Estd:1980

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

COMPUTER SCIENCE & ENGINEERING

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R19)
I/IV B.TECH
I-SEMESTER
(With effect from **2019-2020**Admitted Batch onwards**)**

Subject Code	Name of the Subject	Category	Cr	L	T	P	Internal Marks	External 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 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
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 1104	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**

Code	Category	L	T	P	C	I.M	E.M	Exam
B19HS1101	**HS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

ENGLISH

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

Introduction:

The course is designed to train students in receptive as well as productive skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as GRE, GMAT, IELTS, TOEFL and BEC besides being able to handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives:

1.	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
2.	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.
3.	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
4.	Impart effective strategies for good writing and demonstrate the same in both summarizing and analyzing; writing well-organized essays, letters, e-mails, CV's and reports.
5.	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Course Outcomes:

S.No	Outcome	Knowledge Level
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.	K3
2	Apply suitable strategies for skimming and scanning to get the main idea of a text and locate specific information.	K3
3	Build confidence and adapt themselves to the social and public discourses, discussions and presentations.	K6
4	Understand and apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.	K6
5	Construct sentences using proper grammatical structures and correct word forms.	K4

SYLLABUS

UNIT-I (8 Hrs)	**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 (8 Hrs)	**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 (8 Hrs)	**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 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 (8 Hrs)	**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; degrees of comparison. **Pronunciation**: Contrastive Stress.
UNIT-V (8 Hrs)	**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). **Pronunciation:** Stress in compound words
Text Books:	
1.	*Infotech English*, Maruthi Publications.
Reference Books:	
1.	Bailey, Stephen. *Academic writing:* A *Handbook for International Students.* Routledge, 2014.

2.	Chase. Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3.	*SkilfulLevel 2 Reading & Writing Student's Book Pack* (B1). Macmillan Educational.
4.	Hewing, Martin. *Cambridge Academic English (B2).* CUP, 2012.
Weblinks:	
	Grammar/Listening/Writing
	1-language.com
	http://www.5minuteenglish.com/
	https://www.englishpractice.com/
	Grammar/Vocabulary
	English Language Learning Online
	http://www.bbc.co.uk/learningenglish/
	http://www.better-english.com/
	http://www.nonstopenglish.com/
	https://www.vocabulary.com/
	BBC Vocabulary Games
	Free Rice Vocabulary Game
	Reading
	https://www.usingenglish.com/comprehension/
	https://www.englishclub.com/reading/short-stories.htm
	https://www.english-online.at/
	Listening
	https://learningenglish.voanews.com/z/3613
	http://www.englishmedialab.com/listening.html
	Speaking
	https://www.talkenglish.com/
	BBC Learning English – Pronunciation tips
	Merriam-Webster – Perfect pronunciation Exercises
	All Skills
	https://www.englishclub.com/
	http://www.world-english.org/
	http://learnenglish.britishcouncil.org/
	Online Dictionaries
	Cambridge dictionary online
	MacMillan dictionary
	Oxford learner's dictionaries

Subject Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1101	**BS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

MATHEMATICS-I

(LINEAR ALGEBRA,DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS)

(Common to All Branches)

Pre-requisites: Calculus of functions of a single variable and Matrices.

Course Objectives: Students are expected to learn

1.	Concepts of linear algebra and methods of solution of linear simultaneous algebraic equations.
2.	Eigen values, Eigen vectors and quadratic forms.
3.	First order ordinary differential equations and some simple geometrical and physical applications.
4.	Orthogonal trajectories, Simple electrical circuits and Newton's law of cooling.
5.	Methods of solution of linear higher order ordinary differential equations.
6.	Concepts of Laplace transform and their applications for solving ODE.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Solve a given system of linear algebraic equations	K2
2.	Determine Eigen values and Eigen vectors of a system represented by a matrix.	K2
3.	Solve linear ordinary differential equations of first order and first degree.	K1
4.	Apply the knowledge in simple applications such as Newton's law of cooling, orthogonal trajectories and simple electrical circuits.	K3
5.	Solve linear ordinary differential equations of second order and higher order.	K1
6.	Determine Laplace transform and inverse Laplace transform and solve linear ODE.	K2

SYLLABUS

UNIT-I (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**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 (8 Hrs)	**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 (12 Hrs)	**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.

