOMETRIC MODELING (M19CAD1101)

UNIT-I : Cubic splines –I Definition, Explicit and implicit equations, parametric equations, Algebraic and geometric form of cubic spline, Hermite cubic spline, tangent vectors, parametric space of a curve, blending functions.

UNIT-II : Four point form, reparametrization, truncating and subdividing of curves. Graphic construction and interpretation, composite pc curves. Bezier Curves: Bernstein basis, equations of Bezier curves, properties, derivatives.

UNIT-III: B-Spline Curves: B-Spline basis, equations, knot vectors, properties, and derivatives.

UNIT-IV: Surfaces: Bicubic surfaces, Coon's surfaces, Bezier surfaces, B-Spline surfaces, surfaces of revolutions, Sweep surfaces, ruled surfaces, tabulated cylinder, bilinear surfaces, Gaussian curvature

UNIT-V: Torsion of Prismatic bars – Bars with elliptical cross section – Other elementary solution – Membrane analogy – Torsion of rectangular bars – Solution of Torsional problems by energy method.

Course Outcomes for First Semester Course	
Course Code: M19CAD1101	
Course Title: GEOMETRIC MODELING	
CO-1	Develop mathematical model store present cubic curves used for engineering applications.
CO-2	Develop mathematical model store present Bezier curves used for engineering applications.
CO-3	Select appropriate synthetic curves in modelling process
CO-4	Develop mathematical models to represent surfaces used for engineering applications.
CO-5	Model engineering components using solid modelling techniques.



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SYLLABUS: COMPUTER AIDED MANUFACTURING (M19CAD1102)

UNIT-I: General information, APT programming, and Examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction toCAD/CAM software, Automatic Tool Path generation.

UNIT-II: TOOLING FOR CNC MACHINES: Interchangeable tooling system, preset and qualified tools, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages and disadvantages of DNC, adaptive control with optimization, Adaptive control with constraints, Adaptive control of machining processes like turning, grinding.

UNIT-III: POST PROCESSORS FOR CNC: Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP — based- Post Processor: Communication channels and major variables in the DAPP— based Post Processor, the creation of a DAPP — Based Post Processor.

UNIT-IV: MICRO CONTROLLERS: Introduction, Hardware components, I/O pins, ports, external memory, counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded Controllers, Applications and Programming of Micro Controllers. Programmable Logic Controllers (PLC's): Introduction, Hardware components of PLC, System, basic structure, principle of operations, Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT-V: COMPUTER AIDED PROCESS PLANNING: Hybrid CAAP System, Computer Aided Inspection and quality control, Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.\

Course Outcomes for First Semester Course	
Course Code: M19CAD1102	
Course Title: Computer Aided Manufacturing	
CO-1	Understand the principles of NC, CNC and DNC technology and develop manual and computer aided part programming for turning and milling operations.
CO-2	Explain the concept of tooling for CNC machines.
CO-3	Apply the use of various transducers, Micro controllers, encoders and feedback devices in CAM
CO-4	Explain the concepts of group technology and cellular manufacturing.
CO-5	Understand the concepts of production planning & control and computer aided quality control.



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SYLLABUS: COMPUTATIONAL METHODS IN ENGINEERING (M19CAD1103)
(Program Elective-I)

UNIT-I: Introduction to numerical methods applied to engineering problems: Examples, solving sets of equations – Matrix notation – Determinants and inversion – Iterative methods – Relaxation methods – System of non-linear equations. Least square approximation fitting of non-linear curves by least squares – regression analysis- multiple linear regression, non linear regression - computer programs

UNIT-II: Boundary value problems and characteristic value problems: Shooting method – Solution through a set of equations – Derivative boundary conditions – Rayleigh – Ritz method – Characteristic value problems.

UNIT-III: Transformation Techniques: Continuous fourier series, frequency and time domains, laplace transform, fourier integral and transform, discrete fourier transform (DFT), Fast fourier transform (FFT).

UNIT-IV: Numerical solutions of partial differential equations: Laplace's equations – Representations as a difference equation – Iterative methods for Laplace's equations – poisson equation – Examples – Derivative boundary conditions – Irregular and non – rectangular grids – Matrix patterns, sparseness – ADI method – Finite element method.

UNIT-V: Partial differential equations: Explicit method – Crank-Nickelson method – Derivative boundary condition – Stability and convergence criteria. Solving wave equation by finite differences-stability of numerical method –method of characteristics-wave equation in two space dimensions-computer programs.

Course Outcomes for First Semester Course	
Course Code: M19CAD1103	
Course Title: COMPUTATIONAL METHODS IN ENGINEERING	
CO-1	Find the solutions of system of linear and non linear equations.
CO-2	Solve boundary value problems and characteristic value problems.
CO-3	Understand various transformation techniques.
CO-4	Understand Laplace and poisons equations
CO-5	Solve ordinary and partial differential equations numerically.



SYLLABUS: MATERIALS TECHNOLOGY (M19CAD1104)
(Program Elective-I)

UNIT-I: Elasticity in metals, mechanism of plastic deformation, slip and twinning, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening. Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity, Yield criteria: Von-mises and Tresca criteria..

UNIT-II: Griffith's Theory, stress intensity factor and fracture Toughness, Toughening Mechanisms, Ductile and Brittle transition in steel, High Temperature Fracture, Creep, Larson – Miller parameter, Deformation and Fracture mechanism maps.

UNIT-III: Integral Equations- Fatigue, fatigue limit, features of fatigue fracture, Low and High cycle fatigue test, Crack Initiation and Propagation mechanism and Paris Law, Effect of surface and metallurgical parameters on Fatigue, Fracture of non-metallic materials, fatigue analysis, Sources of failure, procedure of failure analysis. Motivation for selection, cost basis and service requirements, Selection for Mechanical Properties, Strength, Toughness, Fatigue and Creep.

UNIT-IV: MODERN METALLIC MATERIALS: Dual Steels, Micro alloyed, High Strength Low alloy (HSLA) Steel, Transformation induced plasticity (TRIP) Steel, Maraging Steel, Inter metallics, Ni and Ti Aluminides. Processing and applications of Smart Materials, Shape Memory alloys, Metallic Glass Quasi Crystal and Nano Crystalline Materials.

UNIT-V: NONMETALLIC MATERIALS: Polymeric materials and their molecular structures, Production Techniques for Fibers, Foams, Adhesives and Coatings, structure, Properties and Applications of Engineering Polymers, Advanced Structural Ceramics WC, TiC, TaC, Al_2O_3 , SiC, Si_3N_4 , CBN and Diamond – properties, Processing and applications.

