I-SEMESTER

S. No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE01	Professional Communication-I	2	0	0	2	30	70	100
2	20FE03	Differential Equations	2	1	0	3	30	70	100
3	20FE07	Applied Physics	2	1	0	3	30	70	100
4	20CE04	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
5	20EE03	Electronic Circuits and Devices	2	1	0	3	30	70	100
Laboratory Courses									
6	20FE54	Applied Physics Lab	0	0	3	1.5	15	35	50
7	20CE53	Basic Civil and Mechanical Engineering Lab	0	0	2	1	15	35	50
8	20EE53	Electronic Circuits and Devices Lab	0	0	3	1.5	15	35	50
9	20ME51	Engineering Workshop	0	0	3	1.5	15	35	50
Total			11	3	11	**19.5**	**210**	**490**	**700**

II-SEMESTER

S.No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE02	Professional Communication-II	2	0	0	2	30	70	100
2	20FE04	Linear Algebra and Transformation Techniques	2	1	0	3	30	70	100
3	20FE05	Applied Chemistry	3	0	0	3	30	70	100
4	20CS01	Programming for Problem Solving using C	3	0	0	3	30	70	100
5	20EE04	Fundamentals of Electrical Engineering	2	1	0	3	30	70	100
6	20MC01	Constitution of India	2	0	0	0	30	70	100
Laboratory Courses									
7	20FE51	Professional Communication Skills Lab	0	0	2	1	15	35	50
8	20FE52	Applied Chemistry Lab	0	0	3	1.5	15	35	50
9	20CS51	Programming for Problem Solving using C Lab	0	0	3	1.5	15	35	50
10	20ME53	Computer Aided Engineering Drawing	0	0	3	1.5	15	35	50
Total			**14**	**2**	**11**	**19.5**	**240**	**560**	**800**

III SEMESTER

S. No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20FE10	Numerical Methods and Integral Calculus	2	1	0	3	30	70	100
2	20CS03	Data Structures	3	0	0	3	30	70	100
3	20EE05	Electrical Circuit Analysis	2	1	0	3	30	70	100
4	20EE06	Digital Electronics	2	1	0	3	30	70	100
5	20EE07	Electric and Magnetic Fields	2	1	0	3	30	70	100
6	20MC02	Environmental Science	2	0	0	0	30	70	100
Laboratory Courses									
7	20CS53	Data Structures Lab	0	0	3	1.5	15	35	50
8	20EE54	Electrical Circuits & Simulation Lab	0	0	3	1.5	15	35	50
9	20EE55	Digital Electronics Lab	0	0	3	1.5	15	35	50
10		Skill Oriented Course – I PCB Design	1	0	2	2	-	50	50
Total			**14**	**4**	**11**	**21.5**	**225**	**575**	**800**

IV SEMESTER

S. No	Course code	Course Title	Contact hours/week			Credits	Scheme of Valuation		
			L	T	P		CIE	SEE	Total
Theory Courses									
1	20HS01	Universal Human values 2: Understanding Harmony	3	0	0	3	30	70	100
2	20EE08	Power Systems-I	2	1	0	3	30	70	100
3	20EE09	Control Systems	2	1	0	3	30	70	100
4	20EE10	Analog Electronics	2	1	0	3	30	70	100
5	20EE11	Electrical Machines-I	2	1	0	3	30	70	100
Laboratory Courses									
6	20AD53	Programming Using Python Lab	1	0	2	2	15	35	50
7	20EE56	Analog Electronics Lab	0	0	2	1	15	35	50
8	20EE57	Electrical Machines-I Lab	0	0	3	1.5	15	35	50
9		Skill Oriented Course – II IOT Applications of Electrical Engineering	1	0	2	2	-	50	50
Total			**13**	**4**	**9**	**21.5**	**195**	**505**	**700**
Honors/Minor Courses						**4**			

B.Tech. (I Sem.)	20FE01—PROFESSIONAL COMMUNICATION-I	L	T	P	Cr.
		2	0	0	2

Pre-requisites: **Nil**

Course Educational Objectives: To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, Reading & Writing skills.

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

CO1 : Write sentences and paragraphs using proper grammatical structures and word forms. **(Remember – L1)**

CO2 : Comprehend the given text by employing suitable strategies for skimming and scanning and draw inferences. **(Understand – L2)**

CO3 : Write summaries of reading texts using correct tense forms & appropriate structures. **(Remember – L1)**

CO4 : Write Formal Letters; Memos & E-Mails. **(Apply – L3)**

CO5 : Edit the sentences/short texts by identifying basic errors of grammar/vocabulary/syntax. **(Understand – L2)**

UNIT - I

Exploration - 'A Proposal to Girdle the Earth – Nellie Bly'; Reading: Skimming for main idea; Scanning for specific information; Grammar & Vocabulary: Content Words; Function Words; Word Forms: verbs, nouns, adjectives and adverbs; Nouns: Countable and Uncountable, Singularand Plural forms; Wh - Questions; Word Order in Sentences; Writing: Paragraph Analysis; Paragraph Writing; Punctuation and Capital Letters

UNIT – II

On Campus- 'The District School as it Was by One Who Went to it – Warren Burton'; Reading: Identifying Sequence of Ideas; Grammar & Vocabulary: Cohesive Devices: Linkers/signposts/Transition signals, Synonyms, Meanings of Words/Phrases in the context; Writing: Memo Drafting

UNIT – III

Working Together-'The Future of Work'

Reading: Making basic inferences; Strategies to use text clues for comprehension; Summarizing; Grammar & Vocabulary: Verbs: Tenses; Reporting Verbs for Academic Purpose; Writing**:** Rephrasing what is read; Avoiding redundancies and repetitions Abstract Writing/ Summarizing.

UNIT – IV

'A.P.J.AbdulKalam'; Grammar & Vocabulary: Direct & Indirect Speech; articles and their Omission; Writing: E-Mail Drafting.

UNIT – V

'C.V.Raman'; Grammar & Vocabulary: Subject-Verb Agreement; Prepositions; Writing: Formal Letter Writing.

TEXT BOOKS:

1. Prabhavati. Y & et al, "English All Round – Communication Skills for UndergraduateLearners", Orient Black Swan, Hyderabad, 2019.
2. "Panorama – A Course on Reading", A collection of prose selections, Oxford UniversityPress, New Delhi, 2016.

REFERENCE BOOKS:

1. Swan,M., "Practical English Usage", Oxford University Press, 2016.

2. Kumar,S and Latha, P, “Communication Skills”, Oxford University Press, 2018.
3. Rizvi Ashraf M., “Effective Technical Communication”, Tata Mc Graw Hill, New Delhi,2008.
4. BaradwajKumkum, “Professional Communication”, I.K.International Publishing HousePvt.Lt., New Delhi, 2008.
5. Wood,F.T., “Remedial English Grammar”, Macmillan, 2007.

B.Tech. (I Sem.)	20FE03—DIFFERENTIAL EQUATIONS	L	T	P	Cr.
		2	1	0	3

Pre-requisites: Nil

Course Educational Objective: The objective of this course is to introduce the first order and higher order differential equations, functions of several variables. The students also learn solving of first order partial differential equations.

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

CO1: Apply first order and first-degree differential equations to find orthogonal trajectories. **(Apply – L3)**

CO2: Distinguish between the structure and methodology of solving higher order differential equations with constant coefficients. **(Understand – L2)**

CO3: Apply various Numerical methods to solve initial value problem. **(Apply – L3)**

CO4: Generate the infinite series for continuous functions and investigate the functional Dependence. **(Understand – L2)**

CO5: Solve partial differential equations using Lagrange's method. **(Apply – L3)**

UNIT –I:DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE

Differential equations of first order and first degree –Exact and Non-Exact differential Equations, Applications of differential equations – Orthogonal Trajectories.

UNIT –II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Homogeneous and Non-Homogeneous Linear differential equations of second and higher order with constant coefficients with R.H.S. functions e^{ax}, sin $(ax+b)$, cos $(ax+b)$, x^m, $e^{ax}V(x)$, $xV(x)$, Method of variation of parameters.

UNIT – III: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Numerical solution of Ordinary Differential equations, Solution by Taylor's series - Picard'sMethod of successive approximations.

Euler's Method - Runge- Kutta Methods.

UNIT –IV:FUNCTIONS OF SEVERAL VARIABLES

Generalized Mean Value Theorem (without proof), Maclaurin's series, Functions of several variables, Jacobians (Cartesian and polar coordinates), Functional dependence. Maxima and Minima of function with two variables.

UNIT – V: PARTIAL DIFFERENTIAL EQUATIONS

Formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions. Solution of first order and first degree linear partial differential equation – Lagrange's method

TEXT BOOKS:

1. B.S. Grewal, "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, New Delhi,2012.
2. B. V. Ramana, "Higher Engineering Mathematics", 1st Edition, TMH Publications, New Delhi,2010

REFERENCE BOOKS:

1. M. D. Greenberg, "Advanced Engineering Mathematics", 2nd Edition, TMH Publications,New Delhi, 2011.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 8th Edition, John Wiley & sons,New Delhi, 2011.
3. W.E. Boyce and R. C. Diprima, " Elementary Differential Equations", 7th Edition, JohnWiley & sons, New Delhi, 2011.
4. S. S. Sastry, "Introductory Methods of Numerical Analysis", 5th Edition, PHI LearningPrivate Limited, New Delhi, 2012.

B.Tech. (I Sem.)	20FE07—APPLIED PHYSICS	L	T	P	Cr.
		2	1	0	3

Pre-requisites: **Nil**

Course Educational Objectives: It enables the students to understand the fundamental concepts of optics, quantum mechanics, free electron theory of metals, semiconductors, dielectrics and their applications.