Text Books:	
1.	B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	N.P.Bali & Manish Goyal, Engineering Mathematics, Lakshmi Publications.
Reference Books:	
1.	V.Ravindranath & P. Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.
2.	Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
3.	Michael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson.
4.	Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
5.	Peter O'Neil, Advanced Engineering Mathematics, Cengage Learning.
6.	Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
7.	Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, New Delhi.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1102	**BS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

MATHEMATICS – II

(NUMERICAL ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS)

(Common to CSE, ECE & IT)

Pre requisites: Calculus of functions of a single variable and Geometry

Course Objectives: **S**tudents are expected to learn:

1.	The concept of interpolation and its use for equally and unequally spaced data points
2.	Numerical methods to solve algebraic and transcendental equations, methods for numerical evaluation of integrals and for solving first order ODEs.
3.	Partial differentiation and Jacobians.
4.	Application of Partial differentiation for maxima/ minima and for evaluation of real definite integrals.
5.	Formation and solution of linear partial differential equations
6.	Solution of one-dimensional wave equation and one-dimensional heat equation by the method of separation of variables.

Course Outcomes: At the end of the course students will be able to

S.No	Outcome	Knowledge Level
1.	Fit an interpolation formula and perform interpolation for an equally spaced data as well as unequally spaced data.	K2
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.	K3
3.	Compute partial derivatives, total derivative and Jocobian	K1
4.	Find maxima/minima of functions of two variables and evaluate some real definite integrals.	K2
5.	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.	K1
6.	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation	K3

SYLLABUS

UNIT-I (10 Hrs)	**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 (12 Hrs)	**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 $1/3^{rd}$ 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 (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**Applications of partial differential equations:** Method of separation of variables, One –dimensional wave equation, the D'Alembert's solution, one- dimensional heat equation

Text Books:	
1.	B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	N.P.Bali& Manish Goyal, A Text book of Engineering Mathematics, Lakshmi Publications.

Reference Books:	
1.	Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press.
2.	V.Ravindranath and P. Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.
3.	Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
4.	David Kincaid, Ward Cheney, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.
5.	Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
6.	Dass H.K., RajnishVerma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, New Delhi.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1105	**BS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

APPLIED CHEMISTRY

(Common to CSE,ECE & IT)

Course Objectives:

1.	To understand the physical and mechanical properties of Polymers/Plastics/elastomers helps in selecting suitable materials for different purpose.
2.	To create awareness on fuels as a source of energy for industries like thermal power stations, steel industry, fertilizer industry etc.
3.	To understand the concept of galvanic cells and corrosion with theories like electro chemical theory.
4.	To understand the importance of water.
5.	To understand about the materials which are used in major industries like steel and metallurgical manufacturing industries, construction and electrical equipment manufacturing industries.

Course Outcomes

S.No	Outcome	Knowledge Level
1	At the end of the course the students learn the advantages and limitations of plastics materials and their use in design.	K3
2	Fuels which are used commonly and their economics, advantages and limitations are discussed.	K3
3	Students gained knowledge reasons for corrosion and some methods of corrosion control.	K3
4	Students understands the impurities present in raw water, problems associated with them and how to avoid them.	K3
5	Similarly students understand liquid crystals and semi conductors. Students can gain the building materials, solar materials, lubricants and energy storage devices.	K4

SYLLABUS

UNIT-I (10 Hrs)	**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 (9 Hrs)	**Energy Sources and Applications** **Nuclear Energy:** Nuclear fission and Nuclear fusion – Nuclear Power reactor – Applications of radicative 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 glassline, Cetane number of diesel oil, synthetic Petrol; LPG, CNG
UNIT-III (11 Hrs)	**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; Electrroless plating ; Paints.
UNIT-IV (8 Hrs)	**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 (12 Hrs)	**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 refactories. 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.

