



Estd:1980

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE
(AUTONOMOUS)**

(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade
UG Programmes CE,CSE,ECE,EEE,IT & ME are Accredited by NBA
Chinna Amiram, Bhimavaram-534204. (AP)

Regulation: R20			I / IV - B.Tech. I - Semester						
MECHANICAL ENGINEERING									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2020-21 admitted Batch onwards)									
Course Code	Course Name	Category	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B20 HS 1101	English	HS	3	3	0	0	30	70	100
B20 BS 1101	Mathematics-I	BS	3	3	0	0	30	70	100
B20 BS 1102	Applied Physics	BS	3	3	0	0	30	70	100
B20 ME 1101	Engineering Drawing	ES	3	2	0	2	30	70	100
B20 EE 1102	Basic Electrical and Electronics Engineering	ES	3	3	0	0	30	70	100
B20 EE 1105	Basic Electrical and Electronics Engineering Lab	ES	1.5	0	0	3	15	35	50
B20 BS 1107	Applied Physics Lab	BS	1.5	0	0	3	15	35	50
B20 ME 1102	Workshop Practice	ES	1.5	0	0	3	15	35	50
TOTAL			19.5	14	0	11	195	455	650

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20HS1101	HS	3	--	--	3	30	70	3Hrs

ENGLISH

(Common to AIDS,CE,CSE,ECE,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 components 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.	To facilitate effective listening skills for better comprehension of varied accents spoken at national and global levels.
2.	To focus on appropriate reading strategies for better comprehension of multiple texts and authentic materials.
3.	To improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
4.	To 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.	To provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

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

S.No	OutCome	KL
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.	K3
4.	Apply the principles of writing to paragraphs, arguments, essays and formal/informal communication.	K3
5.	Construct sentences using proper grammatical structures and correct word forms.	K4

SYLLABUS

UNIT-I (8 Hrs)	<p>Lesson: A Drawer full of happiness from <i>Infotech English</i>, Maruthi Publications.</p> <p>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.</p>
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	<p>Speaking: Self- introduction and introducing others. Asking and answering general questions on topics such as home, family, work, studies and interests.</p> <p>Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.</p> <p>Reading for Writing: Paragraph Writing (Hints Development), general essays using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing, punctuation.</p> <p>Vocabulary: Technical vocabulary from across technical branches (20) GRE Vocabulary (20), antonyms and synonyms, word applications, verbal reasoning and sequencing of words.</p> <p>Grammar: Content words and function words; parts of Speech, tenses, word order in sentences, sentence structures.</p>
<p>UNIT-II (8 Hrs)</p>	<p>Lesson-: Nehru's letter to his daughter, Indira on her birthday from <i>Infotech English</i>, Maruthi Publications.</p> <p>Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts both in speaking and writing.</p> <p>Speaking: Discussion in pairs/ small groups on specific topics followed by short structured talks, functional English: greetings and leave takings.</p> <p>Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.</p> <p>Reading for Writing: Identifying the main ideas, rephrasing and summarizing them (précis writing); avoiding redundancies and repetitions.</p> <p>Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words), antonyms and synonyms, word applications.</p> <p>Grammar: Articles, prepositions, conjunctions, use of synonyms and antonyms.</p>
<p>UNIT-III (8 Hrs)</p>	<p>Lesson: Stephen Hawking-Positivity'Benchmark' from <i>Infotech English</i>, Maruthi Publications.</p> <p>Listening: Listening for global comprehension and summarizing what is listened to both in speaking and writing.</p> <p>Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Functional English: complaining and apologizing.</p> <p>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.</p> <p>Reading for Writing: Letter writing- types, format and principles of letter writing, E-mail etiquette, writing a Resume/CV and covering letter.</p> <p>Vocabulary: Technical vocabulary from across technical branches (20 words). GRE. Vocabulary 20 words), Idioms & Phrasal verbs, Homonyms, word applications, sequencing of words.</p>