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

CO1: Define the nature of interference and diffraction. **(Remember - L1).**

CO2: Apply the lasers and optical fibers in different fields. **(Apply - L3).**

CO3: Estimate the electrical conductivity of metals. **(Understand - L2).**

CO4: Analyze the properties of semiconducting materials. **(Understand – L2).**

CO5: Classify the different types of magnetic and dielectric materials. **(Understand - L2).**

UNIT – I

Wave Optics

Interference**:**Principle of super position, Conditions for Interference, Interference in thin parallel film by reflection, Newton's rings (reflection), working principle of Interferometer.

Diffraction**:**Introduction, Fraunhofer diffraction at single slit- Diffraction due to circular aperture, Diffraction Grating- Resolving power of Grating.

UNIT – II

Lasers and optical fibers

Lasers**:** Introduction - Principle of laser (absorption, spontaneous and stimulated emission of radiation), Einstein Coefficients – Nd-YAG laser, Helium Neon laser- applications.

Optical Fibers: Optical Fiber principle, Structure of optical fiber, numerical aperture andacceptance angle, types of optical fibers - applications.

UNIT – III

Principles of Quantum Mechanics &Free electron theory

Principles of quantum mechanics: de Broglie Hypothesis, Davisson – Germer experiment, Schrodinger time independent and dependent wave equations, physical significance of the wave function – particle in a box.

Free electron theory

Classical free electron theory- Postulates, Advantages and Draw backs, Fermi-Dirac distribution function-Temperature dependence of Fermi- Dirac distribution function, Classification of Solids on the basis of Band theory.

UNIT – IV

Semiconductor physics

Conductivity of Intrinsic and Extrinsic semiconductors, Drift and Diffusion Current, Einstein relation, Hall Effect, Differences between direct and indirect Band Gap semiconductors, Solar Cell, Applications of Solar Cells.

UNIT – V:

Magnetic &Dielectric materials

Magnetic parameters, Classification of magnetic materials-Diamagnetic, paramagnetic and ferromagnetic materials, Hysteresis loop, soft and hard magnetic materials, Applications of Ferromagnetic materials

Dielectrics: polarization - Electronic and ionic polarization, orientation polarization (Qualitative), Local field, Claussius Mosotti equation, Applications of dielectric materials.

TEXT BOOKS:

1. V. Rajendran, "*Engineering Physics*", TMH, New Delhi, 6th Edition, 2014.
2. M.N. Avadhanulu, P.G. Kshirsagar, "Engineering *Physics*", S. Chand & Co., 2ndEdition, 2014.

REFERENCE BOOKS:

1. M.N. Avadhanulu, TVS Arun Murthy, "Applied *Physics*", S. Chand & Co., 2nd Edition, 2007.
2. P.K. Palani Samy, "*Applied Physics*", Sci. Publ. Chennai, 4th Edition, 2016.
3. P. Sreenivasa Rao, K Muralidhar, "*Applied Physics*", Him. Publi. Mumbai, 1st Edition, 2016.
4. Hitendra K Mallik , AK Singh " *Engineering Physics*", TMH, New Delhi,1stEdition, 2009.

B.Tech. (I Sem.)	20CE04 - BASIC CIVIL AND MECHANICAL ENGINEERING	L	T	P	Cr.
		3	0	0	3

Pre-requisites: **Nil**

Course Education Objective: The main objective of this course is to know the system of forces, Centre of Gravity, Centroid principles in Engineering Mechanics, fluid mechanics concepts in basic civil engineering and thermodynamic, IC engines, steam and gas turbine principles in mechanical engineering fundamental concepts.

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

CO1: Compute the center of gravity and Centroid in simple basic structures and resolve the system of forces from free body diagrams while designing any component. **(Apply -L3)**
CO2: Differentiates the fluid statics and kinematic principles in fluid flows. **(Understand-L2)**
CO3: Understand the working principles of hydraulic turbines. **(Understand-L2)**

CO4: Understand the laws of thermodynamics and working principles in Internal Combustionengines. **(Understand-L2)**
CO5: Comprehends the working principles of steam and gas turbines. **(Understand-L2)**

UNIT-I
ENGINEERING MECHANICS

Introduction, Basic concepts of mechanics, Resultant of system of forces: Resultant of Coplanar ConcurrentForceSystem - Moment of a Force,Couple,Varignon's Theorem,Resultant of Coplanar, Non-Concurrent Force System, Equilibrium of a Body Subjected to Concurrent Forces and Non-concurrent Forces, Free Body Diagrams,Lami's Theorem, Concept of Centroid and Centre of gravity for simple bodies**(Problems on simple figures from basic concepts).**

UNIT – II
FLUID MECHANICS

FLUID STATICS: Introduction, Dimensions and Units: Physical Properties of Fluids- Specific Gravity, Viscosity, Surface Tension, Vapour Pressure and itsinfluence on Fluid Motion, Atmospheric Gauge and Vacuum Pressure-Measurement of Pressure-Piezometer, U-Tube and Differential Manometers (**Simple and basic pressure measurement problems**).
FLUID KINEMATICS: Introduction, Stream Line, Path Line, Streak Line, Stream Tube, Classification of Flows -Equation of Continuity for One Dimensional Flow (**Theory only**).

UNIT-III
HYDRAULIC TURBINES

Introduction, Classification of Turbines, Working of Pelton Wheel, Francis Turbine, and Kaplan Turbine, Draft Tube Theory and Cavitation (**Theory concepts only**), Derivation and numerical problems on specific speed of hydraulic turbines.

UNIT-IV
APPLIED THERMODYNAMICS

BASICS OF THERMODYNAMICS: Introduction, System, Property, State, Path, Process, Cycle, Laws of thermodynamics, Energy, Internal Energy, Enthalpy, Specific heat, Latent heat - Heat Engines, Refrigerator and Heat Pump (**Theory questions**).
INTERNAL COMBUSTION ENGINES: Introduction, classification, I.C engine parts and their functions, I.C engine Nomenclature, working of 4-stroke petrol & diesel engines, working of 2-stroke petrol &diesel engines and comparison –Valve and Port timing diagrams- Applications of IC engines (**Theory question only**).

UNIT-V

TURBINES

STEAM AND GAS TURBINES: Introduction, Classification of impulse and reaction steam turbines, comparison of impulse and reaction steam turbines and applications, Classification of Gas Turbines, difference between open and closed cycle gas turbines and applications (**Theory questions only**).

TEXT BOOKS:

1. S.S. Bhavikatti, Engineering Mechanics, 4th Edition, New Age International (P) Ltd, 2012.
2. R.K.Rajput, Thermal Engineering, 6th Edition, 2007
3. R.K.Bansal,"FluidMechanics and Hydraulic Machines",9thEdition, Lakshmi Publications.

REFERENCE:

1. D.S.Bedi, MP Poonia, Elements of Mechanical Engineering, 2019
2. N.H.Dubey, Engineering Mechanics, McGraw Hill, 2013.

B.Tech. (I Sem.)	20EE03 - ELECTRONIC CIRCUITS AND DEVICES	L	T	P	Cr.
		2	1	0	3

Pre-requisites: Nil

Course Educational Objective: This course enables the student to interpret the concepts ofbasic and special semiconductor devices and their applications.

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

CO1: Illustrate the working of different types of diodes and their characteristics. **(Understand-L2)**

CO2: Analyze the operation of diode rectifiers with filters. **(Understand-L2)**

CO3: Understand the working and characteristics of various transistor configurations. **(Understand-L2)**

CO4: Analyze the transistor biasing, stabilization and amplification circuits. **(Understand-L2)**

UNIT – I: JUNCTION DIODE CHARACTERISTICS

Review of semi conductor Physics – n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level of semiconductors, Energy band diagram of PN diode, PN diode-biasing, The current components, Diode equation, V-I characteristics, Temperature dependence of VI characteristic, Transition and Diffusion capacitances, Breakdown Mechanisms in p-n Diode, Zener diode, Tunnel Diode, Varactor Diode.

UNIT – II: RECTIFIERS AND FILTERS

Half wave rectifier, Full wave rectifier, Bridge rectifier , Ripple factor Harmonic components ina rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π- section filter, Multiple L-section and Multiple π- section filter, and comparison of various filter circuits in terms of ripple factors, basics of regulators

UNIT – III: TRANSISTOR AND FET CHARACTERISTICS

Junction transistor, Transistor current components, Transistor as an amplifier, Transistor construction, Current components in a transistor, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations, Relation betweenAlpha, Beta and gama, Small signal model of Transistor, Comparison of Transistors, FET Characteristics.

UNIT – IV: BIASING AND STABILISATION

BJT biasing, DC equivalent model, criteria for fixing operating point, Fixed bias, Collector to base bias, Self bias techniques for stabilization, Stabilization factors, (S, S', S''), Compensation techniques, (Compensation against variation in V_{BE}, I_{CO},) , Thermal run away, Thermal stability FET Biasing.

UNIT – V: AMPLIFIERS

Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A_I ,R_i , A_V, R_O, FET Amplifier(CD and CS).

TEXT BOOKS:

1. R.L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, Pearson/Prentice Hall,9th Edition,2006
2. Jacob Millman, Christos C Halkias and SatyabrataJit, Millman's Electronic Devices and Circuits, Tata McGraw Hill, Second Edition, New Delhi, 2008.

REFERENCE:

1. S Salivahanan, N.Suresh Kumar and A Vallavaraj, Electronic Devices and Circuits, McGraw Hill, 5th edition, 2010.
2. J.B Gupta Electronic Devices and Circuits, S.K. Kataria&Sons, 2nd Edition,2013.

B.Tech. (I Sem.)	20FE54 - APPLIED PHYSICS LAB	L	T	P	Cr.
		0	0	3	1.5

Pre-requisites: Nil

Course Educational Objective: This course enables the students to acquire theoretical ideas, analytical techniques, and graphical analysis, by completing a host of experiments with the procedures and observational skills for appropriate use of simple and complex apparatus.