Text Books:	
1.	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing co.
2.	Engineering Chemistry by Willy India Pvt Ltd.
3.	Engineering chemistry by Dr.K.Anji Reddy and Dr.M.S.R.Reddy ; Silicon Publications.
Reference Books:	
1.	Engineering Chemistry by Shikha Aharwal; Cambridge University Press, 2015 edition.
2.	A text of Engineering Chemistry by S.S.Dara; S.Chand & Co Ltd.
3.	Chemistry in Engineering and Technology by JC Kuriacose and J. Rajaram Mc. Graw Hill edition.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS1101	**ES**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C

(Common to CSE & IT)

Course Objectives:

1.	To introduce programming through Visual programming tool - Scratch
2.	To teach problem solving through Flow charting tool – Raptor
3.	To understand programming language
4.	To understand concepts of Loops
5.	To understand reading a set of Data, stepwise refinement,
6.	To understand Functions, Control structure, Arrays.

Course Outcomes

S.No	Outcome	Knowledge Level
1	The student will be able to develop Flow charts and write algorithms.	K3
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.	K3
3	The student will able write programs using functions and arrays	K3
4	The student will able write programs using Pointers and Structures	K3
5	The student will able write programs for Files	K4

SYLLABUS

UNIT-I (8 Hrs)	**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 (12 Hrs)	**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 (10 Hrs)	**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 (12 Hrs)	**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 (6 Hrs)	**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.

Text Books:	
1.	An Introduction to Computer studies –Noel Kalicharan-Cambridge
2.	Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE
3.	Programming in C, Reema Thareja, OXFORD
4.	ANSI C Programming, Gary J. Bronson, Cengage Learning.
5.	The C programming Language by Dennis Richie and Brian Kernighan, Pearson Education

Reference Books:	
1.	C. How to program, Dietel and Diretel
2.	Programming with C, Bichkar, Universities Press
3.	Computer Fundamentals by Anitha Goel, Pearson Edition.

Web Links:	
1.	https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf
2.	https://nostarch.com/scratchplayground
3.	http://fusecontent.education.vic.gov.au/9f79537a-66fc-4070-a5ce-e3aa315888a1/scratchreferenceguide14.pdf
4.	https://raptor.martincarlisle.com/

Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1108	**BS**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

APPLIED CHEMISTRY LAB

(Common to CSE,ECE & IT)

Course Objectives:

1.	To investigate and understand Physical behaviour in the laboratory using scientific reasoning and logic and interpret the result of simple experiments and demonstration of chemical Principle and also evaluate the impact of chemical discoveries on how we view the world.
2.	Effectively communicate experimental results and solutions to application problems through oral and written reports.
3.	Understand the basic concepts, definitions, characteristics and phenomena.
4.	Recognize the classical ideas and chemical phenomena and also define and analyse the concepts.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	An understanding of Professional and develop confidence on recent trends.	K3
2.	Able to gain technical knowledge of measuring, operating and testing of chemical instruments and equipments.	K4
3.	Acquire ability to apply real time knowledge of chemistry.	K3
4.	Exposed to the real time working environment.	K3
5.	Demonstrate the ability to learn Principles, design and conduct experiments.	K3
6.	Ability to work on laboratory and multidisciplinary tasks.	K3

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 $K_2Cr_2O_7$.
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 resion.
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.

Reference Books:	
1.	Engineering Chemistry Lab Manual Prepared by Chemistry Faculty of S.R.K.R.Engineering College.
2.	Laboratory manual on Engineering Chemistry by Dr.Sudha Rani; Dhanpat Rai Publishing Company.
3.	Engineering Chemistry Laboratory manual – I & II by Dr.K.Anji Reddy; Tulip Publications.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19HS1102	**HS**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

ENGLISH LAB

(Common to All Branches)

Course Objectives:

1.	Students will be exposed to a variety of self instructional, learner friendly modes of language learning
2.	Students will be habituated to CALL (Computer Assisted Language Learning). Thus providing them with the required facility to face computer-based competitive exams like GRE, TOEFL, GMAT etc.
3.	Students will learn better pronunciation through stress, intonation and rhythm
4.	Students build their confidence in speaking skills.
5.	Students learn and practice LSRW Skills.