Course Outcomes for First Semester Course	
Course Code: M19CAD1104	
Course Title: MATERIALS TECHNOLOGY	
CO-1	Gain knowledge on elastic & plastic deformation and strengthening mechanism of engineering materials.
CO-2	Learn the structure, properties and applications of modern metallic materials, smart materials non-metallic materials and advanced structural ceramics.
CO-3	Understand the fatigue and fracture failure mechanism of engineering materials.
CO-4	Understand the mechanical behaviour of modern metallic materials.
CO-5	Understand the mechanical behaviour of non metallic materials.



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SYLLABUS: MECHANICAL VIBRATIONS (M19CAD1105)

(Program Elective-I)

UNIT-I: Single degree of Freedom systems: Undamped and damped free vibrations: forced vibrations ; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation, Vibration isolation and transmissibility, Vibrometers, velocity meters & accelerometers.

UNIT-II: Response to Non Periodic Excitations: unit Impulse, unit step and unit Ramp functions; response to arbitrary excitations, The Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

UNIT-III: Multi degree freedom systems: Principal modes – undamped and damped free and forced vibrations; undamped vibration absorbers, Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi – rotor systems and geared systems; Discrete-Time systems.

UNIT-IV Numerical Methods: Rayleigh's, Stodola's, Matrix iteration, Rayleigh-Ritz Method and Holzer's methods

UNIT-V: Application of concepts: Free vibration of strings – longitudinal oscillations of bars- transverse vibrations of beams- Torsional vibrations of shafts. Critical speeds without and with damping, secondary critical speed.

Course Outcomes for First Semester Course	
Course Code: M19CAD1105	
Course Title: MECHANICAL VIBRATIONS	
CO-1	Determine the natural frequencies of single and two degrees of freedom systems without and with damping.
CO-2	Develop a mathematical model for response to non periodic excitations
CO-3	Determine the natural frequencies of multi degrees of freedom systems
CO-4	Apply numerical methods to determine the natural frequencies and mode shapes.
CO-5	Determine the natural frequencies and mode shapes of bars in elongation and torsion and beams in bending.



Estd:1980

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ChinnaAmiram, Bhimavaram-534204. (AP)

SYLLABUS: MECHATRONICS (M19CAD1106)

(Program Elective-II)

UNIT-I: Mechatronics systems, elements, levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II: Solid state electronic devices, PN junction diode, BJT, FET, DIA and TRIAC. Analog signal conditioning, amplifiers, filtering. Introduction to MEMS & typical applications.

UNIT-III: Hydraulic and pneumatic actuating systems, Fluid systems, Hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems: Mechanical actuating systems and electrical actuating systems.

UNIT-IV: Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control

UNIT-V: System and interfacing and data acquisition, DAQS, SCADA, A to D and D to A conversions; Dynamic models and analogies, System response. Design of mechatronics systems & future trends

Course Outcomes for First Semester Course	
Course Code: M19CAD1106	
Course Title: MECHATRONICS	
CO-1	Find the solutions of system of linear and non linear equations.
CO-2	Solve ordinary and partial differential equations numerically.
CO-3	Find correlation coefficient and regression.
CO-4	Use a computer language of their choice to solve problems using numerical methods covered in the course.



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SYLLABUS: INDUSTRIAL ROBOTICS (M19CAD1107)
(Program Elective-II)

UNIT-I: INTRODUCTION: Automation and Robotics, Robot anatomy, robot configuration, motions joint notation scheme, work volume, robot drive systems, control systems and dynamic performance, precision of movement. **CONTROL SYSTEM AND COMPONENTS:** basic concepts and motion controllers, control system analysis, robot actuation and feedback components, Positions sensors, velocity sensors, actuators, power transmission systems, robot joint control design.

UNIT-II: MOTION ANALYSIS AND CONTROL: Manipulator kinematics, position representation, forward and inverse transformations, homogeneous transformations, manipulator path control, robot arm dynamics, configuration of a robot controller..

UNIT-III: END EFFECTORS: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. **SENSORS:** Desirable features, tactile, proximity and range sensors, uses sensors in robotics. **MACHINE VISION:** Functions, Sensing and Digitizing-imaging devices, Lighting techniques, Analog to digital single conversion, image storage: Image processing and Analysis-image data reduction, Segmentation, feature extraction, Object recognition. Training the vision system, Robotic application.

UNIT-IV: ROBOT PROGRAMMING: Lead through programming, Robot program as a path in space, Motion interpolation, WAIT, SIGNAL AND DELAY commands, Branching, capabilities and Limitations of lead through methods. **ROBOT LANGUAGES:** Textual robot Languages, Generations of robot programming languages, Robot language structures, Elements and function.

UNIT-V: ROBOT CELL DESIGN AND CONTROL: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detection, Work cell controller. **ROBOT APPLICATION:** Material transfer, Machine loading/unloading, Processing operation, Assembly and Inspection, Future Application.

Course Outcomes for First Semester Course	
Course Code: M19CAD1107	
Course Title: INDUSTRIAL ROBOTICS (Program Elective-2)	
CO-1	Distinguish between fixed automation and programmable automation and identify various components of robot.
CO-2	Understand the motion analysis of a robot.
CO-3	Understand the concepts of end effectors and machine vision used in Robots.
CO-4	Understand the concepts of robot programming and robot languages.
CO-5	Illustrate robot applications in manufacturing.



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SYLLABUS: MODELING AND SIMULATION OF MANUFACTURING SYSTEMS (M19CAD1108)
(Program Elective-II)

UNIT-I: Introduction to System and simulation: Concept of system and elements of system, Discrete and continuous system, Models of system and Principles of modeling and simulation, Monte carlo simulation, Types of simulation, Steps in simulation model, Advantages, limitations and applications of simulation, Applications of simulation in manufacturing System

UNIT-II: Review of statistics and probability: Types of discrete and continuous probability distributions such as Geometric, Poisson, Uniform, Geometric distribution with examples, Normal, Exponential distribution with examples.