COURSE OUTCOMES: At the end of the course, the student will be able to:

CO1: Analyze the wave characteristics of light. **(Understand -L2)**

CO2: Estimate the magnetic field using Stewart's and Gee's apparatus. **(Understand - L2)**

CO3: Verify the characteristics of semiconductor diodes. **(Apply - L3)**

CO4: Determine the acceptance angle and numerical aperture of optical fiber. **(Apply -L3)**

CO5: Improve report writing skills and individual teamwork with ethical values. **(Understand -L2)**

LIST OF EXPERIMENTS

(Any of the 10 experiments are required to be conducted)

GENERAL EXPERIMENTS:

1. Determine the energy band gap of a semiconductor Diode.
2. Study the characteristics of Zener Diode.
3. Study the magnetic field along the axis of a current carrying circular coil using Stewart's& Gee's apparatus and to verify Biot - Savart's law.
4. Study the characteristics of Solar cell
5. Determination of dielectric constant by charging and discharging method.
6. Study the characteristics of Photo diode.
7. Determination of resistivity of semiconductor by four probe method.

OPTICS LAB EXPERIMENTS:

1. Determine the wavelength of a laser radiation.
2. Determine the width of a single slit by forming diffraction pattern.
3. Determine the Radius of Curvature of a Plano - Convex lens by forming Newton's Rings.
4. Determine the Wavelengths of various spectral lines by using diffraction grating.
5. Resolving power of grating.
6. Determine the acceptance angle and numerical aperture of a fiber.
7. Measure the bending losses in the optical fiber cable at different wavelengths.

20CE53-BASIC CIVIL AND MECHANICAL ENGINEERING LAB

B.Tech. (I Sem.)

L	T	P	Cr.
0	0	3	1.5

Course Education Objective: To learn the concept of Radius of Gyration, different types of Viscometers, valve timing and port timing diagrams in I.C engines, performance parameters in Hydraulic Systems.

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

CO1: Find the Viscosity of different oils using Viscometers. **(Apply -L3)**

CO2: Analyze valve and port timing diagrams in I.C engines. **(Apply -L3)**

CO3: Determine the performance parameters of hydraulic turbines. **(Apply -L3)**

CO4: Conduct the Reynolds experiment to decide the flow classification. **(Apply -L3)**

CO5: Evaluate Bernoulli's principles in pipe flows. **(Apply -L3)**

LIST OF EXPERIMENTS

(At least 10 experiments are to be conducted)

1. Determination of Radius of Gyration using compound pendulum.
2. Determination of Radius of Gyration using bifilar suspension.
3. Determination of viscosity of given oil using Redwood viscometer
4. Determination of viscosity of given oil using Engler's Viscometer.
5. Determination of Flash and Fire points of a given oil using ABEL'S apparatus.
6. Valve timing diagram for single cylinder, four stroke water cooled Diesel engine.
7. Port timing diagram for single cylinder, two stroke air cooled Diesel engine.
8. Verification of Bernoulli's Theorem
9. Impact of jets on Vanes.
10. Performance Test on Pelton Wheel.
11. Performance Test on Kaplan Turbine.
12. Reynolds experiment.
13. Flow Visualization study using Water Flow Channel
14. Determination of loss of head due to sudden contraction in a pipeline

20EE53-ELECTRONIC CIRCUITS AND DEVICES LAB	L	T	P	Cr.
B.Tech. (I Sem.)	0	0	3	1.5

Pre-requisites: Nil

Course Educational Objective: This lab course enables the student to demonstrate characteristics of semiconductor devices.

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

CO1: Analyze the characteristics of diodes. **(Understand-L2)**

CO2 : Examine the performance of rectifiers with filters. **(Apply-L3)**
CO3: Analyze the characteristics of BJT and FET. **(Understand-L2)**
CO4 : Design various transistor amplifier circuits. **(Apply-L3)**

LIST OF EXPERIMENTS

(At least 10 experiments are to be conducted)

1. Study the characteristics of PN junction diode.
2. Study the characteristics of Zener diode.
3. Calculation of Ripple factor and regulation of Half wave rectifier with & without filters.
4. Calculation of Ripple factor and regulation of Bridge rectifier with & without filters.
5. Determination of h-parameters of transistor from CE characteristics.
6. Determination of h-parameters of transistor from transistor CB characteristics.
7. Determination of h-parameters of transistor from FET transfer characteristics.
8. Calculation of Band width of CE Amplifier.
9. Calculation of Band width of CC Amplifier.
10. Calculation of Band width of CB Amplifier.
11. Calculation of Band width of Common Source FET Amplifier.
12. Calculation of Band width of CD FET amplifier

20ME51-ENGINEERING WORKSHOP

B.Tech. (I Sem.)

L	T	P	Cr.
0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVE: The objective of this course is to get familiarized with various trades used in Engineering Workshop and learn the safety precautions to be followed in the workshops while working with the different tools.

COURSE OUTCOMES: After completion of the course students will be able to**:**

CO1: Develop different prototypes in the carpentry section. (**Understand-L2)**
CO2: Fabricate various basic prototypes in fitting trade. (**Understand-L2**)
CO3:Demonstrate various operations related to plumbing, tin smithy and blacksmithy. (**Understand-L2**)
CO4: Perform various basic house wiring techniques. (**Apply-L3**)

(Conduct at least 4 Trades with 2 exercises from each Trade and demonstrate about 2 Trades)

Trade –1: CARPENTRY SHOP

Introduction to various types of wood such as Teak, Sal, Oak, Beach, Neam, Wallnut Mango, Shisham, Deodar, Babul. demonstration, function and use of carpentry hand- tools and their safety precautions. Introduction to various types of wooden joints, their relative advantages and uses.

Job I - Marking, sawing, plaining and chiselling operations.Job II - Preparation of half lap-joint
Job III – Preparation of Mortise and Tenon Joint

Trade –2: FITTING SHOP

Introduction to fitting shop tools, common materials used in fitting shop,description, demonstration, care, use of tools and safety precautions.

Job I- Making a L-Fit from a rectangular piece of Mild Steel Flat (MS).Job II-Making a T-Fit from a rectangular piece of MS Flat.
Job III-Making a V-Fit from a rectangular piece of MS Flat
Job IV-Making a Half round fit from a rectangular piece of MS flat.

Trade -3: TIN- SMITHY SHOP

Introduction to tin-smithy, specification and use of hand tools, accessories and the safetyprecautions.

Job I -Preparation of a rectangular tray using GI sheet.
Job II-Preparation of an open scoop/ funnel using GI sheet.
Job III - Preparation of a Single Seam Joint and Double Seam Joint using GI sheet.
Job IV - Preparation of a Corner Seam Joint using GI sheet.

Trade –4: PLUMBING SHOP

Introduction to plumbing – demonstration, use of hand tools, accessories and safetyprecautions.

Job I – preparation of pipe layout.

Job II – Pipe threading.

Trade -5: BLACK SMITHY

Introduction– demonstration of tools, equipment and safety precautions.

Job I – Preparation of S–Hook.

Job II – Preparation of Chisel

REFERENCES:

1. LBRCE Workshop Lab Manual.
2. S.K.HajraChoudary and A.K.Choudary, ‐Workshop Technology-I& II, MediaPromotersand Publishers Pvt.Ltd., Mumbai,2012.
3. B.S.Raghuvamsi, ‐Workshop Technology-I& II, Dhanpatrai and company, New Delhi, 2014.
4. P.Khannaiah, K.L.Narayana, ‐Workshop Manual‖,ScitechPublicationsIndiaPvt.Ltd, 2015.

20FE02-PROFESSIONAL COMMUNICATION-II

B.Tech. (II Sem.)

L	T	P	Cr.
2	0	0	2

Pre-requisites: Nil

Course Educational Objective: To improve English language proficiency of the students on various aspects like vocabulary, grammar, communication skills, listening skills, Reading & Writing skills.

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

CO1: Produce a coherent paragraph interpreting a figure/graph/chart/table.(**Understand – L2**)

CO2: Comprehend the given texts thoroughly by guessing the meanings of the words contextually (**Understand – L2**).

CO3: Use language appropriately for describing/comparing/contrasting/giving directions & suggestions (**Remember – L1**).

CO4: Write formal/informal dialogues with an understanding of verbal/non-verbal features of communication. Guess meanings of the words from the context (**Understand – L2**).

CO5: Write well-structured essays; Reports & Résumé (**Apply – L3**).

UNIT - I

Fabric of Change- 'H.G. Wells and the Uncertainties of Progress – Peter J. Bowler'; Reading: Studying the use of Graphic elements in texts; Grammar & Vocabulary**:** Quantifying Expressions; Adjectives and adverbs; Comparing and Contrasting; Degrees of Comparison Writing: Information Transfer

UNIT - II

Tools for Life - 'Leaves from the Mental Portfolio of a Eurasian – Sui Sin Far'; Reading: Global Comprehension; Detailed Comprehension; Grammar & Vocabulary**:** Active & Passive Voice; Idioms & Phrases; Writing: Structured Essays using suitable claims and evidences

UNIT - III

'Homi Jahangir Bhabha';

Grammar & Vocabulary: Words often confused; Common Errors; Writing**:** Incident & Investigation Reports.

UNIT - IV

'Jagadish Chandra Bose'; Grammar & Vocabulary: Use of antonyms; Correction of Sentences; Writing**:** Dialogue Writing.

UNIT - V

'**Prafulla Chandra Ray'**; Grammar & Vocabulary: Analogy; Sentence Completion; Writing**:** Writing a Résumé

TEXT BOOKS:

1. Prabhavati. Y & et al, "English All Round – Communication Skills for UndergraduateLearners", Orient Black Swan, Hyderabad, 2019.
2. "The Great Indian Scientists" published by Cengage Learning India Pvt. Ltd., Delhi,2017

REFERENCE BOOKS:

1. Swan,M., "Practical English Usage", Oxford University Press, 2016.
2. Kumar,S and Latha, P, "Communication Skills", Oxford University Press, 2018.
3. Rizvi Ashraf M., "Effective Technical Communication", Tata Mc Graw Hill, New Delhi,2008.
4. BaradwajKumkum, "Professional Communication", I.K.International Publishing HousePvt.Lt., New Delhi, 2008.
5. Wood,F.T., "Remedial English Grammar", Macmillan, 2007.