Course Outcomes:

S.No	Outcome	Knowledge Level
1	Remember and understand the different aspects of English language proficiency with emphasis on LSRW skills.	K2
2	Apply communication skills through various language learning activities.	K3
3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening comprehension.	K4
4	Exhibit an acceptable etiquette essential in social settings.	K6
5	Get awareness on mother tongue influence and neutralize it in order to improve fluency and clarity in spoken English.	K4

SYLLABUS

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

Text Books:	
1.	Infotech English**,** MaruthiPublications
Reference Books:	
1.	Exercises in Spoken English Part 1,2,3,4, OUP and CIEFI.
2.	English Pronunciation in use- Mark Hancock, CUP.
3.	English Phonetics and Phonology-Peter Roach, CUP.
4.	English Pronunciation in use- Mark Hewings, CUP.
5.	English Pronunciation Dictionary- Daniel Jones, CUP.
6.	English Phonetics for Indian Students- P. BalaSubramanian, Mac Millan Publications

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS1104	**ES**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

COMPUTER FUNDAMENTALS & PROBLEM SOLVING USING C LAB

(Common to CSE & IT)

Course Objectives:

1.	Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
2.	Acquire knowledge about the basic concept of writing a program.
3.	Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
4.	Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
5.	Role of Functions involving the idea of modularity.

Course Outcomes: By the end of the Lab, the student

S.No	Outcome	Knowledge Level
1.	Gains Knowledge on various concepts of a C language.	K2
2.	Able to draw flowcharts and write algorithms.	K3
3.	Able to design and develop of C problem solving skills.	K4
4.	Able to design and develop modular programming skills.	K4
5.	Able to trace and debug a program	K3
6.	Able to Identify various computer components, Installation of software	K3

LIST OF EXPERIMENTS

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 ... 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.
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.
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.
Note: a) All the Programs must be executed in the Linux Environment. (Mandatory) b) The Lab record must be a print of the LATEX (.tex) Format.	
Reference Books:	
1.	ANSI C Programming, Gary J. Bronson, Cengage Learning.
2.	The C programming Language by Dennis Richie and Brian Kernighan, Pearson Education
3.	C. How to program, Dietel and Diretel
4.	C Programming, A Problem Solving Approach, Forouzan, Gilberg, CENGAGE
5.	Programming with C, Bichkar, Universities Press
Reference Links:	
1.	https://www.cse.msu.edu/~stockman/ITEC/Scratch/BGC2011Scratch-Rev1.pdf

Code	Category	L	T	P	C	I.M	E.M	Exam
B19MC1101	**MC**	**3**	**--**	**--**	**--**	**--**	**--**	**--**

ENVIRONMENTAL SCIENCE

(Common to CSE,IT & ME)

Course Objectives: The objectives of the course are to impart:

1.	Overall understanding of the natural resources.
2.	Basic understanding of the ecosystem and its diversity.
3.	Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4.	An understanding of the environmental impact of developmental activities.
5.	Awareness on the social issues, environmental legislation and global treaties.

SYLLABUS

UNIT-I (8 Hrs)	**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 (8 Hrs)	**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 (8 Hrs)	**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-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT-IV (8 Hrs)	**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.
UNIT-V (8 Hrs)	**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 (8 Hrs)	**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.**

Text Books:	
1.	Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada Rani; Pearson Education, Chennai
2.	Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
3.	Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula

Reference Books:	
1.	Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2.	A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3.	Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4.	Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

Estd:1980

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

COMPUTER SCIENCE & ENGINEERING

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R19)
I/IV B.TECH
II-SEMESTER
(With effect from **2019-2020**Admitted Batch onwards**)**

Subject Code	Name of the Subject	Category	Cr	L	T	P	Internal Marks	External 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**

Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1202	**BS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

MATHEMATICS-III

(Multivariable Calculus and Fourier analysis)

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

Prerequisites: Concepts of Calculus

Course Objectives: The students are expected to learn:

1.	How to expand a periodic function in a Fourier series.
2.	How to find Fourier transform for a given function and evaluate some real definite integrals.
3.	Evaluation of Multiple integrals; definitions of Beta, Gamma and error functions.
4.	Concepts of Gradient, divergence and curl and second order operators.
5.	To evaluate line integral, compute work done by a force and Flux of a vector function
6.	Green's, Stokes' and Gauss divergence theorems.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Determine Fourier series and half range series of functions.	K2
2.	Find different Fourier transforms of non-periodic functions and also use them to evaluate integrals.	K3
3.	Use the knowledge of Beta and Gamma functions in evaluating improper integrals.	K2
4.	Evaluate double integrals, simple triple integrals & find areas and volume.	K2
5.	Find the gradient of a scalar function, divergence and curl of a vector function. Determine scalar potential.	K2
6.	Apply Green's, Stokes' and Gauss divergence theorems to solve problems.	K3