UNIT-III: Random numbers: Need for RNs, Technique for Random number generation such as Mid product method, Mid square method, and Linear congruential method with examples Test for Random numbers: Uniformity - Chi square test or Kolmogorov Smirnov test, Independency- Auto correlation test Random Variate generation: Technique for Random variate generation such as Inverse transforms technique or Rejection method

UNIT-IV: Analysis of simulation data: Input data analysis, Verification and validation of simulation models, Output data analysis Simulation languages: History of simulation languages, Comparison and selection of simulation languages Design and evaluation of simulation experiments: Development and analysis of simulation models using simulation language with different manufacturing systems

UNIT-V: Queueing models: An introduction, M/M/1 and M/M/m Models with examples, Open Queueing and Closed queueing network with examples Markov chain models and others: Discrete time markov chain with examples, Continuous time markov chain with examples, stochastic process in manufacturing, Game theory

Course Outcomes for First Semester Course	
Course Code: M19CAD1108 (Program Elective-2)	
Course Title: MODELING AND SIMULATION OF MANUFACTURING SYSTEMS	
CO-1	Understand the concepts of system, elements of systems and types of simulation.
CO-2	Classify different discrete and continuous probability distributions.
CO-3	Gain knowledge on Generation of random numbers, random variants and variables.
CO-4	Build simulation model and also can verify and validate the model.
CO-5	Understand the concepts of queueing models, markov chain models and game theory.



Estd:1980

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SYLLABUS: ADVANCED CAD LAB (M19CAD1109)

LIST OF EXERCISES

Students shall carry out the modeling and FE analysis of the following to predict deflection and stress distributions :

1. Trussess – 2D and 3D
2. Beams
3. Plate with Plane stress condition
4. Plate with Plane strain condition
5. Cylinders – Axi-symmetric condition
6. Natural frequencies of Beam

Course Outcomes for First Semester Course	
Course Code: M19CAD1109	
Course Title: ADVANCED CAD LAB	
CO-1	Perform stress analysis on 2D and 3D Trusses and
CO-2	Perform analysis on plates and axi-symmetrical components.
CO-3	Execute frequency analysis on beams and 2D components.



Estd:1980

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SYLLABUS: ADVANCED MANUFACTURING LAB (M19CAD1110)

LIST OF EXPERIMENTS

1. Casting processes - Study of Solidification, temperatures, metallurgical phases.
2. Forging processes - Study of hot working processes and extrusion
3. Forming Processes – Study of blanking, bending and deep drawing
4. Welding Processes – Study of arc, and spot welding processes
5. Powder metallurgy- Study of Green Density and sintering density
6. Additive Manufacturing – Study of simple parts in 3D printing
7. Machining- Estimation of chip reduction coefficient and shear angle in orthogonal turning,
8. Measurement of cutting forces and average cutting temperature, and Estimation of tool life of a single point turning tool.

Course Outcomes for First Semester Course	
Course Code: M19CAD1110	
Course Title: ADVANCED MANUFACTURING LAB	
CO-1	Identify and select proper manufacturing process for the manufacturing of parts.
CO-2	Manufacture parts using basic and advanced manufacturing processes.
CO-3	Build a 3D printed engineering component.



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SYLLABUS: RESEARCH METHODOLOGY AND IPR (M19RD1101)
(Common to CST,CS,PSA, IT & CAD/CAM)

UNIT-I: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-III: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications

UNIT-V: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs

Course Outcomes for First Semester Course	
Course Code: M19RD1101	
Course Title: RESEARCH METHODOLOGY AND IPR	
CO-1	Analyze research related information
CO-2	Formulate a Research Proposals and Publish papers with research ethics
CO-3	Award for Intellectual Property Rights like Patents, Trade and Copyrights
CO-4	Analyze Various Intellectual Property Rights
CO-5	Assess New Developments of IPRs in National and International level



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SYLLABUS: WRITING SKILLS FOR SCIENTIFIC COMMUNICATION (M19AC1109)

UNIT-I: Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness, Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising

UNIT-II: Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-III: Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature.

UNIT-IV: Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.

UNIT-V: Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Course Outcomes for First Semester Course	
Course Code: M19AC1109	
Course Title: WRITING SKILLS FOR SCIENTIFIC COMMUNICATION	
CO-1	Understand that how to improve your writing skills and level of readability
CO-2	Learn about what to write in each section
CO-3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission



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Regulation: R19			I / II - M.Tech. II - Semester						
MECHANICAL ENGINEERING									
CAD/CAM									
(Under Choice Based Credit System / Elective Course System)									
SCHEME OF INSTRUCTION & EXAMINATION									
(With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19CAD 1201	Theory of Elasticityand Plasticity	PC	3	3	0	0	25	75	100
M19CAD 1202	Advanced Manufacturing Processes	PC	3	3	0	0	25	75	100
#PE-III	Program Elective-III	PE	3	3	0	0	25	75	100
#PE-IV	Program Elective-IV	PE	3	3	0	0	25	75	100
M19CAD 1209	Computer Aided Machining Lab	PC	2	0	0	4	25	75	100
M19CAD 1210	Robotics Lab	PC	2	0	0	4	25	75	100
M19CAD 1211	Mini Project With Seminar	MP	2	2	0	4	100	--	100
#AC	Audit Course	AC	0	2	0	0	0	0	0
Total			18	14	18	16	0	12	250

	Course Code	Course
#PE-III	M19CAD 1203	Advanced Finite Element Methods
	M19CAD 1204	Fracture Mechanics
	M19CAD 1205	Product Design and Development
#PE-IV	M19CAD 1206	Materials Characterization Techniques
	M19CAD 1207	Optimization & Reliability
	M19CAD 1208	Additive Manufacturing

	Course Code	Course
#AC	M19AC 0005	Constitution of India
	M19AC 0006	Pedagogy studies
	M19AC 0008	Personality development through life enlightenment skills



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CAD/CAM

SYLLABUS THEORY OF ELASTICITY AND PLASTICITY (M19CAD1201)

UNIT-I: INTRODUCTION: Elasticity –Notation for forces and stresses-Components of stresses – components of strain –Hooke's law.**PLANE STRESS AND PLANE STRAIN ANALYSIS:** Plane stress- plane strain-Differential equations of equilibrium- Boundary conditions- Compatibility equations- stress function-Boundary conditions.

UNIT-II: TWO DIMENSIONAL PROBLEMS IN RECTANGULAR COORDINATES: Solution by polynomials-Saint Venant's principle-Determination of displacements-bending of simple beams-application of Fourier series for two dimensional problems - gravity loading.

TWO DIMENSIONAL PROBLEMS IN POLAR COORDINATES : General Equation in polar co-ordinates - stress distribution symmetrical about an axis –Pure bending of curved bars- strain components in polar coordinates-Displacements for symmetrical stress distributions- simple symmetric and asymmetric problems-General solution of two dimensional problem in polar coordinates-Application of the general solution of two dimensional problem in polar coordinates-Application of the general solution in polar coordinates.