	Grammar: Sentence Structures, Transformation of sentences (Active and passive Voice, Degrees of comparison, Simple, Compound and Complex).
UNIT-IV (8 Hrs)	<p>Lesson: Liking a Tree, Unbowed: Wangari Maathai biography from <i>Infotech English</i>, Maruthi Publications.</p> <p>Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio), listening to audio-visual texts.</p> <p>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.</p> <p>Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.</p> <p>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.</p> <p>Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words), antonyms and synonyms, word applications, cloze encounters, foreign phrases.</p> <p>Grammar: Quantifying expressions - adjectives and adverbs: comparing and contrasting, question Tags, direct and indirect speech, reporting for academic purposes.</p>
UNIT-V (8 Hrs)	<p>Lesson: Stay Hungry–Stay Foolish from <i>Infotech English</i>, Maruthi Publications.</p> <p>Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.</p> <p>Speaking: Formal oral presentations on topics from academic contexts– with/without the use of PPT slides. Functional English: Suggesting/Opinion giving.</p> <p>Reading: Reading for comprehension, RAP Strategy - intensive reading and extensive reading techniques.</p> <p>Reading for Writing: Report writing, writing academic proposals- writing research articles: format and style.</p> <p>Vocabulary: Technical vocabulary from across technical branches (20 words GRE Vocabulary (20 words, antonyms and synonyms, word applications, coherence, matching emotions).</p> <p>Grammar: Editing short texts — identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject-verb agreement, parallel structures, phrases and clauses).</p>
Text Books:	
1	<i>Infotech English</i> , 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.	Skilful Level 2 Reading & Writing Student's Book Pack (B1). Macmillan Educational.
4.	Hewing, Martin. Cambridge Academic English (B2). CUP, 2012.
E-Resources:	
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

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B20BS1101	BS	3	--	--	3	30	70	3 Hrs.

MATHEMATICS-I

(LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS)

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

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 transforms and their applications for solving ODE.

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

S.No	Outcome	KL
1.	Solve a given system of linear algebraic equations	K3
2.	Determine Eigen values and Eigen vectors of a system represented by a matrix.	K3
3.	Solve ordinary differential equations of first order and first degree.	K3
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.	K3
6.	Determine Laplace transform, inverse Laplace transform and solve linear ODE	K3

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)	<p>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.</p>
Text Books:	
1.	B.S.Grewal, Higher Engineering Mathematics, 43 rd Edition, Khanna Publishers.
2.	B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
3.	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, 10 th Edition, Wiley-India.
3.	Michael Greenberg, Advanced Engineering Mathematics, 9 th 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.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20BS1102	BS	3	--	--	3	30	70	3 Hrs.

APPLIED PHYSICS

(Common to AIDS, CE, EEE & ME)

Course Objectives:

1.	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.	Familiarize the student with modern technologies like lasers, optical fibers and ultrasonics with an understanding of the science behind.
3.	Impart the elementary concepts of nanomaterials and their significance in different engineering branches.

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

S.No	Outcome	KL
1.	Interpret the behavior of light radiation in interference and diffraction Phenomena and their applications.	K3
2.	Explain the classification and properties of dielectric and magnetic materials suitable for engineering applications.	K3
3.	Understand the basics of modern optical technologies like lasers and optical fibers and their utility in various fields.	K3
4.	Explain the important aspects of semiconductors and electrical conductivity in them.	K3
5.	Understand the basics of technology of Ultrasonics in various fields and demonstrate the synthesis and applications of nanomaterials.	K3

SYLLABUS

UNIT-I (10 Hrs)	<p>WAVE OPTICS</p> <p>Interference: Principle of super position. Interference of light, interference in thin films (reflected light) – Wedge film and Newton’s rings – Applications</p> <p>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</p>
UNIT-II (10 Hrs)	<p>DIELECTRICS AND MAGNETICS</p> <p>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.</p> <p>Magnetics: Introduction to magnetics, Magnetic dipole moment , Magnetization, Magnetic susceptibility and Permeability, Origin of permanent magnetic moment, Classification of magnetic materials (Dia , Para, Ferro, Antiferro and ferri), Hysteresis – Weiss Domain theory – Ferrites, soft and hard magnetic materials, Magnetic device applications.</p>

UNIT-III (10 Hrs)	<p>LASERS AND FIBER OPTICS</p> <p>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.</p> <p>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.</p>
UNIT-IV (9 Hrs)	<p>SEMICONDUCTORS</p> <p>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.</p>
UNIT-V (9 Hrs)	<p>ULTRASONICS AND NANOMATERIALS</p> <p>Ultrasonics: Introduction, Production of Ultrasonics – Piezoelectric and Magnetostriction methods, detection of ultrasonics, acoustic grating - determination of wavelength and velocity of ultrasonics, applications of ultrasonics.</p> <p>Nanomaterials: Introduction, salient features of Nanomaterials, Synthesis methods – Ball milling, Condensation, Chemical Vapour Deposition and Sol – Gel methods, Characterization techniques for nano materials - The scanning tunneling microscopy (STM) and The atomic force microscopy (AFM), Carbon nanotubes (CNTS), Applications of Nano materials.</p>
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. McGrawhill Publishing Company Ltd.
3.	Engineering Physics by V.Rajendran. McGrawhill 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 TataMcGrawhill 2013.
4.	Optical fiber communications by Gerd Keiser, Tata McGraw hill 2008.
e-Resources:	
1.	http://library.iiti.ac.in/
2.	https://onlinecourses.nptel.ac.in/