SYLLABUS

UNIT-I (10 Hrs)	**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 (10 Hrs)	**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 (12 Hrs)	**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 (10 Hrs)	**Vector Differentiation** Gradient, directional derivative, Divergence, Curl, Incompressible flow, solenoidal and irrotational vector fields, vector identities.
UNIT-V (10 Hrs)	**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.

Text Books:	
1.	**B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2.	**N.P.Bali & Manish Goyal**, Engineering Mathematics, Lakshmi Publications.
Reference Books:	
1.	**MichaelGreenberg,** Advanced Engineering Mathematics, 9th edition, Pearson edn.
2.	**Erwin Kreyszig** Advanced Engineering Mathematics, 10th Edition, Wiley-India.
3.	**Peter O'Neil,** Advanced Engineering Mathematics,7th edition, Cengage Learning.
4.	**D.W. Jordan and T. Smith,** Mathematical Techniques, Oxford University Press.
5.	**Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6.	**Dass H.K., Rajnish Verma. Er., H**igher Engineering Mathematics, S. Chand Co. Pvt. Ltd, New Delhi.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1203	**BS**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

APPLIED PHYSICS
(Common to CSE, ECE & IT)

Course Objectives:

1.	**To impart** the knowledge in basic concepts of wave optics through the Phenomena of interference and diffraction, basic concepts and properties of dielectric and magnetic materials and semiconductors.
2.	**To familiarize** the student with modern technologies like lasers, optical fibers and ultrasonics with an understanding of the science behind.
3.	**To impart** the elementary concepts of nano materials and their significance in different engineering branches.

Course Outcomes

S.No	Outcome	Knowledge Level
1	**Interpret** the behavior of light radiation in interference and diffraction Phenomena and their applications.	K3
2	**Explain** the properties of dielectric and magnetic materials suitable for engineering applications.	K3
3	**Explain** the important aspects of semiconductors and electrical conductivity in them.	K3
4	**Understand** the basics of modern technologies lasers, optical fibers and ultrasonics and their utility in various fields.	K3
5	**Demonstrate** the synthesis methods and applications of nano materials.	K2

SYLLABUS

UNIT-I (10 Hrs)	**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, Fraunhoffer diffraction at a single alit, Diffraction grating, grating spectrum. Missing order, Resolving power, Rayleigh's Criterion, Resolving power of Grating, Telescope, Microscope (qualitative treatment only)
UNIT-II (10 Hrs)	**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, Claussius 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 (10 Hrs)	**LASERS AND FIBER OPTICS** **Lasers**: Introduction, Interaction fof 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 propagations, types of fibers, classification of fibers based on refractive index profile, applications of fibers with emphasis on fiber optic communication.
UNIT-IV (9 Hrs)	**SEMICONDUCTORS** Introduction, intrinsic semi conductors, density of charge carries, 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 (9 Hrs)	**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.

Text Books:	
1.	A text Book of Engineering Physics – M.N. Avadhanulu and P.G.Kshirasagar.-S.Chand Publications 2017
2.	Engineering Physics by HK Malik and A.K.Singh. Mc Grawhill Publishing Company Ltd.
3.	Engineering Physics by V.Rajendran. Mc Grawhill Education (India)Pvt Ltd.

Reference Books:	
1.	Introduction to Solid State Physics by Charles Kittel , Wiley Publications 2011
2.	Semiconductors Devices – Physics and Technology by S.M.Sze , Wiley Publications 2008
3.	Text book of Nano Science and Nano technology by Tata Mc Grawhill 2013.
4.	Optical fiber communications by Gerd Keiser, Tata Mc Graw hill 2008.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS1202	**ES**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

DIGITAL LOGIC DESIGN

(Common to CSE & IT)

Course Objectives:

1.	To introduce the basic principles for design of combinational circuit and sequential circuits.
2.	To learn simple digital circuits in preparation for computer engineering.