UNIT-III: ANALYSIS OF STRESS AND STRAIN IN THREE DIMENSIONS: Principle stress - ellipsoid and stress-director surface-Determination of principle stresses- Maximum shear stresses- Homogeneous deformation-principle axis of strain rotation.

GENERAL THEOREMS: Balance laws - Differential equations of equilibrium- conditions of compatibility - Determination of displacement-Equations of equilibrium in terms of displacements-principle of superposition-Uniqueness of solution –the Reciprocal theorem.

UNIT-IV: TORSION OF PRISMATIC BARS: General solution of problems by displacement (St. Venant's warping function) & force (Prandtl's stress function) approaches - Membrane analogy - Torsion of circular and non-circular (elliptic and rectangular) sections - Torsion of thin rectangular section and hollow thin walled section - Single and multi-celled sections.

UNIT-V: THEORY OF PLASTICITY: Stress-strain curve - Theories of strength and failure –Yield Criteria - Yield Surface – Plastic Flow – Plastic Work – Plastic Potential – Strain hardening



Estd:1980

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Course Outcomes for Second Semester Course	
Course Code: M19CAD1201	
Course Title: THEORY OF ELASTICITY AND PLASTICITY	
CO-1	Apply to concepts to solve the problems of 3-D elasticity
CO-2	Students can independently work with the problems of 2-D elasticity in Cartesian/Polar Coordinates.
CO-3	Apply the use of airy's stress function in 2-D problems of elasticity in Cartesian/Polar Coordinates.
CO-4	Students will be equipped with the knowledge of various theories of torsion of prismatic bars of various cross sections and can solve the problems of torsion.
CO-5	Understand the concepts of plasticity.



Estd:1980

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SYLLABUS: ADVANCED MANUFACTURING PROCESSES (M19CAD1202)

UNIT-I: SURFACE TREATMENT: Scope, Cleaners, Methods of cleaning, Surface coating types, ceramic and organic methods of coating, and economics of coating. Electro forming, Chemical vapor deposition, Physical vapor deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

UNIT-II: PROCESSING OF CERAMICS: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, hot compaction, drying, sintering, and finishing of ceramics, Areas of application.

PROCESSING OF COMPOSITES: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites

UNIT-III: FABRICATION OF MICROELECTRONIC DEVICES: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in micro electronics, surface mount technology, Integrated circuit economics.

UNIT-IV: ADVANCED MACHINING PROCESSES: AJM, WJM, WireEDM, ECM, LBM, EBM, PAM – Principle, working, limitations and applications.

UNIT-V: RAPID PROTOTYPING: Working Principles, Methods, Stereo Lithography, Laser Sintering, Fused Deposition Method, Applications and Limitations, Rapid tooling, Techniques of rapid manufacturing

Course Outcomes for Second Semester Course	
Course Code: M19CAD1202	
Course Title: ADVANCED MANUFACTURING PROCESSES	
CO-1	Understand the principles of various surface treatment processes.
CO-2	Understand different processing types of ceramics & composite materials.
CO-3	Understand the various technologies related to fabrication of microelectronic devices.
CO-4	Understand the working principle of various advanced machining processes.
CO-5	Understand the concepts of Rapid prototyping and rapid tooling.



Estd:1980

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SYLLABUS: ADVANCED FINITE ELEMENT METHODS (M19CAD1203)

(Program Elective-III)

UNIT-I: Formulation Techniques: Methodology, Engineering problems and governing differential equations, finite elements., Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT-II: One-dimensional elements: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT-III: Two dimensional problems: CST, LST, four noded and eight noded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems:Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two- dimensional fin.

UNIT-IV: Isoparametric formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, pascal's triangle, Patch test.

UNIT-V: Finite elements in Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite elementpackages.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1203	
Course Title: ADVANCED FINITE ELEMENT METHODS (Program Elective-1)	
CO-1	Apply variational and weighted residual methods to solve differential equations
CO-2	Analyse structural members such as 1-D bar, trusses, beams and frames using finite element method.
CO-3	Analyse two dimensional problems, axi-symmetric problems and heat conduction problems using finiteelement method.
CO-4	Understand the concepts of iso, sub and super parametric formulation and numerical integration.
CO-5	Analyse vibration problems for frequencies and mode shapes.



Estd:1980

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SYLLABUS: FRACTURE MECHANICS (M19CAD1204)

UNIT-I: Introduction: Prediction of mechanical failure. Macroscopic failure modes; brittle and ductile behaviour. Fracture in brittle and ductile materials – characteristics of fracture surfaces; inter- granular and intra-granular failure, cleavage and micro-ductility, growth of fatigue cracks, The ductile/brittle fracture transition temperature for notched and unnotched components. Fracture at elevated temperature.

UNIT-II: Griffiths analysis: Concept of energy release rate, G , and fracture energy, R . Modification for ductile materials, loading conditions. Concept of R curves.

Linear Elastic Fracture Mechanics, (LEFM): Three loading modes and the state of stress ahead of the crack tip, stress concentration factor, stress intensity factor and the material parameter the critical stress intensity factor, crack tip plasticity, effect of thickness on fracture toughness.

UNIT-III: Elastic-Plastic Fracture Mechanics (EPFM): The definition of alternative failure prediction parameters, Crack Tip Opening Displacement, and the J integral. Measurement of parameters and examples of use.

UNIT-IV: Fatigue: definition of terms used to describe fatigue cycles, High Cycle Fatigue, Low Cycle Fatigue, mean stress R ratio, strain and load control. $S-N$ curves. Goodmans rule and Miners rule. Micro-mechanisms of fatigue damage, fatigue limits and initiation and propagation control, leading to a consideration of factors enhancing fatigue resistance. Total life and damage tolerant approaches to life prediction.

UNIT-V: Creep deformation: the evolution of creep damage, primary, secondary and tertiary creep. Micro-mechanisms of creep in materials and the role of diffusion. Ashby creep deformation maps. Stress dependence of creep – power law dependence. Comparison of creep performance under different conditions – extrapolation and the use of Larson-Miller parameters. Creep-fatigue interactions. Examples.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1204	
Course Title: FRACTURE MECHANICS (Program Elective-III)	
CO-1	Determine stress intensity factors by applying Linear Elastic and Elastic plastic fracture mechanics.
CO-2	Apply fatigue concepts in predicting the life of Components.
CO-3	Formulate and solve problems involving the static, fatigue or impact loading of flawed structures



Estd:1980

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SYLLABUS: PRODUCT DESIGN AND DEVELOPMENT (M19CAD1205)
(Program Elective-III)

UNIT-I: Introduction: Classification/Specifications of Products, Product life cycle. Product mix, Introduction to product design, Modern product development process, Innovative thinking.