20FE04-LINEAR ALGEBRA AND TRANSFORMATION TECHNIQUES

B.Tech. (II Sem.)

L	T	P	Cr.
2	1	0	3

Pre-requisites: Nil

Course Educational Objective: In this course, students learn Matrix Algebra and introduced with transformation techniques such as Laplace Transforms and Z – Transforms.

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

CO1: Investigate the consistency of the system of equations and solve them. **(Apply – L3)**
CO2: Determine the eigen vectors and inverse, powers of a matrix using Cayley – Hamilton Theorem. **(Apply - L3)**

CO3: Use the concepts of Laplace Transforms to various forms of functions. **(Understand – L2)**

CO4: Solve ordinary differential equations by using Laplace Transforms. **(Apply – L3)**

CO5: Apply Z - Transforms to solve difference equations. **(Apply – L3)**

UNIT – I

System of Linear Equations

Matrices - Rank- Echelon form, Normal form, PAQ form– Solution of Linear Systems – Homogeneous system of equations and Non-Homogeneous system of equations.

UNIT – II

Eigen Values and Eigen Vectors

Eigen values – Eigen Vectors – Properties – Cayley-Hamilton Theorem – Inverse and Powers of a matrix by using Cayley-Hamilton Theorem.

UNIT – III

Laplace Transforms

Laplace transforms of standard functions –Linear Property - Shifting Theorems, Change of Scale Property Multiplication and Division by‘t’ - Transforms of derivatives and integrals – Unit step function –Dirac’s delta function.

UNIT – IV

Inverse Laplace Transforms

Inverse Laplace transforms– Linear Property - Shifting Properties - Convolution theorem, Applications of Laplace transforms to ordinary differential equations.

UNIT – V

Z-Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse Z –transform - Convolution theorem – Solution of difference equation by Z-transforms.

Text Books:

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, NewDelhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, NewDelhi, 2010.

Reference Books:

1. M. D. Greenberg, "*Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi, 2011.
2. Erwin Kreyszig, *"Advanced Engineering Mathematics"*, 8th Edition, John Wiley & sons, New Delhi, 2011.
3. W.E. Boyce and R. C. Diprima, " *Elementary Differential Equations"*, 7th Edition, JohnWiley & sons, New Delhi, 2011.

20FE05-APPLIED CHEMISTRY

B.Tech. (II Sem.)

L	T	P	Cr.
3	0	0	3

Pre-requisites: Nil

Course Educational Objective: It enables the students to understand the fundamental concepts of chemistry and to provide them with the knowledge of industrial problems and finding the solutions. It helps to strengthen the basic concepts of water, fuel technologies**,** electrochemistry, corrosion and advanced materials used in technologies.

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

CO1: Identify the troubles due to hardness of water and its maintenance in industrial applications. **(Understand - L2)**
CO2: Understand the issues related to conventional fuels, biofuels and photo-voltaic cells in energy production. **(Understand - L2)**
CO3: Apply Nernst Equation for calculating electrode cell potentials and compare batteries for different applications. **(Apply - L3)**
CO4: Apply principles of corrosion for design and effective maintenance of various equipment. (Apply - L3)
CO5: Analyse the suitability of engineering materials like polymers, lubricants, nano materials and composites in technological applications. **(Understand – L2)**

UNIT – I
WATER TECHNOLOGY

Sources of water and quality; Hardness of Water - Temporary and permanent hardness, units and their inter relation, problems on hardness and disadvantages of hard water in industries. Boiler troubles - Reasons, disadvantages and methods of prevention for Scale and sludge formation, caustic embrittlement, boiler corrosion and carry over (priming and foaming), W.H.O standards of potable water; Water softening: Ion- Exchange Process, merits and demerits; Desalination of brackish water - Electro dialysis and reverse osmosis; Treatment of industrial wastewater.

UNIT – II
FUEL TECHNOLOGY

Classification of fuels (solid, liquid and gaseous fuels, merits and demerits) and characteristics of a good fuel; Calorific value -Definition, gross and net calorific values (definition only).Solid fuels - Coal – origin, proximate analysis of coal and significance; Liquid Fuels - Petroleum-origin, types of crude oil and refining of petroleum. Cracking - moving bed catalytic cracking and synthetic petrol – Fischer Tropsch's process; Gaseous fuels - Natural gas composition and C.N.G - advantages.Bio fuels - Characteristics of bio fuels, sources of bio mass and advantages - Production of biodiesel from rape seed oil; Photo-voltaic Cell - Design, working, schematic diagram, advantages and disadvantages.

UNIT – III
ELECTRO CHEMISTRY & BATTERIES

Types of Electrodes - Calomel Electrode, Glass Electrode**,** Calculation of EMF of Cell**,** Applications of Nernst Equation**,** Applications of Electro chemical Series

Batteries -Lead-acid Battery, Lithium ion Battery, H_2– O_2 Fuel Cell, Mg-Cu reserve battery.

UNIT – IV

SCIENCE OF CORROSION

Dry Corrosion (Direct Chemical corrosion) - Types of dry corrosion-oxidative corrosion, Pilling Bed worth rule, corrosion by other gases and liquid metal corrosion; Wet Corrosion (Electro Chemical corrosion) - Mechanism- oxygen absorption, hydrogen evolution, types of wet corrosion, Galvanic Corrosion, Concentration Cell Corrosion, passivity and Galvanic series; Factors Influencing Corrosion -Nature of metal (purity, position in galvanic series, relative area of cathode & anode, nature of surface film) and nature of environment (temperature, humidity, atmospheric pollution and nature of ions in the medium); Control of Corrosion - Cathodic Protection - Sacrificial anode and impressed current methods, electro plating and metal cladding.

UNIT – V

CHEMISTRY OF ENGINEERING MATERIALS

Polymers - Differences between thermoplasts and thermo sets, Types of polymerization with examples, Preparation properties and engineering applications of PVC, Teflon, BUNA-S and Polyurethane;

Lubricants -Characteristics of a good lubricant and properties of lubricants (viscosity, flash and fire points, cloud and pour points, aniline point) and applications;

Nano Materials -Introduction, definition, extraordinary changes observed at nano size of materials and reasons, types of nano-materials, Gas-Phase Synthesis of nanomaterials, Applications;

Composites -Advantageous characteristics of Composites, Constituents, Fibre reinforced composites (GFRP, CFRP), Reasons for failure of composites.

TEXT BOOKS:

1. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai PublishingCompany, New Delhi, 3rd Edition, 2003.
2. Jain, Jain, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi, 16th Edition, 2015.

REFERENCE:

1. Shikha Agarwal, "A text book of Engineering Chemistry", Cambridge University Press, NewDelhi, 1st Edition, 2015.
2. S.S. Dara, S.S. Umare, "A Text book of Engineering Chemistry", S. Chand Publications, NewDelhi, 12th Edition, 2010.
3. Y. BharathiKumari, Jyotsna Cherukuri, "A Text book of Engineering Chemistry", VGSPublications, Vijayawada, 1st Edition, 2009.

20CS01-PROGRAMMING FOR PROBLEM SOLVING USING C

B.Tech. (II Sem.)

L	T	P	Cr.
3	0	0	3

Pre-requisite: Nil

Course Educational Objective: The Objective of the course is to make learn the basic elements of C programming, control structures, derived data types, Modular programming, user defined structures, basics of files and its I/O operations.

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

CO1: Familiar with syntax and semantics of the basic programming language constructs. **(Understand - L2)**

CO2: Construct derived data types like arrays in solving problem.(**Apply - L3**)

CO3: Decompose a problem into modules and reconstruct it using various ways of user-defined functions. **(Apply - L3)**

CO4: Use user-defined data types like structures and unions and its applications to solve problems.**(Apply- L3)**

CO5: Discuss various file I/O operations and its application.**(Understand - L2)**

UNIT – I

Introduction to Problem solving through C-Programming: Problem Specification, Algorithm / pseudo code, flowchart, examples.

C-Programming: Structure of C program, identifiers, basic data types and sizes, Constants, variables, Input-output statements, A sample c program, operators, expressions, type conversions, conditional expressions, precedence of operators and order of evaluation.

Control statements: if, if else, else if ladder and switch statements, while, do-while and for statements, break, continue, go to and labels.

UNIT – II

Arrays- concept, declaration, definition, accessing elements, storing elements, two dimensional and multi-dimensional arrays.

Character Arrays: declaration, initialization, reading, writing strings, string handling functions, pre-processor Directives, and macros.

Applications of Arrays: Linear search, Binary search, Bubble Sort.

UNIT – III

Pointers- concepts, declaring & initialization of pointer variables, pointer expressions, pointer arithmetic, pointers and arrays, pointers and character arrays, pointers to pointers.

Functions: basics, category of functions, parameter passing techniques, recursive functions-comparison with Iteration, Functions with arrays, Standard library functions, dynamic memory management functions, command line arguments.

Storage classes - auto, register, static and extern.

UNIT – IV

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, type def.

UNIT – V

Files – concept of a file, text files and binary files, streams, standard I/O, Formatted I/O, file I/Ooperations, error handling.

TEXTBOOK:

1. ReemaThareja, Programming in C, Oxford University Press, 2nd Edition, 2015

REFERENCE BOOKS:

1. Jeri R.Hanly, Elliot B.Koffman, Problem Solving and Program Design in C, PearsonPublishers, 7th Edition, 2013
2. E Balagurusamy, Computer Programming, McGraw Hill Education, 8th Edition.
3. C: The Complete Reference, McGraw Hall Education,4th Edition.
4. PradeepDey, Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition, 2011.
5. Stephen G.Kochan, Programming in C, Pearson Education, 3rd Edition, 2005.