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20ME1101	ES	2	--	2	3	30	70	3 Hrs
ENGINEERING DRAWING								
(Common to CE,EEE & ME)								
Course Objectives:								
1.	To bring awareness that Engineering drawing is the language of engineers							
2.	To impart basic knowledge and skills required to prepare Engineering drawings.							
3.	To develop the Engineering imagination essential for successful design.							
Course Outcomes: At the end of the course, the students will be able to								
S.No	Outcomes							KL
1.	Apply principles of drawing to Construct polygons and engineering curves.							K3
2.	Apply principles of Orthographic projections 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 projections of solids and their sectional views.							K3
5.	Apply principles of drawing to draw developments and pictorial view of solids.							K3
SYLLABUS								
UNIT-I (8Hrs)	Geometrical Constructions and Engineering Curves: Introduction to Engineering Drawing, Geometrical Constructions, Engineering Curves: Parabola, Ellipse and Hyperbola by general method (Eccentricity method only), cycloid, epicycloid, hypocycloid, involutes, tangent & normal for these curves.							
UNIT-II (8Hrs)	Orthographic Projections: Introduction to orthographic projection, projections of points in various quadrants, projections of lines: lines perpendicular to one of the reference planes (HP,VP or PP), Projections of straight lines inclined to one reference plane and parallel to other, Projections of straight lines inclined to both the planes.							
UNIT-III (8Hrs)	Projections of planes: Regular planes perpendicular to one reference plane and parallel to other, planes perpendicular to one reference plane and inclined to the other reference plane; planes inclined to both the reference planes.							
UNIT-IV (8Hrs)	Projections of Solids: – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes. Sections of Solids: Sections and Sectional views of Right and Regular Solids – Prism, Cylinder, Pyramid and Cone – Auxiliary views.							
UNIT-V (8Hrs)	Development of Solids: Development of Surfaces of Right and Regular Solids – Prism, Cylinder, Pyramid and Cone. Isometric Projection: Introduction to Isometric projection and Isometric projection of simple Right and Regular Solids – Prism, Cylinder, Pyramid and Cone.							
Text Books:								
1.	Engineering Drawing by N.D Bhatt, Charotar Publications.							
2.	Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers							

Reference Books:

1.	Engineering Drawing by K.L.Narayana& P. Kanniah, Scitech Publishers.
2.	Engineering Graphics for Degree by K.C. John, PHI Publishers.
3.	Engineering Graphics by PI Varghese, McGrawHill Publishers.
4.	Engineering Drawing– K Venugopal, V. Prabhu Raja, New Age
e-Resources:	
1.	https://nptel.ac.in/courses/112103019/
2.	https://nptel.ac.in/courses/112104172/1

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20EE1102	ES	3	--	--	3	30	70	3 Hrs.
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING								
(For ME)								
Course Objectives:								
1.	To introduce basics of electric circuits.							
2.	To teach DC and AC electrical circuit analysis.							
3.	To explain working principles of transformers and electrical machines.							
4.	To explain the operation of half wave, full wave and bridge rectifiers.							
5.	To teach operation of PNP and NPN transistors, sensors and transducers							
Course Outcomes: At the end of the course, the students will be able to								
S.No	Out Come							KL
1.	Apply concepts of Ohm's Law, Kirchhoff's laws, Superposition theorem for solving DC circuits and Phasor representation.							K3
2.	Apply Faraday's laws and induced EMF concepts to describe the operating principles and characteristics of DC Machines, Transformers and Induction motors.							K3
3.	Analyze the operation of DC Motors by using Speed Control methods and Transformers with OC & SC Tests.							K4
4.	Illustrate the concepts of diodes, Zener diodes in different applications like rectifier, voltage regulator and Light Emitting Diode.							K3
5.	Explain transistor operation, sensors and transducers related to electrical signals.							K3
SYLLABUS								
UNIT-I (10 Hrs)	Electrical circuit elements (R - L and C) - Ohm's Law- Kirchhoff laws - Series and parallel connection of resistances with DC excitation - Superposition Theorem - Faraday's Laws - Dynamically induced EMF - Statically induced EMF - Representation of sinusoidal waveforms: Peak, Average and RMS values - Phasor representation.							
UNIT-II (10 Hrs)	Principle of operation of DC generator – EMF equation – types of DC Generators – principle of operation of DC Motor - torque equation - types of DC Motors – characteristics of DC motors – speed control methods of DC motor- applications							
UNIT-III (10 Hrs)	Principle of operation of Single-Phase Transformer – EMF equation - Equivalent circuit – Losses – Efficiency - OC and SC test on transformer - principle of operation of 3- phase Induction Motor [Elementary treatment only].							
UNIT-IV (10 Hrs)	Introduction - Operation of PN junction diode as rectifier, Avalanche breakdown and Zener breakdown phenomenon, Operation of Zener diode as regulator. Light Emitting Diode (LED).							
UNIT-V (10 Hrs)	Introduction, construction, basic operation of NPN and PNP transistors – Transistor as a switch – Common Emitter (CE) amplifier. Introduction to sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals. [Elementary treatment only].							