UNIT-II: Morphology of design. Conceptual Design: Generation, selection & embodiment of concept. Product architecture, Industrial design: process, need, Robust Design: Taguchi Designs & DOE, Design Optimization.

UNIT-III: Design for Mfg& Assembly: Methods of designing for Manufacturing and assembly, Designs for Maintainability, Designs for Environment, Product costing, Legal factors and social issues, Engineering ethics and issues of society related to design of products. Value Engineering / Value Analysis. : Definition. Methodology, Case studies.

UNIT-IV: Economic analysis: Qualitative & Quantitative. Ergonomics / Aesthetics: Gross human autonomy, Anthropometry, Man-Machine interaction, Concepts of size and texture, colour .Comfort criteria, Psychological & Physiological considerations.

UNIT-V: Creativity Techniques: Creative thinking, conceptualization, brain storming, primary design, drawing, simulation, detail design. Concurrent Engineering, Rapid prototyping, Tools for product design – Drafting / Modeling software, CAM Interface, Patents & IP Acts. Overview, Disclosure preparation.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1205	
Course Title: PRODUCT DESIGN AND DEVELOPMENT (Program Elective-III)	
CO-1	Identify and analyse the product design and development processes in manufacturing industry.
CO-2	Define the components and their functions of product design and development processes and their relationships from concept to customer over whole product lifecycle.
CO-3	Analyse, evaluate and apply the methodologies for product design, development and management.
CO-4	Undertake a methodical approach to the management of product development to satisfy customer needs.



Estd:1980

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SYLLABUS: MATERIALS CHARACTERIZATION TECHNIQUES (M19CAD1206)

(Program Elective-IV)

UNIT-I: Introduction to materials and Techniques, Structure analysis tools: X-ray diffraction: phase identification, indexing and lattice parameter determination, Analytical line profile fitting using various models, Neutron diffraction, Reflection High Energy Electron Diffraction, and Low Energy Electron Diffraction.

UNIT-II: Microscopy techniques: Optical microscopy, transmission electron microscopy (TEM), energy dispersive X-ray microanalysis (EDS), scanning electron microscopy (SEM), Rutherford backscattering spectrometry (RBS), atomic force microscopy (AFM) and scanning probe microscopy (SPM).

UNIT-III: Thermal analysis technique: Differential thermal analysis (DTA), Differential Scanning Calorimetry (DSC), Thermogravimetric analysis (TGA); Electrical characterization techniques: Electrical resistivity, Hall effect, Magnetoresistance.

UNIT-IV: Magnetic characterization techniques: Introduction to Magnetism, Measurement Methods, Measuring Magnetization by Force, Measuring Magnetization by Induction method, Types of measurements using magnetometers: M-H loop, temperature dependent magnetization, time dependent magnetization, Measurements using AC susceptibility, Magneto-optical Kerr effect, Nuclear Magnetic Resonance, Electron Spin Resonance.

UNIT-V: Optical and electronic characterization techniques: UV-VIS spectroscopy, Fourier transform infrared spectroscopy, Raman spectroscopy, X-ray photoelectron spectroscopy.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1206(Program Elective-IV)	
Course Title: MATERIALS CHARACTERIZATION TECHNIQUES	
CO-1	Apply appropriate characterization techniques for microstructure examination at different magnification level and use them to understand the microstructure of various materials
CO-2	Choose and appropriate electron microscopy techniques to investigate microstructure of materials at high resolution
CO-3	Understand the principles of various thermal analysis techniques
CO-4	Understand the principles of Magnetic characterization techniques
CO-5	Understand the principles of Optical and electronic characterization techniques.



Estd:1980

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SYLLABUS: OPTIMIZATION & RELIABILITY (M19CAD1207)
(Program Elective-IV)

UNIT-I: CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions, merits and demerits of classical optimization techniques.

UNIT-II: NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, Pattern search methods, conjugate method, types of penalty methods for handling constraints, advantages of numerical methods.

UNIT-III: GENETIC ALGORITHM (GA) : Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA,

GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

MULTI-OBJECTIVE GA: Pareto's analysis, Non-dominated front, multi – objective GA, Non-dominated sorted GA, convergence criterion, applications of multi-objective problems.

UNIT-IV: APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING

SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNIT-V: RELIABILITY: Concepts of Engineering Statistics, risk and reliability, probabilistic approach to design, reliability theory, design for reliability, numerical problems, hazardanalysis.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1207	
Course Title: OPTIMIZATION & RELIABILITY(Program Elective-IV)	
CO-1	Understanding the concepts of conventional, unconventional optimization algorithms.
CO-2	Formulate engineering design problems as mathematical optimization problems and solve them by using suitable optimization techniques.
CO-3	Understand the concepts of Genetic Algorithm, Genetic programming and multi objective GeneticAlgorithm.
CO-4	Apply the concepts of optimization in design and manufacturing.
CO-5	Understand the basic concepts of reliability.



Estd:1980

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SYLLABUS: ADDITIVE MANUFACTURING (M19CAD1208)
(Program Elective-IV)

UNIT-I: Additive Manufacturing Process: Basic Principles of the Additive Manufacturing Process, Generation of Layer Information, Physical Principles for Layer Generation. Elements for Generating the Physical Layer, Classification of Additive Manufacturing Processes, Evaluation of the Theoretical Potentials of Rapid Prototyping Processes.

UNIT-II: Machines for Rapid Prototyping: Overview of Polymerization: Stereolithography (SL), Sintering/Selective Sintering: Melting in the Powder Bed, Layer Laminate Manufacturing (LLM) and Three-Dimensional Printing (3DP).

UNIT-III: Rapid Prototyping: Classification and Definition, Strategic Aspects for the Use of Prototypes, Applications of Rapid Prototyping in Industrial Product Development. Rapid Tooling: Classification and Definition of Terms, Properties of Additive Manufactured Tools, Indirect Rapid

UNIT-IV: Tooling Processes: Molding Processes and Follow-up Processes, Indirect Methods for the Manufacture of Tools for Plastic Components, Indirect Methods for the Manufacture of Metal Components.