20EE04-FUNDAMENTALS OF ELECTRICAL ENGINEERING

B.Tech. (II Sem.)

L	T	P	Cr.
2	1	0	3

Pre-requisites: Applied Physics and Differential Equations

Course Educational Objective: The objective of this course is to introduce the basic concepts of electrical circuits which is the foundation for all courses in Electrical and Electronics Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits and theorems.

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

CO1: Apply network reduction techniques to simplify electrical circuits. **(Apply-L3)**
CO2: Analyze the electrical circuits using fundamental laws. **(Apply-L3)**
CO3: Analyze magnetic circuits. **(Understand-L2)**
CO4: Identify a suitable measuring instrument to measure electrical variables.**(Understand-L2)**
CO5: Determine the circuit parameters using AC and DC bridges. **(Apply-L3)**

UNIT-I
INTRODUCTION TO ELECTRICAL CIRCUITS

Basic Concepts of passive elements of R, L, C and their V-I relations, sources (dependent and independent),Kirchoff's laws, network reduction techniques(series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent sources.

UNIT-II
SINGLE PHASE AC CIRCUITS

R.M.S, average values and form factor for different periodic wave forms-steady state analysis of R, L, C (in different combination) with sinusoidal excitation –concept of reactance, impedance, susceptance and admittance. phase and phase difference, concept of complex power, real and reactive power and power factor. Series and parallel resonance, band width and quality factor

UNIT-III
MAGNETIC CIRCUITS

Basic terminology, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction, concept of self and mutual inductance-dot convention-coefficient of coupling, analysis of series and parallel magnetic circuits.

UNIT - IV
INTRODUCTION TO MEASURING INSTRUMENTS

Errors in measurement, Classification – deflecting, control and damping torques – ammeters and voltmeters – PMMC, moving iron type instruments, shunts and multipliers. Construction and principle of operation of DC Potentiometer, Current Transformer & Potential Transformer,Single phase dynamometer wattmeter, Single phase induction type energy meter.

UNIT – V
DC & AC BRIDGES

Method of measuring low, medium and high resistance –Wheat-stone's bridge , Kelvin's double bridge , loss of charge method. Measurement of inductance- Maxwell's bridge, Anderson's bridge . Measurement of capacitance and loss angle – Wien's bridge – Schering Bridge.

TEXT BOOKS:

1. William Hayt and Jack E.Kemmerley, "Engineering Circuit Analysis" ,Mc Graw HillCompany, 9th edition,2019.
2. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai &Co. Publications, 2005.

REFERENCE :

1. Van Valkenburg, "Network Analysis and Synthesis", Pearson publication,3rd edition,2015.
   A. Sudhakar ,Shyammohan, S Palli, "Electrical Circuits Analysis-2" Tata McGraw- Hill,5th edition,2015.
2. N.C.Jagan, C.Lakshmi Narayana, "Network Analysis",BS publications 2nd edition,2008.
3. Charles K Alexander, Mathew. N. O.Sadiku, "Fundamental of Electric Circuits", TataMcGraw- Hill ,6th edition,2019.
4. ChakrabartiA,"Electric Circuits Analysis & Synthesis " Dhanpat Rai & Co (p) Ltd,6thedition,2014.

20MC01-CONSTITUTION OF INDIA

B.Tech. (II Sem.)

L	T	P	Cr.
2	0	0	0

Pre-requisites: Nil

Course Educational Objectives

- To enable the student to understand the importance of constitution.
- To understand the structure of Executive, Legislature and Judiciary.
- To understand Philosophy of fundamental rights and duties.
- To understand the autonomous nature of constitution bodies like Supreme Court and HighCourt Controller and Auditor General of India and Election Commission of India.
- To understand the Central and State relation, financial and administrative.

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

CO1: Understand history and philosophy of constitution with reference to Preamble,Fundamental Rights and Duties (**Understand – L2**).

CO2: Understand the concept of Unitary and Federal Government along with the role ofPresident, Prime Minister and Judicial System (**Understand – L2**).

CO3: Understand the structure of the state government, Secretariat, Governor and Chief Minister and their functions (**Understand – L2**).

CO4: learn local administration viz. Panchayat, Block, Municipality and Corporation(**Understand – L2**).

CO5: learn about Election Commission and the process and about SC, ST, OBC and women (**Understand – L2**).

UNIT – I:

Introduction to Indian Constitution: 'Constitution' meaning of the term, Indian Constitution – Sources and Constitutional History, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT – II:

Union Government and its Administration Structure of the Indian Union: Federalism Centre – State relationship, President: Role, Power and Position. Prime Minister (PM) and Council of Ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha. The Supreme Court and High Court: Powers and Functions.

UNIT – III:

State Government and its Administration Governor – Role and Position – Chief Minister (CM) and Council of Ministers. State Secretariat: Organization, Structure and Functions.

UNIT – IV:

A Local Administration -- Role and Importance, Municipalities – Mayor and Role of Elected Representative, Panchayati Raj: Functions of Panchayati Raj Institution, Zilla Panchayat, Elected Officials and their roles, Village level – Role of Elected and Appointed officials.

UNIT – V:

Election Commission: Election Commission – Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions and Commissions for the welfare of SC/ST/OBC and Women.

Reference Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd.,New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government and Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai. Constitutional Law of India, 4th edition in 3 volumes (Universal LawPublication).
6. J.C. Johari, Indian Government and Politics Hans.
7. J.Raj, Indian Government and Politics.
8. M.V. Pylee, Indian Constitution, Durga Das Basu, Human Rights inConstitutional 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.hss.iitb.ac.in/en/lecture-details.
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indianconstitution.

* * *

20FE51-PROFESSIONAL COMMUNICATION SKILLS LAB

B.Tech. (II Sem.)

L	T	P	Cr.
0	0	2	1

Pre-requisites : **Nil**

Course Educational Objective: To improve the proficiency of students in English with an emphasis on better communication in formal and informal situations; Develop speaking skills required for expressing their knowledge and abilities and to face interviews with confidence.

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

CO1: Introduce oneself and others using appropriate language and details. **(Understand – L2)**

CO2: Comprehend short talks and speak clearly on a specific topic using error free English. **(Understand – L2)**

CO3: Report effectively after participating in informal discussions ethically. **(Remember –L1)**

CO4: Interpret data aptly, ethically & make oral presentations. **(Apply – L3)**

Syllabus: Professional Communication Lab (PCS) shall have two parts:

- **Computer Assisted Language Learning (CALL) Lab** for 60 students with 60 systems, LAN facility and English language software for self- study by learners.
- **Interactive Communication Skills (ICS) Lab.** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo – audio & video system and camcorder etc.

Exercise – I

CALL Lab: Understand - Sentence structure.

ICS Lab: Practice - Listening: Identifying the topic, the context and specific informationSpeaking: Introducing oneself and others.

Exercise – II

CALL Lab: Understand - Framing questions.

ICS Lab: Practice - Listening: Answering a series of questions about main idea and supportingideas after listening to audio text.
Speaking: Discussing in pairs/small groups on specific topics; Delivering short structured talksusing suitable cohesive devices (JAM)

Exercise – III

CALL Lab: Understand - Comprehension practice – Strategies for Effective Communication

ICS Lab: Practice - Listening: Listening for global comprehension and summarizing Speaking: Discussing specific topics in pairs/small groups, reporting what is discussed

Exercise – IV

CALL Lab: Understand- Features of Good Conversation – Strategies for Effective Communication.

ICS Lab: Practice -Listening: making predictions while listening to conversations/transactional dialogues with/without video Speaking: Role – plays – formal & informal – asking for and giving information/directions/instructions/suggestions

Exercise – V

CALL Lab: Understand - Features of Good Presentation, Methodology of Group Discussion

ICS Lab:Practice - Introduction to Group Discussions.

Listening: Answering questions identifying key terms and understanding concepts. Speaking: Formal Oral & Poster presentations on topics from academic contexts without the useof PPT.

Lab Manual:

1. Prabhavati. Y & et al, "English All Round – Communication Skills for UndergraduateLearners", Orient Black Swan, Hyderabad, 2019.

Suggested Software:

1. Digital Mentor: Globarena, Hyderabad, 2005
2. Sky Pronunciation Suite: Young India Films, Chennai, 2009
3. Mastering English in Vocabulary, Grammar, Spelling, Composition, DorlingKindersley,USA,2001
4. Dorling Kindersley Series of Grammar, Punctuation, Composition, USA, 2001
5. Oxford Talking Dictionary, The Learning Company, USA, 2002
6. Learning to Speak English - 4 CDs. The Learning Company,USA,2002
7. Cambridge Advanced Learners English Dictionary (CD). Cambridge University Press,New Delhi,2008.

20FE52-APPLIED CHEMISTRY LAB

B.Tech. (II Sem.)

L	T	P	Cr.
0	0	3	1.5

Pre-requisites: Nil

Course Educational Objective: This course enables the students to analyze water samples and perform different types of volumetric titrations. It provides them with an overview of preparation of polymers and properties of fuels.

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

CO1: Assess quality of water based on the procedures given. **(Understand - L2)**

CO2: Distinguish different types of titrations in volumetric analysis after performing the experiments listed in the syllabus. **(Understand - L2)**

CO3: Acquire practical knowledge related to preparation of polymers. **(Understand - L2)**

CO4: Exhibit skills in performing experiments based on theoretical fundamentals. **(Understand - L2)**

List of Experiments

(Any of the 10 experiments are required to be conducted)

Model Experiment

1) Determination of amount of HCl using standard Na_2CO_3 solution.

Water Analysis

2) Determination of alkalinity of water sample**.**
3) Determination of total Hardness of water using EDTA method.
4) Determination of permanent hardness of using EDTA method.