Text Books:	
1.	Principles of Electrical Engineering and Electronics by V.K. Mehta & Rohit Mehta, S.Chand publications, 3 rd edition,2014.
2.	D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
3.	Electrical Technology by Surinder Pal Bali, Pearson Publications.
4.	Electronic Devices and Circuits by R.L. Boylestad and Louis Nashelsky, 9 th edition, PEI/PHI 2006.
Reference Books:	
1.	Basic Electrical Engineering by Ritu sahdev, Khanna book publishing, 2018.
2.	Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2 nd edition
3.	Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications,2 nd edition.
4.	E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20EE1105	ES	--	--	3	1.5	15	35	3 Hrs.
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB								
(For ME)								
Course Objectives:								
1.	To Verify Kirchhoff's laws and Superposition theorem.							
2.	To learn performance characteristics of DC Machines.							
3.	To perform open circuit & Short Circuit test on 1- Phase Transformer							
4.	To find out the characteristics of PN junction diode & transistor.							
5.	To determine the ripple factor of half wave & full wave rectifiers.							
Course Outcomes: At the end of the course, the students will be able to								
S.No	Out Come							KL
1.	Verify Kirchhoff's Laws & Superposition theorem for dc supply							K4
2.	Analyze the performance of AC and DC Machines by testing							K4
3.	Perform speed control of dc shunt motor							K4
4.	Conduct experiments to obtain I – V Characteristics of Diode							K4
5.	Determine the ripple factor of half wave & full wave rectifiers							K4
LIST OF EXPERIMENTS								
1.	Verification of Kirchhoff laws.							
2.	Verification of Superposition Theorem.							
3.	Swinburne's test on D.C. Shunt Motor.							
4.	OC and SC tests on single phase transformer.							
5.	Speed control of D.C. Shunt motor.							
6.	Brake test on D.C. Shunt Motor.							
7.	Brake test on D.C. Series Motor							
8.	PN junction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and Resistance calculations).							
9.	Half wave rectifier with and without filters.							
10.	Full wave rectifier with and without filters.							
11.	Transistor Common Emitter (CE) characteristics (input and output).							
12.	Transistor as a switch							
Reference Books:								
1.	Basic Electrical Engineering by Ritu sahdev, Khanna book publishing, 2018 edition.							
2.	Principles of Electrical Engineering and Electronics by V.K. Mehta & Rohit Mehta, S.Chand publications, 3 rd edition, 2014.							
3.	Electronic Devices and Circuits by R.L. Boylestad and Louis Nashelsky, 9 th edition, PEI/PHI 2006.							

Course Code	Category	L	T	P	C	LM	E.M	Exam
B20BS1107	BS	--	--	3	1.5	15	35	3 Hrs.
APPLIED PHYSICS LAB								
(Common to AIDS, CE,EEE & ME)								
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: At the end of the course students will be able to								
S.No	Out Come							KL
1.	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	To study the characteristics of PN Junction diode							
8	To determine the Numerical aperture of a given optical fiber and hence to find its acceptance angle.							
9	Determination of Planck constant							
10	Determination of the Rigidity modulus of elasticity of a material – Torsional pendulum.							
11	Verification of the laws of vibrations in stretched strings - Sonometer.							
12	Determination of the frequency of the AC supply – AC Sonometer.							
13	To determine refractive indices (μ_o and μ_e) of a birefringent material (prism).							
Reference Books:								
1.	Advanced Practical Physics Vol 1& 2 SP Singh & M.S Chauhan Pragati Prakashan ,Meerut							

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20ME1102	ES	--	--	3	1.5	15	35	3 Hrs
WORKSHOP PRACTICE								
(Common to EEE & ME)								
Course Objectives:								
1.	To familiarize students with wood working skills.							
2.	To familiarize students with sheet metal operations.							
3.	To familiarize students with fitting operations.							
4.	To familiarize students with electrical house wiring skills.							
Course Outcomes: At the end of the Course, the student will be able to								
S.No	Out Come							KL
1.	Apply wood working skills in real world applications.							K3
2.	Build different parts with metal sheets in real world applications.							K3
3.	Apply fitting operations in various applications.							K3
4.	Apply different types of basic electric circuit connections.							K3
LIST OF PROGRAMS								
CARPENTRY								
1	T Lap Joint							
2	Corner Halving 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	Square Tray							
2	Frustum of cone							
3	Straight Pipe							
4	Open Scoop							
HOUSE WIRING								
1	One Lamp Control by one switch							
2	Parallel/Series Connection of three bulbs							
3	Stair case wiring							
4	Florescent Lamp Fitting							
Reference Books:								
1.	Elements of Workshop Technology Vol.1 by S.K. and H.K Choudary							