UNIT-V: Direct Rapid Tooling Processes: Prototype Tooling: Tools Based on Plastic Rapid Prototyping Models and Methods, Metal Tools Based on Multilevel AM Processes, Direct Tooling: Tools Based on Metal Rapid Prototype Processes.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1208	
Course Title: ADDITIVE MANUFACTURING(Program Elective-IV)	
CO-1	Understand the concepts of Additive Manufacturing and Rapid Prototyping technologies.
CO-2	Classify and explain principles of various machines used for rapid prototyping.
CO-3	Understand the concepts of tooling processes and direct rapid tooling processes.



Estd:1980

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SYLLABUS: COMPUTER AIDED MACHINING LAB (M19CAD1209)

LIST OF EXERCISES

1. Introduction to Manual part programming and features of CNC Turning and Milling Centres.
2. Preparation of manual part programme for Turning and drilling operations using point-to-point, Linear and circular interpolation Techniques.
3. Preparation of manual part programme for Milling operations using point-to-point, Linear and circular interpolation Techniques.
4. Part programming using Fixed or Canned Cycles for Drilling, Peck drilling, Boring, Tapping and Thread cutting operations.
5. Generation of Tool path, NC code and its Simulation for Turning and Milling operations using any one CAM packages like EdgeCAM, MasterCAM and Off-line NC simulation softwares.
6. Computer Assisted Part Programme generation using APT language.
7. Machining of simple components on CNC lathe machine
8. Machining of simple components on CNC Milling machine

Course Outcomes for Second Semester Course	
Course Code: M19CAD1209	
Course Title: COMPUTER AIDED MACHINING LAB	
CO-1	Demonstrate part programming for CNC lathe and mill and execute the same for the part production.
CO-2	Develop the manufacturing of components through CAM Software



Estd:1980

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SYLLABUS: ROBOTICS LAB (M19CAD1210)

LIST OF EXPERIMENTS

1. Introduction to programming in MATLAB.
2. Introduction to Simulink: Modeling and simulation of spring-mass-damper system.
3. Modeling and simulation of 2-R manipulator using Simulink.
4. Development of PID control for DC motor.
5. Joint space and work space control of 2R manipulator.
6. Forward and Inverse kinematics of robot manipulator using Robo-Analyzer software
7. Pick and place operation using a 4-DOF robotic manipulator.
8. Collaborative manipulation using two robotic manipulators.

Course Outcomes for Second Semester Course	
Course Code: M19CAD1210	
Course Title: ROBOTICS LAB	
CO-1	Understand the dynamic simulation of robot manipulator using MATLAB.
CO-2	Learn the dynamic modelling and control of robot manipulator using Simulink.
CO-3	Develop in-depth knowledge of forward and inverse kinematics and dynamics using open-source robot software.
CO-4	Learn and gain practical knowledge of different components of physical robot.
CO-5	Understand programming of robot manipulator for various operations.



Estd:1980

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SYLLABUS: MINI PROJECT WITH SEMINAR (M19CAD1211)

MINI PROJECT WITH SEMINAR

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.



Estd:1980

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SYLLABUS: CONSTITUTION OF INDIA (M19AC0005)

UNIT-I: History of Making of the Indian Constitution: History , Drafting Committee, (Composition & Working)

UNIT-II: Philosophy of the Indian Constitution: Preamble ,Salient Features

UNIT-III: Fundamental Rights,Right to Equality, Right to Freedom,Right against Exploitation, Right to Freedom of Religion,Cultural and Educational Rights,Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties

UNIT-IV: Organs of Governance:

Parliament, Composition, Qualifications and Disqualifications ,Powers and Functions, Executive, President , Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Local Administration:

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat: Position and role. Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy

UNIT-V: Election Commission: Election Commission: Role and Functioning. Chief ElectionCommissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes for Second Semester Course	
Course Code: M19AC0005	
Course Title: CONSTITUTION OF INDIA	
CO-1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO-2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO-3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO-4	Discuss the passage of the Hindu Code Bill of 1956.



Estd:1980

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SYLLABUS: PEDAGOGY STUDIES (M19AC0006)

UNIT-I: Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT-II: Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.

UNIT-III: Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.

UNIT-IV: Theory of change, Strength and nature of the body of evidence for effective pedagogical practices Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies. Professional development: alignment with classroom practices and follow-up support

UNIT-V: Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.



Estd:1980

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SYLLABUS: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(M19AC0008)

UNIT-I: Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom)

Verses- 29,31,32 (pride & heroism)Verses- 26,28,63,65 (virtue)

UNIT-II: Neetisatakam-Holistic development of personality

Verses- 52,53,59 (don't's)

Verses- 71,73,75,78 (do's)

Approach to day to day work and duties.

Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,

UNIT-III: Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,

Chapter 18-Verses 45, 46, 48.

UNIT-IV: Statements of basic knowledge.

Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68

Chapter 12 -Verses 13, 14, 15, 16,17, 18

UNIT-V: Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42,

Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63

Course Outcomes for Second Semester Course	
Course Code: M19AC0008	
Course Title: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	
CO-1	Study of Shrimad- Bhagwad- Geeta will help the student in developing his personality and achieve the highest goal in life.
CO-2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO-3	Study of Neetishatakam will help in developing versatile personality of students.



Estd:1980

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Regulation: R19			II / II - M.Tech. I - Semester						
MECHANICAL ENGINEERING CAD/CAM (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
#PE-V/ MOOCS	Program Elective-V	PE	3	3	0	0	25	75	100
#OE/MOOCS	Open Elective	OE	3	3	0	0	25	75	100
M19CAD2106	Dissertation-I / Industrial Project	PR	10	0	0	20	50	50	100
TOTAL			16	6	0	20	100	200	300

	Course Code	Course
#PE-V/ MOOCS	M19CAD 2101	Non Destructive Evaluation
	M19CAD 2102	Quality Engineering
	M19CAD 2103	Green Manufacturing
	M19CAD 2104 (MOOCS-I)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course
#OE/ MOOCS	#OE	Students have to choose one open elective course offered by departments other than the parent department. List of open Electives offered by other departments are enclosed.
	M19CAD 2105 (MOOCS-II)	Students Going for Industrial Project / Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12 weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M. Tech Course

OPEN ELECTIVES OFFERED TO OTHER DEPARTMENTS	
M19CAD 2107	Operations Research
M19CAD 2108	Nano Technology
M19CAD 2109	Product Design & Manufacturing



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CAD/CAM

SYLLABUS : NON DESTRUCTIVE EVALUATION (M19CAD2101)

(Program Elective-V)

UNIT-I : General Methods: Flaw Detection Using Dye Penetrants. Magnetic Particle Inspection, introduction to electrical impedance, Principles of Eddy Current testing, Flaw detection using eddy currents.