Course Outcomes

S.No	Outcome	Knowledge Level
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.	K2
2	An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.	K3
3	An ability to define the following combinational circuits: multiplexer, de-multiplexers encoders/decoders, comparators, arithmetic-logic units and to be able to a build simple circuits.	K4
4	An ability to understand asynchronous and synchronous sequential circuits, like counters and shift registers.	K4
5	An ability to understand memories like RAM and ROM, Programmable Logic Array and Programmable Array Logic.	K2

SYLLABUS

UNIT-I (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**Memory and Programmable Logic** Introduction. Random-Access Memory. Memory Decoding, Error Detection and Correction. Read-Only Memory. Programmable Logic Array. Programmable Array Logic.

Text Books:	
1.	Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
2.	Fundamentals of Logic Design, 5/e, Roth, Cengage.

Reference Books:	
1.	Digital Logic Design Principles, Norman Balabanian & Bradley Carlson, John Wiley & Sons(Asia) Pvt.Ltd.,2002
2.	Switching and Finite Automata Theory, 2nd Edition ZVI Kohavi Tata McGraw Hill
3.	Switching Theory and Logic Design, 3rd Edition, A.Anand Kumar PHI Learning Pvt.Ltd.
4.	Digital Logic and Computer Design, M.Morris Mano, PEA.
5.	Digital Logic Design, Leach, Malvino, Saha, TMH.
6.	Modern Digital Electronics, R.P. Jain, TMH.

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS1203	**ES**	**3**	**--**	**--**	**3**	**25**	**75**	**3 Hrs.**

BASIC DATA STRUCTURES AND PYTHON PROGRAMMING

(Common to CSE & IT)

Course Objectives:

1.	The fundamental design, analysis, and implementation of basic data structures.
2.	Basic concepts in the specification and analysis of programs.
3.	Principles for good program design, especially the uses of data abstraction.
4.	Significance of algorithms in the computer field
5.	Various aspects of algorithm development and Qualities of a good solution
6.	To elucidate problem solving through python programming language
7.	To introduce function-oriented programming paradigm through python
8.	To learn modular concepts and practical Python solution patterns

Course Outcomes

S.No	Outcome	Knowledge Level
1	Ability to implement various searching and sorting techniques.	K4
2	Student will be able to write programs to implement stack and queues	K4
3	Proficiency in creating based applications using the Python Programming Language.	K3
4	To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.	K3
5	To be able to draw various kinds of plots using PyLab and Event driven Programming.	K3

SYLLABUS

UNIT-I (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**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 (10 Hrs)	**Data Structures and Idiomatic Programming in Python** Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful Idiomatic approach to solve programming problems.
UNIT-V (8 Hrs)	**Event driven Programming** Turtle Bar Chart, Event Driven programming. Key press events, Mouse events, timer events.

Text Books:	
1.	Fundamentals of Data Structures in C, 2nd edition, Horowitz, Sahani and Anderson-Freed, Universities Press, 2008.
2.	How to Think Like a Computer Scientist: Learning with Python 3 Documentation Release 3rd Edition Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers

Reference Books:	
1.	John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2.	R. Nageswara Rao, "Core Python Programming", dreamtech
3.	Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall
4.	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Pyhon", Wiley
5.	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication Luke Sneeringer, "Professional Python", Wrox
6.	Data Structures using C by Aaron M. Tenenbaum,Y.Langsam and M.J. Augenstein, Pearson Education, 2009.
7.	Data Structures with C by Seymour lipschutz, Schaum Outline series, 2010.
8.	Data Structures using C by R. KrishnaMoorthy G. IndiraniKumaravel, TMH, New Delhi,2008.