Regulation: R20			I / IV - B.Tech. II - Semester						
MECHANICAL ENGINEERING									
SCHEME OF INSTRUCTION & EXAMINATION (With effect from 2020-21 admitted Batch onwards)									
Course Code	Course Name	Category	Cr	L	T	P	Int. Marks	Ext. Marks	Total Marks
B20 BS 1201	Mathematics-II	BS	3	3	0	0	30	70	100
B20 BS 1203	Applied Chemistry	BS	3	3	0	0	30	70	100
B20 CS 1201	Programming for Problem Solving Using C	ES	3	3	0	0	30	70	100
B20 ME 1201	Engineering Mechanics	ES	3	3	0	0	30	70	100
B20 ME 1202	Material Science and Metallurgy	ES	3	3	0	0	30	70	100
B20 BS 1208	Applied Chemistry Lab	BS	1.5	0	0	3	15	35	50
B20 HS 1202	Communication Skills Lab	HS	1.5	0	0	3	15	35	50
B20 CS 1205	Programming for Problem Solving Using C Lab	ES	1.5	0	0	3	15	35	50
B20 MC 1201	Environmental Science	MC	0	2	0	0	--	--	--
B20 MC 1203	National Service Scheme (NSS)	MC	0	0	0	2	--	--	--
TOTAL			19.5	17	0	11	195	455	650

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20BS1201	BS	3	--	--	3	30	70	3 Hrs.
MATHEMATICS – II								
(FOURIER ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS)								
(Common to AIDS, CE, CSE, ECE, EEE, IT & ME)								
Prerequisites: Calculus of functions of a single variable and Geometry								
Course Objectives: Students are expected to learn:								
1.	How to expand an aperiodic function in a Fourier series.							
2.	How to find Fourier transform for a given function and evaluate some real definite integrals.							
3.	Application of partial differentiation for determining maxima/ minima of functions.							
4.	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							KL
1.	Determine Fourier series and half range series of functions							K3
2.	Determine Fourier transforms of non-periodic functions and also use them to evaluate integrals.							K3
3.	Compute partial derivatives, total derivative and Jacobians.							K3
4.	Find maxima/minima of functions of two variables and evaluate some real definite integrals.							K3
5.	Form partial differential equations and solve Lagrange linear equation. Solve linear higher order homogeneous and non-homogeneous PDEs.							K3
6.	Find theoretical solution of one-dimensional wave equation and one-dimensional heat equation							K3
SYLLABUS								
UNIT-I (10 Hrs)	Fourier Series Introduction, Periodic functions, Fourier series of a periodic function, Dirichlet's conditions, Change of interval. Even and odd functions, Half-range sine and cosine series.							
UNIT-II (12 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 (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, 43 rd Edition, Khanna Publishers.
2.	N.P.Bali& Manish Goyal, A Text book of Engineering Mathematics, Lakshmi Publications.
3.	B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
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, 10 th Edition, Wiley-India.
4.	David Kincaid, Ward Cheney, Numerical Analysis-Mathematics of Scientific Computing, 3 rd Edition, Universities Press.
5.	Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
6.	Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, New Delhi.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20BS1203	BS	3	--	--	3	30	70	3Hrs
APPLIED CHEMISTRY								
(Common to AIDS,CE,EEE & ME)								
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: At the end of the course students will be able to								
S.no	Out Come							KL
1.	Develop polymer composites, synthetic polymers and formulation of polymers and their use in design							K3
2.	Apply the knowledge about quality of water and its treatment methods for domestic and industrial applications. Understanding the principle, mechanism of corrosion and utilization of various techniques to control.							K3
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.							K3
4.	Identify constituents of various ceramic materials, characteristics and their appropriate use in construction. Apply the knowledge of electrochemistry principles to design energy storage							K2
SYLLABUS								
UNIT-I (10Hrs)	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 (10Hrs)	Energy Sources and Applications: Nuclear Energy: Nuclear fission and Nuclear fusion – Nuclear Power reactor – Applications. 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 (12Hrs)	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; Electrolessplating ;Paints
UNIT-IV (8Hrs)	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.
UNIT-V (10Hrs)	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
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.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS1201	ES	3	--	--	3	30	70	3 Hrs.