Preparation of Polymers

5) Nylon Fibers
6) Bakelite

Redox Titrations

7) Estimation of Mohr's salt using potassium permanganate.
8) Estimation of Mohr's salt using potassium dichromate.
9) Determination of Copper(II) using standard hypo solution.

Demonstration Experiments

10) Determination of pH of the given sample solution/ soil using pH meter.
11) Determination of Turbidity of the given sample water.

Estimations

12) Determination of ferrous content in the given sample of iron ore against potassium dichromate using potassium ferricyanide as external indicator.
13) Determination of Iron(III) by colorimetric method.

Fuels

14) Determination of flash and fire points of a given fuel/lubricant.

20CS51-PROGRAMMING FOR PROBLEM SOLVING USING C LAB

B.Tech. (II Sem.)

L	T	P	Cr
0	0	3	1.5

Pre-requisite : NIL

Course Educational Objective: The objective of the course is to learn the basic elements of C Programming Structures like Data Types, Expressions, Control Statements, and Various I/O Functions and to solve simple mathematical problems using control structures. Design and implementation of various software components, which solve real world problems.

Course Outcomes (CO): At the end of this course, the student will be able to:

CO1: ply control structures of C in solving computational problems.(**Apply - L3**)

CO2: plement derived data types & use modular programming in problem ving**(Apply- L3)**

CO3: plement user defined data types and perform file operations.**(Apply- L3)**

CO 4: prove individual / teamwork skills, communication & report writing skills with ical values.

# of modules at most 10 can be taught and all the modules should be in line with theory.

Module 1: Introduction to Raptor Tool.

Module 2: Problem solving using Raptor Tool.

Module 3: Exercise Programs on Basics of C-Program.

Module 4: Exercise Programs on Control Structures.

Module 5: Exercise Programs on Loops & nesting of Loops.

Module 6: Exercise Programs on Arrays & Strings.

Module 7: Exercise Programs on Pointers.

Module 8: Exercise Programs on Functions.

Module 9: Exercise Programs on user defined data types.

Module 10: Exercise Programs on Files.

20ME53-COMPUTER AIDED ENGINEERING DRAWING LAB

B.Tech. (II Sem.)

L	T	P	Cr.
0	0	3	1.5

PRE-REQUISITES: Nil

COURSE EDUCATIONAL OBJECTIVE:The main objectives of this course are to familiarize various commands used in Auto-CAD andto visualize the isometric and orthographic views of any solid object.

COURSE OUTCOMES: After completion of the course students are the able to:
CO1: Understand the Auto-CAD basics and apply to solve practical problems used in industries where the speed and accuracy can be achieved. **(Understand-L2)**
CO2: Understand the principle of Orthographic projections of points, lines, planesand solids. **(Understand-L2)**
CO3: Draw the isometric views of lines, planes and simple solids. **(Understand-L2)CO4:** Convert orthographic to isometric vice versa. **(Understand-L2)**

At least 10 Exercises are to be conducted using Auto Cad software:

BASIC AUTO CAD COMMANDS:

1. Basic drawing commands (line, circle, arc, ellipse, polygon, and rectangle).
2. Edit commands (copy, move, erase, zoom).
3. Array commands (polar array, rectangular array, P-edit, divide a line, offset).
4. Hatching & line commands (hatching with different angles and different types of lines).
5. Mirror & trim commands (mirror an object, trim, extend a line, chamfer and fillet, explode).
6. Dimensioning & text commands (linear, angular, radius, diameter and text).

PROJECTION OF POINTS AND LINES:

1. Projection of points (I, II, III, & IV quadrants).
2. Projection of lines parallel to both reference planes.
3. Projection of lines parallel to one reference plane & inclined to other reference plane.

PROJECTION OF PLANES AND SOLIDS:

1. Projection of planes parallel to one reference plane and perpendicular to other reference plane.
2. Projection of planes inclined to one reference plane and perpendicular to other reference plane.
3. Projection of solids in simple position.
4. Projection of solids with axes inclined to one reference plane & parallel to other.

CONVERSION OF ORTHOGRAPHIC PROJECTIONS INTO ISOMETRIC PROJECTIONS & VICE VERSA:

1. Conversion of plane objects.
2. Conversion of circular objects.
3. Conversion of both combination of plane figures and circular objects.

Expt. No.	Type of Drawings	Name of the Experiment
1.	Basic drawing Commands	Exercise on Basic Drawing Commands-I
2.		Exercise on Basic Drawing Commands-II
3.	Modify commands	Exercise on Modify Commands
4.	Projection of Lines	Exercise on Projection of Lines-I
5.		Exercise on Projection of Lines-II
6.	Isometric Diagrams	Exercise on isometric views-I
7.		Exercise on isometric views-II
8.		Exercise on isometric views-III
9.		Exercise on isometric views-IV
10.	Conversion of Isometric to Orthographic views	Exercise on conversion of Isometric views into Orthographic views

REFERENCES

1. M. Kulkarni, A.P Rastogi, and A.K. Sarkar, Engineering Graphics with AutoCAD, PHILearning Private Limited, New Delhi, 2009.
2. Bethune, Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi,2009.
3. N. D. Bhatt, Engineering Drawing, 51th Revised and Enlarged Edition, CharotarPublishers, 2012.

20FE10-Numerical Methods and Integral Calculus

(Common to AE, CE, EEE, ECE, MECH)

B. Tech. (III Sem.)

L	T	P	Cr.
2	1	0	3

Pre-requisites : None

Course Educational Objective: The main objective of this course is to enable the students learn
Numerical Techniques for solving the equations and apply interpolation techniques. They will also learn about the Fourier analysis of single valued functions, Multiple Integrals in different coordinate systems and Vector differentiation.

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

CO1: Estimate the best fit polynomial for the given tabulated data using Interpolation. **L2**
CO2: Apply numerical techniques in solving of equations and evaluation of integrals. **L3**
CO3: Discriminate among Cartesian, Polar and Spherical coordinates in multiple integrals and their respective applications to areas and volumes. **L3**
CO4: Generate the single valued functions in the form of Fourier series and obtain Fourier series representation of periodic function. **L3**
CO5: Evaluate the directional derivative, divergence and angular velocity of a vector function. **L3**

UNIT – I

Interpolation and Finite Differences

Interpolation: Introduction – Finite differences- Forward Differences- Backward Differences-Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Lagrange's Interpolation formula.

UNIT – II

Numerical Solution of Equations and Numerical Integration

Solutions of Algebraic and Transcendental Equations – Regula Falsi method and Newton Raphson Method in one variable.

Numerical Integration

Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule.

UNIT – III

Multiple Integrals

Multiple integrals - double and triple integrals (Cartesian, polar, spherical coordinates) – Changing the order of Integration.

UNIT IV

Fourier series

Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series

UNIT – V

Vector Differentiation

Vector Differentiation: Gradient- Directional Derivatives -Divergence – Solenoidal fields- Curl – Irrotational fields-potential surfaces - Laplacian and second order operators

Text Books:

1. B.S. Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, New Delhi, 2012.
2. B. V. Ramana, "*Higher Engineering Mathematics*", 1st Edition, TMH Publications, New Delhi, 2010.
3. S. S. Sastry, *"Introductory Methods of Numerical Analysis"* 5th Edition, PHI Learning Private Limited, New Delhi, 2012.

Reference:

1. M. D. Greenberg, " *Advanced Engineering Mathematics*", 2nd Edition, TMH Publications, New Delhi,2011.
2. Erwin Krezig, *"Advanced Engineering Mathematics"* , 8th Edition, John Wiley & sons, New Delhi,2011.
3. W.E. Boyce and R. C. Diprima, " *Elementary Differential Equations"* , 7th Edition, John Wiley & sons, New Delhi,2011.

B.Tech. (III Sem.)	20CS03-Data Structures	L	T	P	Cr.
		3	0	0	3

Pre-requisite : Programming Language

Course Educational Objectives :

The objective of the course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

Course Outcomes (COs): *At the end of this course, the student will be able to*

CO 1	Write the algorithms for various operations on list using arrays and linked list and analyze the time complexity of its operations. **(Understand - L2)**
CO 2	Apply linear data structures like stack and queue in problem solving. **(Apply - L3)**
CO 3	Demonstrate various searching and sorting techniques and compare their computational complexity in terms of space and time. **(Understand-L2)**
CO 4	Write the algorithms for various operations on binary trees,binary search trees and AVL trees. **(Understand-L2)**
CO 5	Demonstrate graph traversal techniques and hashing techniques. **(Understand-L2)**

UNIT - I

Algorithm Analysis:

Introduction to Algorithm, Algorithm Analysis , Asymptotic Notations.

Introduction to arrays and Abstract Data Type(ADT)

Lists: List using arrays and linked list- Singly Linked List, Doubly Linked List, Circular LinkedList.

UNIT – II

Stacks: Stack ADT,Implementation using arrays and linked list.

Applications of stacks : Infix to postfix expression conversion, Evaluation of Postfix expressions and balancing the symbols.

Queues:

Queue : Queue ADT,Implementation of Queue using arrays and linked list,circular queue, DEQUE

UNIT - III

Sorting: Bubble sort**,** Insertion Sort, Selection sort, Merge Sort, Quick Sort & Heap Sort

UNIT - IV

Trees: Introduction, Tree traversals, Binary Trees, Binary Search Trees, Balanced Binary search tree - AVL Trees and its operations.

UNIT - V

Graphs: Fundamentals, Representation of graphs, Graph Traversals: BFS, DFS.
Hashing: Hash Table, Hash Function, Collision resolution Techniques- separate Chaining, Open addressing, rehashing.

TEXT BOOKS:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education, 2ndedition[1,2,3 units].
2. ReemaThareja, Data Structures using c, Oxford Publications[3,4,5].

REFERENCES:

1. Langson, Augenstein&Tenenbaum, 'Data Structures using C and C++', 2nd Ed, PHI.
2. RobertL.Kruse, Leung and Tando, 'Data Structures and Program Design in C', 2ndedition, PHI.

B.Tech. (III Sem.)