Web Links:	
1.	http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2.	https://zhanxw.com/blog/wp-content/uploads/2013/03/BeautifulCode_2.pdf

Code	Category	L	T	P	C	I.M	E.M	Exam
B19ME1201	**ES**	**1**	**--**	**3**	**2.5**	**25**	**75**	**3 Hrs.**

ENGINEERING DRAWING

(Common to CSE,ECE & IT)

Course Objectives:

1.	Bring awareness that engineering drawing is the language of engineers
2.	To impart basic knowledge and skills required to prepare engineering drawings.
3.	To visualize and represent the pictorial views with proper dimensioning and scaling.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Apply principles of drawing to Construct polygons and engineering curves.	K3
2.	Apply principles of drawing to draw the projections of points and lines.	K3
3.	Apply principles of drawing to draw the projections of planes	K3
4.	Apply principles of drawing to draw the projections of solids.	K3
5.	Apply principles of drawing to represent the object in 3D view through isometric views.	K3

SYLLABUS

UNIT-I (8 Hrs)	**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 (8 Hrs)	**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 (6 Hrs)	**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 (6 Hrs)	Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.
UNIT-V (8 Hrs)	Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Text Books:

1.	Engineering Drawing by N.D. Bhatt, Chariot Publications.
2.	Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

Reference Books:	
1.	Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
2.	Engineering Graphics for Degree by K.C. John, PHI Publishers.
3.	Engineering Graphics by PI Varghese, McGrawHill Publishers.
4.	Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
Web links	
1.	https://nptel.ac.in/courses/112103019/
2.	https://nptel.ac.in/courses/112104172/1

Code	Category	L	T	P	C	I.M	E.M	Exam
B19BS1206	**BS**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

APPLIED PHYSICS LAB

(Common to CSE,ECE & IT)

Course Objectives:

1.	To impart hands-on experience to the students entering engineering / Technology education about handling sophisticated equipment / instruments.
2.	To make the students understand the theoretical aspects of various phenomena experimentally.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Students get hands on experience in setting up experiments and using the instruments / equipment individually.	K3
2.	Get introduced to using new / advanced technologies and understand their significance.	K3

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.

Reference Books:

1.	Advanced Practical Physics Vol 1& 2 SP Singh & M.S Chauhan Pragati Prakashan ,Meerut

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS1205	**ES**	**--**	**--**	**3**	**1.5**	**20**	**30**	**3 Hrs.**

BASIC DATA STRUCTURES AND PYTHON PROGRAMMING LAB

(Common to CSE & IT)

Course Objectives:

1.	The fundamental design, analysis, and implementation of basic data structures.
2.	Basic concepts in the specification and analysis of programs.
3.	Principles for good program design, especially the uses of data abstraction.
4.	Significance of algorithms in the computer field
5.	Various aspects of algorithm development and Qualities of a good solution
6.	To elucidate problem solving through python programming language
7.	To introduce function-oriented programming paradigm through python
8.	To learn modular concepts and practical Python solution patterns

Course Outcomes:

S.No	Outcome	Knowledge Level
1.	Student will be able to write programs to implement stack and queues	K4
2.	Ability to implement various searching and sorting techniques.	K4
3.	To develop proficiency in creating based applications using the Python Programming Language.	K3
4.	To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.	K3
5.	To be able to do testing and debugging of code written in Python.	K4
6.	To be able to draw various kinds of plots using PyLab.	K3
7.	To be able to do text filtering with regular expressions in Python	K3

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 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 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 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 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, second class, third class and failed.
Reference Books:	
1.	Fundamentals of Data Structures in C, 2nd edition, Horowitz, Sahani and Anderson-Freed, Universities Press, 2008.
2.	John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
3.	R. Nageswara Rao, "Core Python Programming", dreamtech
4.	Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall
5.	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Pyhon", Wiley
6.	Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication
7.	Luke Sneeringer, "Professional Python", Wrox
8.	Data Structures using C by Aaron M. Tenenbaum,Y.Langsam and M.J. Augenstein, Pearson Education, 2009.
9.	Data Structures with C by Seymour lipschutz, Schaum Outline series, 2010.
10.	Data Structures using C by R. KrishnaMoorthy G. IndiraniKumaravel, TMH, New Delhi,2008.
Reference Links:	
1.	http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

Code	Category	L	T	P	C	I.M	E.M	Exam
B19HS1203	**HS**	**--**	**1**	**2**	**2**	**20**	**30**	**3 Hrs.**

COMMUNICATION SKILLS LAB

(Common to CSE& IT)

Course Objectives:

1.	Students will be exposed to a variety of formal discussions.
2.	Students will be habituated to CALL (Computer Assisted Language Learning). Thus providing them with the required facility to face computer-based competitive exams like GRE, TOEFL, GMAT etc.
3.	Students will equip themselves with professional communication.
4.	Students build their confidence in speaking skills.
5.	Students learn and enhance LSRW Skills.