PROGRAMMING FOR PROBLEM SOLVING USING C

(Common to CE, EEE & ME)

Course Objectives:

1. To learn about the computer systems, computing environments, developing of a computer program, Structure of a C Program and to evaluate expressions
2. To gain knowledge of the operators, selection, control statements and repetition in C
3. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage.
4. To understand the concepts of pointers, dynamic memory allocation and know the significance of Preprocessor.
5. To learn about various File I/O operations and significance of functions

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

S.No	Outcome	KL
1.	Apply Precedence and Associativity rules to evaluate Expressions.	K3
2.	Make use of Decision Making and Looping statements to solve various problems in C	K3
3.	Illustrate the importance of Arrays and Strings and to apply various operations on them.	K2
4.	Solve various problems by making use of Structure and Union concepts	K3
5.	Design and implement programs to analyze the different pointer applications	K3
6.	Develop programs using Functions and Pointers.	K3

SYLLABUS

UNIT-I (10 Hrs)	Introduction to Computers: 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 (10 Hrs)	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 (10 Hrs)	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 (10 Hrs)	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 (10 Hrs)	Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter Function Communication, Standard Functions, Passing Array to Functions, Passing Pointers 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.
Text Books:	
1.	Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE
2.	The C Programming Language, Brian W.Kernighan, Dennis M. Ritchie, 2e, Pearson
Reference Books:	
1.	Computer Fundamentals and Programming, Sumithabha Das, Mc Graw Hill.
2.	Programming in C, Ashok N. Kamthane, Amit Kamthane, Pearson.
3.	Computer Fundamentals and Programming in C, Pradip Dey, Manas Ghosh, OXFORD.
e-Resources:	
1.	https://www.geeksforgeeks.org/c-programming-language/
2.	https://www.learn-c.org/
3.	https://www.w3resource.com/c-programming-exercises/

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20ME1201	ES	3	--	--	3	30	70	3 Hrs.
ENGINEERING MECHANICS								
(For ME)								
Course Objectives:								
1.	To know the effect of force and moment in the different engineering applications.							
2.	To impart the knowledge about center of gravity and moment of inertia of solids and surfaces.							
3.	To familiarize frictional forces in mechanical applications.							
4.	To learn fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.							
5.	To learn concepts of kinematics and kinetics of rigid bodies under dynamic conditions.							
Course Outcomes: At the end of the course, the students will be able to								
S.No	Outcome							KL
1.	Solve for the resultant of the given force systems & Analyze force systems using equations of equilibrium.							K3
2.	Determine centroid, center of gravity and moment of inertia of areas and bodies.							K3
3.	Analyze trusses and solve mechanics problems associated with friction force.							K3
4.	Determine the displacement, velocity and acceleration relations and apply the work energy and impulse momentum to dynamic systems in rectilinear and curvilinear motion.							K3
5.	Determine the displacement, velocity and acceleration relations and apply the work energy and impulse momentum to rigid bodies.							K3
SYLLABUS								
UNIT-I (10 Hrs)	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 (10 Hrs)	Centroid & Moment of Inertia: Centroid & M.I – Area & Mass M.I – Radius of Gyration, Parallel axis– Perpendicular axis theorem – Simple Problems.							
UNIT-III (10 Hrs)	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, Simple Problems.							
UNIT-IV (10 Hrs)	Dynamics of Particles - Rectilinear Motion – Kinematics, Kinetics – D’Alembert’s principle–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 (8 Hrs)	Dynamics of Rigid Bodies - Rigid body rotation – Kinematics - Kinetics – Work & Energy in Rigid body rotation, Principle of Angular Momentum, Plane Motion – Kinematics – Instantaneous center of rotation, Kinetics - Work-Energy principle in plane motion.
Text Books:	
1.	Engineering Mechanics by S.Timoshenko and D.H.Young McGraw-Hill.
Reference Books:	
1.	Engineering Mechanics, Vol.1 & 2 by J.L. Meriems and L.G. Kraige.
2.	Engineering Mechanics by Singer.
3.	Engineering Mechanics by K.L. Kumar, Tata Mc-Graw Hill.
4.	Engineering mechanics by Bhavikatti, New age international.
Web links	
1.	https://nptel.ac.in/courses/112103108/
2.	https://nptel.ac.in/courses/112103109/
3.	https://nptel.ac.in/courses/122104014/