20EE05-ELECTRICAL CIRCUIT ANALYSIS

L	T	P	Cr.
2	1	0	3

Pre-Requisites: Applied Physics, Differential equations, Linear Algebra and Transformation Techniques and Fundamentals of Electrical Engineering

Course Educational Objective: The objective of this course is study of three phase circuits, transient analysis, network topology, passive filters and Fourier analysis of electrical systems.

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

CO1: Analyze electrical circuits using theorems **(Apply-L3)**

CO2: Evaluate transient response of electrical circuits **(Understand-L2)**

CO3: Examine the performance of three phase circuits **(Understand-L2)**

CO4: Evaluate the two-port network parameters **(Apply-L3)**

CO5: Apply Fourier series to the electrical circuits excited by non sinusoidal inputs **(Apply-L3)**

UNIT – I: NETWORK THEOREMS (DC & AC EXCITATIONS)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem and Milliman's theorem, analysis with dependent current and voltage sources, Concept of duality and dual networks.

UNIT – II: TRANSIENT ANALYSIS

Initial conditions, Laplace transforms methods of solutions. Transient response of R-L, R-C, R-L-C circuits (Series and Parallel combinations) for D.C and sinusoidal excitations. Analysis of electrical circuits with standard test signals (impulse and step).

UNIT – III: THREE PHASE CIRCUITS

Phase sequence, star and delta connection, relation between line and phase voltages and currents in balanced systems, analysis of balanced and unbalanced 3-phase circuits, measurement of active and reactive power.

UNIT – IV: TWO PORT NETWORKS

Two port networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

UNIT – V: FOURIER ANALYSIS OF A.C. CIRCUITS AND FILTERS

Fourier series - Analysis of electrical circuits to non sinusoidal periodic waveforms using Fourier series

Filters-Introduction to filters–low pass, high pass and band pass, constant-k and m-derived filters.

TEXT BOOKS:

1.William Hayt and Jack E.Kemmerley, "Engineering Circuit Analysis" ,Mc Graw Hill Company, 9th edition,2020.

2.C.L.Wadhwa, "Network Analysis And Synthesis", New Age International publication, 3rd edition,2018.

REFERENCE :

1.Van Valkenburg, "Network Analysis and Synthesis", Pearson publication, 3rd edition,2015.

2.A. Sudhakar ,Shyammohan, S Palli, "Electrical Circuits Analysis-2" Tata McGraw- Hill, 5th edition,2015.

3.Charles K Alexander, Mathew. N. O.Sadiku, "Fundamental of Electric Circuits", Tata McGraw- Hill ,6th edition,2019.

4. Chakrabarti A,"Electric Circuits Analysis & Synthesis " Dhanpat Rai & Co (p) Ltd, 6th edition,2014

B.Tech. (III Sem.) **20EE06-DIGITAL ELECTRONICS**

L	T	P	Cr.
2	1	0	3

Pre-Requisites: Applied Physics and Fundamentals of Electrical Engineering.

Course Educational Objective: The objective of this course is to introduce the binary number system, Boolean algebra, Logic gates, Sequential circuits and PLD's**.**

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

CO1: Interpret the number systems **(Remember-L1)**

CO2: Design logic gates. **(Apply-L3)**

CO3: Analyze combinational and sequential logic circuits **(Understand-L2)**

CO4: Realize Memory Organization and state machines **(Understand-L2)**

UNIT - I: NUMBER SYSTEMS

Number system, complements, signed Binary numbers. Binary Arithmetic, Binary codes –BCD, Excess 3 code, Gray code, Error detecting and correcting code – Hamming code, conversion from one code to another.

Boolean Algebra: Boolean postulates –De-Morgan's Theorem, Principle of Duality, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS)- Minterm and Maxterm, Canonical forms – Conversion into canonical form–Karnaugh map Minimization (up to 4 variables)- Don't care conditions.

UNIT - II: **LOGIC GATES**

AND, OR, NOT, NAND, NOR, Exclusive OR and Exclusive NOR, positive logic and negative logic, Realization of Boolean Functions using logic gates (Multi level gate implementations) - AND -OR, OR - AND, NAND -NAND, NOR -NOR, NAND-NOR & NOR -NAND realizations. AND, OR, NOT, NAND and NOR gates using Resistors, Diodes and Transistor.

UNIT – III: COMBINATIONAL LOGIC CIRCUITS

Design procedure, Adders and Subtractors – Serial adder/ Subtractor, Parallel adder/ Subtractor- Carry look ahead adder, BCD adder, Magnitude Comparator, Decoder, encoder, Multiplexer, Demultiplexer, Parity checker, code converters. Memories- Read Only memory and types of ROM, Random access Memory and types of RAM; Programmable Logic Devices– Programmable Logic Array, Programmable Array Logic. Implementation of combinational logic using MUX, PROM, PAL and PLA.

UNIT – IV: SEQUENTIAL LOGIC CIRCUITS

Latches, Flip flops-SR, JK, T, D and Master slave – Characteristic and excitation tables, characteristic equations. Modes of triggering – Edge and Level Triggering, Realization of one flip flop using other flip flops, Registers and their operation, synchronous and Asynchronous counters, modulo – n counters, Race around condition.

UNIT – V: ASYNCHRONOUS SEQUENTIAL CIRCUITS

Sequence detector- Finite state machine-capabilities and limitations, Mealy and Moore models-problems-Design of sequential circuits

Algorithmic State Machines: Components of ASM chart-Salient features-Simple examples.

TEXTBOOKS:

1. Morris Mano, Michael D. Ciletti ,"Digital Design with an Introduction to the Verilog HDL", Pearson Education, New Jersey, 5th edition, 2013.
2. Zvi Kohavi, Niraj K. Jha, "Switching and Finite Automata Theory", Cambridge University Press, New York, 3rd edition, 2010.

REFERENCE:

1. John F. Wakerly, "Digital Design", Pearson Education ,New Delhi, 4th edition,2014.
2. Thomas L. Floyd, "Digital Fundamentals", Pearson Education, New Jersey,11th edition,2015.
3. Charles H. Roth, Larry.L.Kinney, "Fundamentals of Logic Design", Cengage learning Publishers,7th edition,2015.
4. M.V.Subramanyam, "Switching Theory and Logic Design", Laxmi Publications(P) Ltd.New Delhi,2011.
5. A. Anand Kumar, "Switching Theory and Logic Design", PHI Publishers,New Delhi,3rd edition, 2016.

6. Comer, "Digital Logic and State Machine Design", Oxford Higher Education, 3rd edition 2012.

B.Tech. (III Sem.) **20EE07-ELECTRIC AND MAGNETIC FIELDS**

L	T	P	Cr.
2	1	0	3

Pre-Requisites: Applied Physics, Differential equations and Fundamentals of Electrical Engineering

Course Educational Objective: The objective of this course is to introduce the concepts of electric and magnetic fields and their applications which will be useful in the development of the theory for Electrical Machines and Power Systems.

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

CO1: Analyze static electric fields due to various charge distributions. **(Understand-L2)**

CO2: Apply boundary conditions for electric at dielectric interfaces. **(Understand-L2)**

CO3: Analyze static magnetic fields due to various current carrying elements **(Understand-L2)**

CO4: Develop Maxwell's equation in differential and integral form. **(Apply-L3)**

UNIT – I: ELECTRO STATICS

Review of vector calculus, Electrostatic fields – Coulomb's Law – Electric field intensity (EFI) – EFI due to a point, line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric potential – Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law.

UNIT – II: CONDUCTORS, DIELECTRICS AND CAPACITANCE

Current density, conduction and Convection current densities, Ohm's law in point form, equation of continuity. Electric field inside a dielectric material, polarization, Dielectric, Conductor and Dielectric, Dielectric boundary conditions.

Capacitance- Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field.

UNIT – III: STATIC MAGNETIC FIELDS

Biot-Savart Law, Magnetic flux and magnetic flux density. Magnetic field intensity (MFI) due to a straight current carrying filament, circular, square and solenoid. Relation between magnetic flux, magnetic flux density and MFI, Maxwell's second Equation. Ampere's circuital law and its applications, MFI due to an infinite sheet of current and a long current carrying filament, Point form of Ampere's circuital law, Maxwell's third equation. Field due to a circular loop, rectangular and square loops.

UNIT-IV: MAGNETIC FORCES, MATERIALS AND INDUCTANCE

Force on a moving charge, Force on a differential current element, Force between differential current elements, Magnetic dipole, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic Circuits, inductances and mutual inductances.

UNIT – V: TIME VARYING FIELDS AND MAXWELL'S EQUATIONS

Faraday's laws of electromagnetic induction, Its integral and point forms, Maxwell's fourth equation. Modification of Maxwell's equations for time varying fields, Displacement current, Poynting Theorem and Poynting vector.

TEXT BOOKS:

1. "William Hayt, "Engineering Electromagnetics", McGraw Hill, New York, 7th edition, 2011.
2. Gangadhar.K.A, "Field theory", Khanna Publishers, New Delhi, 15th edition, 2004.

REFERENCE:

1. Matthew. N.O. Sadiku, "Elements of Electromagnetics", Fourth Edition, Oxford University Press, First Indian Edition, 2010.
2. David K Cheng, "Field and Wave Electromagnetics", Pearson Education, 2nd edition, 2004.
3. John D. Kraus, "Electromagnetics" McGraw Hill, 5th Edition, 1999.
4. Narayana Rao.N, "Elements of Engg. Electro Magnetics", Prentice Hall of India,6th Edition, 2008.

L	T	P	Cr.
2	-	-	0

B.Tech. (III Sem.) **20MC02- ENVIRONMENTAL SCIENCE**

Course Objectives:

In this course the student will learn about

- Environmental issues like over population, human health etc related to local, regional and global levels.
- The necessity of resources, their exploitation and sustainable management.
- The interactions of human and ecosystems and their role in the food web in the natural world.
- The global biodiversity, threats to biodiversity and its conservation.
- Environmental problems like pollution, disasters and possible solutions.
- The importance of environmental decision making in organizations through audits.