Course Outcomes:

S.No	Outcome	Knowledge Level
1	Learn different aspects of English language proficiency in LSRW skills.	K4
2	Apply communication skills through various language learning activities.	K3
3	Draft job application letters.	K6
4	Adopt a professional etiquette in formal settings.	K6
5	Improve fluency and clarity in both spoken and written English.	K3

SYLLABUS

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

Reference Books:	
1.	Exercises in Spoken English Part 1,2,3,4, OUP and CIEFI.
2.	English Pronunciation in use- Mark Hancock, CUP.
3.	English Phonetics and Phonology-Peter Roach, CUP.
4.	English Pronunciation in use- Mark Hewings, CUP.
5.	English Pronunciation Dictionary- Daniel Jones, CUP.
6.	English Phonetics for Indian Students- P. BalaSubramanian, Mac Millan Publications.
7.	Technical Communication- Meenakshi Raman, Sangeeta Sharma, OUP.
8.	Technical Communication- Gajendra Singh Chauhan, Smita Kashiramka, cengage Publications

Code	Category	L	T	P	C	I.M	E.M	Exam
B19CS1206	**PR**	**--**	**--**	**2**	**1**	**--**	**50**	**3 Hrs.**

ENGINEERING EXPLORATION PROJECT

(Computer Science & Engineering)

Course Objectives:

1.	Build mindsets & foundations essential for designers
2.	Learn about the Human-Centered Design methodology and understand their real-world applications
3.	Use Design Thinking for problem solving methodology for investigating illdefined problems.
4.	Undergo several design challenges and work towards the final design challenge

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.

HOW TO PURSUE THE PROJECT WORK?

1.	The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
2.	The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
3.	The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
4.	The teams start with **Design Challenge** and go through all the phases more in depth from coming up with the right question to empathizing to ideating to prototyping and to testing.
5.	Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
6.	At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

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 ▪ 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
Note: The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

References:

1.	Tom Kelly, *The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm* (Profile Books, 2002)
2.	Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (HarperBusiness, 2009)
3.	Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

OTHER USEFUL DESIGN THINKING FRAMEWORKS AND METHODOLOGIES:
Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
Collective Action Toolkit (frogdesign); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf Design Thinking for Educators (IDEO); https://designthinkingforeducators.com/

Code	Category	L	T	P	C	I.M	E.M	Exam
B19MC1202	**MC**	**3**	**--**	**--**	**--**	**--**	**--**	**--**

CONSTITUTION OF INDIA

(Common to CSE & IT)

Course Objectives:

1.	To Enable the student to understand the importance of constitution
2.	To understand the structure of executive, legislature and judiciary
3.	To understand philosophy of fundamental rights and duties
4.	To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5.	To understand the central and state relation financial and administrative.

Course Outcomes: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

1.	Understand historical background of the constitution making and its importance for building a democratic India.
2.	Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3.	Understand the value of the fundamental rights and duties for becoming good citizen of India.
4.	Analyze the decentralization of power between central, state and local self-government.
5.	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6.	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

SYLLABUS

UNIT-I (8 Hrs)	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 (8 Hrs)	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, LokSabha, RajyaSabha, 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 (8 Hrs)	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 (8 Hrs)	Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: 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 (8 Hrs)	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	
References:	
1.	Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2.	SubashKashyap, Indian Constitution, National Book Trust
3.	J.A. Siwach, Dynamics of Indian Government & Politics
4.	D.C. Gupta, Indian Government and Politics
5.	H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6.	J.C. Johari, Indian Government andPolitics Hans
7.	J. Raj IndianGovernment and Politics
8.	M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9.	Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012
E-resources:	
1.	nptel.ac.in/courses/109104074/8
2.	nptel.ac.in/courses/109104045/
3.	nptel.ac.in/courses/101104065/
4.	www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution
5.	www.hss.iitb.ac.in/en/lecture-details