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20ME1202	ES	3	--	--	3	30	70	3 Hrs.
MATERIAL SCIENCE AND METALLURGY								
(For ME)								
Course Objectives:								
1.	To impart knowledge about the engineering materials and their properties and predict their behavior under different working conditions and methods.							
2.	To impart knowledge about space lattices, crystal structures and crystal defects.							
3.	To acquaint the knowledge about the cooling curves and Phase diagrams of different alloy systems.							
4.	To impart knowledge about different heat treatment and surface hardening methods in improving the mechanical properties of steels.							
5.	To acquaint knowledge about ferrous & Non-ferrous alloys, particularly Steel and Cast Irons.							
6.	To impart knowledge about composite materials							
Course Outcomes: At the end of the course, the students will be able to								
S.No	Outcome							KL
1.	Identify the properties of metals with respect to crystal structure and understand imperfection in crystals.							K2
2.	Estimate phase change parameters for iron-carbon system and Choose appropriate heat-treatment process.							K3
3.	Analyze various I.T curves and surface hardening methods to obtain required material properties.							K3
4.	Select various engineering materials and their compositions used for the specified applications.							K2
5.	Classify composites and explain various methods to manufacture them							K2
SYLLABUS								
UNIT-I (10 Hrs)	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 (10 Hrs)	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, martemering, austempering.							
UNIT-III (10 Hrs)	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 (10 Hrs)	Extraction of metals, 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, Shape Memory Alloys.
UNIT-V (8 Hrs)	Composites: Introduction, classification, Manufacturing using Stir Casting, Powder Metallurgy, Spray Layup, Filament Winding, Resin Transfer Moulding & Chemical Vapour Deposition Methods & applications of composites
Text Books:	
1.	“Materials Science & Engineering- An Introduction”, William D.Callister Jr. Wiley India Pvt. Ltd. 6th Edition, 2006, New Delhi.
2.	“Material Science and Metallurgy for Engineers”, Dr. V.D Kodgire and S.V Kodgire.
3.	Physical Metallurgy, Principles & Practices”, V Raghavan.PHI 2nd Edition 2006, New Delhi.
Reference Books:	
1.	Introduction to Physical Metallurgy by Sidney H AvnerTata McGraw-Hill Education 1997.
2.	Materials Science and Engineering: A First Course By V. Raghavan Phi 5th Edition 2011, New Delhi.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20BS1208	BS	--	--	3	1.5	15	35	3Hrs

APPLIED CHEMISTRY LAB
(Common to AIDS,CE,EEE & ME)

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.	Recognize the classical ideas and chemical phenomena and also define and analyse the concepts.

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

S.No	Out Come	KL
1.	Gain technical knowledge of measuring, operating and testing of chemical instruments and equipments. Carrying out different types of chemical reactions for analysing different materials in micro level quantities.	K3
2.	Analyze and generate experimental skills to enhance the analytical thinking capabilities in the modern trends in engineering and technology.	K3

LIST OF PROGRAMS

1	Determination of Alkalinity of water sample.
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 of water and soil sample.
8	Determination of Chlorides present in water sample.
9	Conductometric titration of strong acid Vs strong 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.

Reference Books:

1.	Engineering Chemistry Lab Manual Prepared by Chemistry Faculty of S.R.K.R.EngineeringCollege.
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.

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20HS1202	HS	--	--	3	1.5	15	35	3Hrs
COMMUNICATION SKILLS LAB								
(Common to AIDS ,CE,CSE,ECE,EEE,IT & ME)								
Course Objectives:								
1.	To expose to a variety of self-instructional, learner-friendly modes of language learning.							
2.	To familiarize the students with CALL (Computer Assisted Language Learning). Thus, providing them with the required facility to face computer-based competitive exams like GRE,TOEFL, GMAT etc.							
3.	To equip the students with necessary professional communication.							
4.	To build confidence in LSRW Skills.							
5.	To adapt the students by adopting the techniques of effective communication skills.							
Course Outcomes: At the end of the course students will be able to								
S.No	Out Come							KL
1.	Apply their linguistic competence in all LSRW skills to professional and personal settings.							K3
2.	Apply communication skills learnt through various language learning activities to their advancement in academics and competitive examinations.							K3
3.	Draft job application letters, E-Mail messages and other writing discourses.							K3
4.	Adopt professional etiquette consistent with formal settings.							K3
5.	Improve fluency and clarity in both spoken and written English.							K3
SYLLABUS								
UNIT-I	A list of communicative expressions (Requests, Permissions, Asking/ giving directions, Thanking and Responding to Thanks, Clarifying, Inviting, Congratulating, Advising, Agreeing and disagreeing etc.,) Common Errors							
UNIT-II	Pronunciation Letters and Sounds The Sounds of English Stress and Intonation Phonetic Transcription							
UNIT-III	Group Discussions							
UNIT-IV	Presentation Skills							
UNIT-V	Interview Skills Resume/ Curriculum Vitae Covering Letter FAQ's Telephonic Interviews/ Etiquette Mock Interviews							

Text Books:	
1.	Interact – English Lab Manual for Undergraduate Students – Orient BlackSwan
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 Pronunciation in use- Mark Hewings, CUP.
4.	English Pronunciation Dictionary- Daniel Jones, CUP.
5.	English Phonetics for Indian Students- P. BalaSubramanian, Mac MillanPublications
6.	Technical Communication- Meenakshi Raman, Sangeeta Sharma, OUP.
7.	Technical Communication- Gajendra Singh Chauhan, SmitaKashiramka, cengage Publications

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20CS1205	ES	0	0	3	1.5	15	35	3 Hrs.