UNIT-II : X-Ray Radiography: The Radiographic process, X-Ray and Gamma-ray sources, Geometric Principles, Factors Governing Exposure, Radio graphic screens, Scattered radiation, Arithmetic of exposure, Radiographic image quality and detail visibility, Industrial X-Ray films, Fundamentals of processing techniques, Process control, The processing Room, Special Processing techniques, Paper Radiography, Sensitometric characteristics of x-ray films, Film graininess signal to noise ratio in radiographs, The photographic latent image, Radiation Protection.

UNIT-III: Generation of ultrasonic waves, Horizontal and shear waves, Near field and far field acoustic wave description, Ultrasonic probes- straight beam, direct contact type, Angle beam, Transmission/reflection type, and delay line transducers, acoustic coupling and media, Transmission and pulse echo methods, A-scan, B-scan, C-scan, F-scan and P-scan modes, Flaw sizing in ultrasonic inspection: AVG, Amplitude, Transmission, TOFD, Satellite pulse, Multi- modal transducer, Zonal method using focused beam. Flow location methods, Signal processing in Ultrasonic NDT; Mimics, spurious echos and noise. Ultrasonic flaw evaluation.

UNIT-IV: Holography: Principles and practices of Optical holography, acoustical, microwave, x-ray and electron beam holography techniques.

UNIT-V: Applications: NDT in flaw analysis of Pressure vessels, piping, NDT in Castings, Welded

Course Outcomes for Third Semester Course	
Course Code: M19CAD2101	
Course Title: NON DESTRUCTIVE EVALUATION(Program Elective-V)	
CO-1	The student shall be able to select an appropriate NDT technique as per requirement.
CO-2	Understand the theoretical and practical aspects of the radiographic testing, interpretation and evaluation.
CO-3	Acquire basic knowledge of ultrasonic testing which enables them to perform inspection of samples.
CO-4	Understand the principle of optical holography and its applications in NDT.
CO-5	Apply various NDTs for flaw analysis of pressure vessels, piping, welded joints, casted parts.



Estd:1980

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SYLLABUS: QUALITY ENGINEERING (M19CAD2102)

(Program Elective-V)

UNIT-I: QUALITY VALUE AND ENGINEERING: An overall quality system, quality engineering in production design, quality engineering in design of production processes. Loss Function and Quality Level: Derivation and use of quadratle loss function, economic consequences of tightening tolerances as a means to improve quality, evaluations and types tolerances.(N-type,S-type and L-type)

UNIT-II: TOLERANCE DESIGN AND TOLERANCING: Functional limits, tolerance design for N-type. L-type and S-type characteristics, tolerance allocation for multiple components. Parameter and Tolerance Design: Introduction to parameter design, signal to noise ratios, Parameter design strategy, some of the case studies on parameter and tolerance designs

UNIT-III: DOE: DOE process steps, Observation method, Ranking method, Column effects method and Plotting method.

ANALYSIS OF VARIANCE (ANOVA): Introduction to ANOVA, Need for ANOVA, NO-way ANOVA, One-way ANOVA, Two-way ANOVA, Critique of F-test, ANOVA for four level factors, multiple level factors.

UNIT-IV: ORTHOGONAL ARRAYS: Typical test strategies, better test strategies, efficient test strategies, steps in designing, conducting and analyzing an experiment. Interpolation of Experimental Results: Interpretation methods, percent contributor, estimating the mean.

UNIT-V: SIX SIGMA AND THE TECHNICAL SYSTEM: Six sigma DMAIC methodology, tools for process improvement, six sigma in services and small organizations, statistical foundations, statistical methodology..

Course Outcomes for Third Semester Course	
Course Code: M19CAD2102	
Course Title: QUALITY ENGINEERING (Program Elective-V)	
CO-1	Understand the concepts of Quality value and Engineering.
CO-2	Understand the concepts of Tolerance design and tolerancing.
CO-3	Understand the principles of DOE and ANOVA.
CO-4	Understand the concepts of orthogonal arrays.
CO-5	Understand the principles of six sigma and the technical system.



Estd:1980

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SYLLABUS: GREEN MANUFACTURING (M19CAD2103)

(Program Elective-V)

UNIT-I: INTRODUCTION TO MANUFACTURING Definition of manufacturing, Impact of manufacturing in environmental ecology, Role of manufacturing sector in national growth, Technological change and evolving risk, concepts of "green" manufacturing need of green manufacturing, Green manufacturing strategies, Green manufacturing – motivation, barriers, regulation, policy, Casting defects and remedies, Advantages and limitations of green manufacturing.

UNIT-II: GREEN MANUFACTURING TOOLS Principles of green manufacturing and its efficiency, Green manufacturing and sustainability, System model architecture and module, Design and planning, control or tools for green manufacturing (Qualitative Analysis, Consumption Analysis, Life Cycle Analysis, Efficiency, Sustainability tools) Standards for green manufacturing (ISO 14000 and OHSAS 18000, Waste stream mapping and application Identify and apply the concepts of product and process design with environmental forethought, Design for environment and for sustainability -Discuss the Product Life Cycle of manufactured goods.

UNIT-III: ATTRIBUTES DECISION MAKING METHODS Introduction to Multi attributes decision making methods, definition, structure for Multi attributes decision making, Reference methods variants and analysis of different methods like Simple Additive Method (SAM) Weighted Product Method (WPM. Analytic Hierarchy Process (AHP) Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Grey Relation Analysis (GRA Elimination and Choice Expressing Reality (ELECTRE) ViseKriterijumska Optimizacija I Kompromisno Resenje (VIKOR), Problems based on different MADMs.

UNIT-IV: CREATING LEAN AND GREEN ORGANISATION Question wasteful practices Gain lean and green endorsement, collaboration to achieve lean and green goals Track progress for environment and profits Creation of sustainable growth Enabling techniques for assuring green manufacturing, Drivers of green manufacturing, impact, advantages and disadvantages of drivers, Green architecture and buildings, Sustainable manufacturing resources management, Carbon footprint analysis and management of manufacturing processes, Green Process Economics, Resource Recovery and Reuse.

UNIT-V: CASE STUDIES IN GREEN MANUFACTURING Design resources saving into product and processes, Closed loop & Open Loop production system, Green manufacturing through clean energy supply, semiconductors manufacturing, Various case studies of implementation of semiconductors manufacturing at industries, Green packaging and supply chain, Various case studies of implementation of Optimizing Logistics solution at industries, Environmental implication of Nanomanufacturing, Various case studies of implementation of lean manufacturing at industries Various case studies of implementation of Optimizing process or product



Estd:1980

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at industries.