PROGRAMMING FOR PROBLEM SOLVING USING C LAB

(Common to CE,EEE & ME)

Course Objectives:

1. Apply the principles of C language in problem solving.
2. To design & develop of C programs using Arrays, Strings, Structures, Unions and Pointers
3. To perform the file operations, preprocessor commands
4. To solve various complex problem by applying modular programming skills

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

S.No	Out Come	KL
1.	Write, Trace and Debug the programs and correct syntax and logical errors.	K4
2.	Solve various Problems by making use of Arrays, Strings, Structures, Unions and Pointers	K3
3.	Solve a complex problem by decomposing into several modules by using Functions	K4
4.	Apply various File I/O operations	K3

LIST OF PROGRAMS

1	<p>Exercise 1:</p> <ol style="list-style-type: none"> 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	<p>Exercise 2:</p> <ol style="list-style-type: none"> 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	<p>Exercise 3:</p> <ol style="list-style-type: none"> 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	<p>Exercise 4:</p> <ol style="list-style-type: none"> 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	<p>Exercise 5:</p> <ol style="list-style-type: none"> 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 programs 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.

Reference Books:

- | | |
|----|---|
| 1. | Programming for Problem Solving, Behrouz A. Forouzan, Richard F. Gilberg, CENGAGE |
| 2. | The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, 2e, Pearson |

e-Resources:

- | | |
|----|---|
| 1. | https://www.geeksforgeeks.org/c-programming-language/ |
| 2. | https://www.learn-c.org/ |
| 3. | https://www.tutorialspoint.com/cprogramming/index.html |

Course Code	Category	L	T	P	C	I.M	E.M	Exam
B20MC1201	MC	2	--	--	0	--	--	--
ENVIRONMENTAL SCIENCE								
(Common to AIDS,CE,CSBS,EEE & 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.							
Course outcomes : After completion of the course, students will be able to								K L
1	Bring awareness among the students about the nature and natural ecosystems							K2
2	Sustainable utilization of natural resources like water, land, energy and air							K4
3	Resource pollution and over exploitation of land, water, air and catastrophic (events) impacts of climate change, global warming, ozone layer depletion, marine, radioactive pollution etc to inculcate the students about environmental awareness and safe transfer of our mother earth and its natural resources to the next generation							K5
4	Constitutional provisions for the protection of natural resources							K2
5	Green technologies and its applications							K3
SYLLABUS								
UNIT-I (8 Hrs)	<p>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.</p> <p>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.</p>							
UNIT-II (8 Hrs)	<p>Natural Resources: Natural resources and associated problems.</p> <p>Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.</p> <p>Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.</p> <p>Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.</p> <p>Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.</p> <p>Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.</p>							

	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-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 (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 wellbeing. 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. Sustainability: theory and practice, 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 Greenpolitics. Environmental dairy. 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, 2 nd Edition, 2011, Oxford University Press.
3.	Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, andK.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, NewDelhi
3.	Environmental Studies, Benny Joseph, Tata McGraw Hill Co, NewDelhi
4.	Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers,2014

Code	Category	L	T	P	C	I.M	E.M	Exam
B20MC1203	MC	--	--	2	--	--	--	--
NATIONAL SERVICE SCHEME(NSS)								
(Common to All Branches)								
Course Objectives:								
1.	To understand the community and understand themselves in relation to their community.							
2.	Identify the needs and problems of the community and involve them in problem solving process.							
3.	Utilize their knowledge for finding practical solution to individual and community problems.							
Course Outcomes: Student will be able to								
S.No								Knowledge Level
1.	understand general orientation about community service, voluntarism role and responsibility of NSS volunteer.							K2
2.	Analyze about the community he live in.							K4
3.	Asses the life in adopted villages.							K5
4.	Identify the importance of national days and attain participation in it.							K3
SYLLABUS								
1.	Volunteerism- community and beyond(Theory).							
2.	Role and responsibility of NSS volunteer (Theory).							
3.	General orientation about community service(Theory).							
4.	Arranging lectures on social issues in schools or villages(Theory).							
5.	Arranging rally's on social issues.							
6.	Socio economic survey in adopted villages							
7.	Plantation of saplings.							
8.	Blood donation camp							
9.	Rainwater harvesting awareness camp.							
10.	Celebration of national days as per NSS list.							