Course Outcomes for Third Semester Course	
Course Code: M19CAD2103	
Course Title: GREEN MANUFACTURING(Program Elective-V)	
CO-1	Understand the basic design concepts, methods, tools, the key technologies and the operation of sustainable green manufacturing.
CO-2	Understand the basic concepts of green manufacturing tools.
CO-3	Understand the basic concepts of various attributes decision making methods.
CO-4	Identify the strategies for the purpose of satisfying a set of given sustainable green manufacturing requirements
CO-5	Design the rules and processes to meet the market need and the green manufacturing requirements by selecting and evaluating suitable technical, managerial/project management and supply chain management scheme.



Estd:1980

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SYLLABUS: MOOCS-I (M19CAD2104)

Students Going for Industrial Project/ Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12weeks' course duration in PG level with 3 credits, but the chosen subject should not be covered in their M.Tech Course



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OPENELECTIVE

Offered from	Course Code	Course Name	Offered to
CIVIL ENGINEERING	M19 ST 2107	Construction Management	CST, CS, PSA,IT & CAD/CAM
	M19 ST 2108	Green Technology	
	M19 ST 2109	Analysis of Offshore Structures	
COMPUTER SCIENCE & ENGINEERING	M19 CST 2106	Python Programming	ST, CS, PSA & CAD/CAM
	M19 CST 2107	Artificial Intelligence	
	M19 CST 2108	Advanced Data structures	
ELECTRONICS & COMMUNICATION ENGINEERING	M19 CS 2107	Signals and systems	ST, CST, PSA, IT & CAD/CAM
	M19 CS 2108	Principles of Communication	
	M19 CS 2109	Image and video Processing	
ELECTRICAL & ELECTRONICS ENGINEERING	M19PS2107	Electric And Hybrid Vehicles	ST, CST, CS, IT & CAD/CAM
	M19PS2108	Energy From Waste	
	M19PS2109	Energy Management and Auditing	
INFORMATION TECHNOLOGY	M19IT2108	Web Technologies	ST, CS, PSA & CAD/CAM
	M19IT2109	Internet of Things	
	M19IT2110	Machine Learning	
SCIENCE & HUMANITIES	M19BS2101	Management and Organisational Behaviour	ST, CST, CS, PSA, IT & CAD/CAM



Estd:1980

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SYLLABUS: MOOCS-II (M19CAD2105)

Students Going for Industrial Project/ Thesis will complete these courses through MOOCS. Students can also choose SWAYAM or NPTEL with a 12weeks'course duration in PG level with 3 credits, but the Chosen subject should not be covered in their M.Tech Course



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SYLLABUS: DISSERTATION-I/INDUSTRIAL PROJECT (M19ST2106)

The Student has to register for Dissertation-I / Industrial project in III semester. Student has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).

Continuous assessment of Dissertation-I during the III-Semester will be monitored by the PRC. Dissertation-I/

Industrial Project is evaluated for 50 internal marks and 50 external marks.

Internal marks 50 awarded by Project Guide and PRC jointly based on continuous assessment consisting of two seminars based on Dissertation work-I.

External marks 50 awarded by External Examiner, Supervisor and Head of the Department jointly based On a review and Viva voce on Dissertation work-I.



Estd:1980

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Regulation: R19			II / II - M.Tech. II - Semester						
MECHANICAL ENGINEERING CAD/CAM (Under Choice Based Credit System / Elective CourseSystem)									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2019-20 admitted Batch onwards)									
Course Code	Course Name	Category	Cr.	L	T	P	Int. Marks	Ext. Marks	Total Marks
M19CAD201	Dissertation-II /Industrial Project	PR	16	0	0	32	--	100	100



Estd:1980

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CAD/CAM

SYLLABUS : DISSERTATION-II/INDUSTRIALPROJECT (M19ST2201)

The student has to continue his/her work from Dissertation-I / Industrial project to complete Dissertation-II in IV semester.

Continuous assessment of Dissertation-II during IV-Semester will be monitored by the PRC.

Dissertation-II is evaluated for 100 external marks based on Review and Viva Voce.

Review and Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Board shall jointly report the candidate's work for 100 marks.

If the report of the Viva-Voce is unsatisfactory (ie, < 50 marks), the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to reregister for the project and complete the project within the stipulated time after taking the approval from the College.



SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)
 (Affiliated to JNTUK, Kakinada),(Recognized by AICTE, NewDelhi) Accredited by NAAC with 'A' Grade
 UG Programmes CE, CSE, ECE, EEE, IT & ME are Accredited by NBA
 ChinnaAmiram, Bhimavaram-534204. (AP)

**LIST OF OPEN ELECTIVES OFFERED BY ALL DEPARTMENTS TO THE
 III Semester M.TECH. STUDENTS**

S.No	Offered from	Course Code	Course Name	Offered to
1	CIVIL ENGINEERING	M19 ST 2107	Construction Management	CST, CS, PSA, IT & CAD/CAM
2		M19 ST 2108	Green Technology	
3		M19 ST 2109	Analysis of Offshore Structures	
4	COMPUTER SCIENCE & ENGINEERING	M19 CST 2106	Python Programming	ST, CS, PSA & CAD/CAM
5		M19 CST 2107	Artificial Intelligence	
6		M19 CST 2108	Advanced Data structures	
7	ELECTRONICS & COMMUNICATION ENGINEERING	M19 CS 2107	Signals and systems	ST, CST, PSA, IT & CAD/CAM
8		M19 CS 2108	Principles of Communication	
9		M19 CS 2109	Image and video Processing	
10	ELECTRICAL & ELECTRONICS ENGINEERING	M19PS2107	Electric And Hybrid Vehicles	ST, CST, CS, IT & CAD/CAM
11		M19PS2108	Energy From Waste	
12		M19PS2109	Energy Management and Auditing	
13	INFORMATION TECHNOLOGY	M19IT2108	Web Technologies	ST, CS, PSA & CAD/CAM
14		M19IT2109	Internet of Things	
15		M19IT2110	Machine Learning	
16	MECHANICAL ENGINEERING	M19CAD 2107	Operations Research	ST, CST, CS, PSA & IT
17		M19CAD 2108	Nano Technology	
18		M19CAD 2109	Product Design & Manufacturing	
19	SCIENCE & HUMANITIES	M19BS2101	Management and Organisational Behaviour	ST, CST, CS, PSA, IT & CAD/CAM