Course Outcomes:

After the completion of this course, the students will able to

CO1: Identify environmental problems arising due to engineering and technological activities that help to be the part of sustainable solutions. **L1**

CO2: Evaluate local, regional and global environmental issues related to resources and their sustainable management. **L2**

CO3: Realize the importance of ecosystem and biodiversity for maintaining ecological balance. **L2**

CO4: Acknowledge and prevent the problems related to pollution of air, water and soil. **L3**

CO5: Identify the significance of implementing environmental laws and abatement devices for environmental management. **L2**

Unit I

Nature and scope of Environmental Problems

- Introduction to Environmental Science
- Population explosion, variations among nations
- Resettlement and Rehabilitation - Issues and possible solutions
- Environmental hazards – causes and solutions. Biological hazards – AIDS, Malaria, Chemical hazards- BPA, PCB, Phthalates, Mercury, Nuclear hazards- Risk and evaluation of hazards.
- Role of Information Technology in environmental management and human health

Unit II

Natural Resources and Conservation

Introduction and classification of Natural Resources

- Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people
- Water resources: Use and over-utilization of surface and ground water, conflicts over water, interlinking of rivers, dams-benefits and problems, Rain water harvesting
- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources
- Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, soil salinity
- Energy resources: Growing energy needs renewable, non-renewable and alternate energy resources

Unit III
Ecology and Biodiversity

- Structure and functions of an Ecosystem, Food chains and Food webs, Ecological succession, Ecological pyramids, Biogeochemical cycles
- Biodiversity, Values of biodiversity, Bio geographical classification of India. Endangered and endemic species of India, Threats to biodiversity; Man and wild life conflicts, Conservation of biodiversity: In-situ and Ex-situ conservation methods

Unit IV
Environmental Pollution

Introduction to Environmental Pollution Causes, effects and control measures of:
Air pollution, Water pollution, Noise pollution, Solid Waste Management – Sources, Classification, effects and control measures of Municipal solid waste, Biomedical waste & Hazardous and e-waste, Disaster Management.

Unit V

Environmental Management

- Sustainable development and unsustainability
- Climate disruption, Green house effect, Ozone layer depletion and Acid rain. Stockholm Conference
- Environmental Impact Assessment (EIA)
- Green building
- Environmental Law- Air, Water, Wild life, Forest, and Environmental protection act

Text Books:

1. Anubha Kaushik, C.P.Kaushik, "*Perspectives in Environmental Studies*", 5nd edition, New age international publishers, Delhi, 2016.
2. G. Tyler Miller, Scott Spoolman, *"Introduction to Environmental Studies"*, 13th Edition, Cengage Learning, New Delhi, 2009.

Reference Books:

1. M. Anji Reddy, "*Textbook of Environmental Sciences and Technology*", 2nd Edition, BS Publications, Delhi 2011.
2. Deeshita Dave, P. Udaya Bhaskar, "*Environmental Studies*", 2nd Edition, Cengage Learning, New Delhi, 2012.
3. S.Deswal, A. Deswal, "*A Basic course in Environmental Studies*", 2nd Edition, Educational & Technical Publishers, Delhi, 2014.
4. R. Rajagopalan, *"Environmental Studies (From Crisis to Cure)"*, 3rd Edition, Oxford University Press, New Delhi, 2012.
5. De, A.K, *"Environmental Chemistry"*, 5th Edition, New Age International (P) Limited, New Delhi, 2003.
6. Dr.K.V.S.G. Murali Krishna, *"Environmental Studies"*, 1st Edition, VGS Techno Series, Vijayawada, 2010.
7. Mahua Basu, S.Xavier, "*Fundamentals of Environmental Studies*", 1st edition, Cambridge University Press, Delhi, 2016.

B.Tech. (III Sem.)	20CS53-Data Structures Lab	L	T	P	Cr.
		0	0	3	1.5

Pre-requisite : Programming Language

Course Educational Objectives :

The objective of this course is to make students familiar with writing algorithms to implement different data structures like stacks, queues, trees and graphs, and various sorting techniques.

Course Outcomes (COs): *At the end of this course, the student will be able to*

CO 1	Implement Linear Data Structures using array and Linked list.
CO 2	Implement Various Sorting Techniques.
CO 3	Implement Non Linear Data Structure such as Trees &Graphs.

I) Exercise Programs on List ADT

a) Implementation of List using Arrays.

b) Implementation of List using Linked List.

II) Exercise Programs on Stacks & Queue ADT

a) Implementation of Stack Operations using Arrays.

b) Implementation of Stack Operations using Linked List.

c) Implementation of Queue Operations using Arrays.

d) Implementation of Queue Operations using Linked List.

III) Exercise Programs on Stack Applications

a) Conversion of Infix Expression to postfix Expression.

b) Conversion of Infix Expression to prefix Expression.

c) Evaluation of Postfix Expression

d) Implementation of Balancing Symbols.

IV) Exercise Programs on Types of Queues

a) Implementation of Circular Queues Linked List.

b) Implementation of Double Ended Queue using Arrays.

c) Implementation of Double Ended Queue using Linked List.

V) Exercise Programs on Sorting Techniques.

a) Implementation of Insertion Sort and

b) Implementation of Selection Sort.

c) Implementation of Merge Sort.

d) Implementation of Quick Sort.

e) Implementation of Bubble Sort.

f) Implementation of Heap Sort.

VI) Exercise Programs on Trees

a) Implementation of Binary Tree Traversals.

b) Implementation of Binary Search Tree Operations.

VII) Exercise Programs on Graph Traversal Techniques.

a) Breadth First Search (BFS) b) Depth First Search (DFS)

B.Tech. (III Sem.)	20EE54-ELECTRICAL CIRCUITS AND SIMULATION LAB	L	T	P	Cr.
		0	0	3	1.5

Pre- Requisite: Fundamentals of Electrical Engineering

Course Educational Objective: The objective of this lab is to impart hands on experience in verification of circuit laws and theorems, study of circuit characteristics and simulation of time response. It also gives practical exposure to the usage of CRO, power sources and function generator.

Course Outcomes: At the end of the course, the **s**tudent will be able to:

CO1: Examine the response of AC and DC electric circuits using theorems **(Apply-L3)**

CO2: Analyze the magnetic circuits **(Understand-L2)**

CO3: Design resonance circuits **(Apply-L3)**

CO4: Estimate two port network parameters **(Apply-L3)**

CO5: Analyze the electrical circuit using simulation tools **(Apply-L3)**

List of Experiments

1. Verification of Superposition and Maximum Power Transfer theorem (both AC and DC excitations).
2. Verification of Thevinen's and Norton's theorems.
3. Calculation of Resonance frequency, Band Width, Quality factor for Series and Parallel resonant circuits.
4. Determination of self Inductance, Mutual Inductances and Coefficient of coupling of a coupled coil.
5. Verification of Two port network parameters (Z and Y).
6. Verification of Reciprocity& Compensation Theorems
7. Verification of Kirchhoff's voltage and current laws using digital simulation
8. Simulation analysis of RL, RC & RLC transient circuits
9. Simulation analysis of three phase balanced and unbalanced networks circuits
10. Fourier analysis of circuits using simulation

Additional Experiments

11. Locus diagram of R-L, R-C and RLC circuits
12. Verification of Millman's theorem

B.Tech. (III Sem.) **20EE55-DIGITAL ELECTRONICS LAB**

L	T	P	Cr.
0	0	3	1.5

Pre-requisites: Digital Electronics

Course Educational Objective: This laboratory course enables the students to demonstrate the design and application of digital logic circuits in day-to-day life.

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

CO1: Analyze simple combinational and sequential logic circuits **(Understand-L2)**

CO2: Demonstrate different application of ICs **(Apply-L3)**

CO3: Design the logic circuits using simulation tools **(Apply-L3)**

LIST OF EXPERIMENTS

1.a) Basic Gates Function Verification using truth tables.
   i) AND Gate using 7408 IC ii) OR Gate using 7432 IC
   iii) NOT Gate using 7404 IC
   b) Universal Gates Functional Verification
   i) NAND Gate using 7400 IC ii) NOR Gate using 7402 IC
   c) Special Gates Functional verification
   i) XOR Gate using 7486 IC
   ii) XNOR Gate using XOR followed by NOT Gate
2. Realization of following gates using universal gates and its functional verification. AND, OR, XOR, NOT
3. Design Half-adder and Full-adder circuits and verify its functionality.
4. Design a four bit comparator and verify its functionality using IC 7485
5. Design a four bit binary to Gray code converter and verify its functionality using logic gates.
6. Design and verify the functionality of Decoders with different inputs.
7. Verify the functionality of following Flip-Flops.
   a) SR Flip-Flop b) JK Flip-Flop c) D Flip-Flop d) T Flip-Flop
8. Design and verify the functionality of multiplexers with different inputs
9. Design and verify UP-Counter with JK Flip-Flops using simulation tools.
10. Design a square wave generator with NAND gates using simulation tools.

Additional Experiments:

11. Design and verify 4-bit Asynchronous counter with JK Flip-Flop using simulation tools.
12. Design and verify BCD to seven segment decoder using simulation tools.

L	T	P	Cr.
1	0	2	2

B.Tech.(III Sem.)

Skill Oriented Course-I

PCB Design

PCB DESIGN USING 'EasyEDA' SOFTWARE

LIST OF EXPERIMENTS

1. Design a single-phase Half-wave and Full wave bridge rectifier circuits using diodes.
2. Design the CB and CE configurations of a transistor.
3. Design a sawtooth wave generator circuit using transistor.
4. Design the square wave to sine wave converter circuit.
5. Design an amplitude modulator circuit using transistor.
6. Design the series and parallel resonance circuits.
7. Design a three-phase balanced and unbalanced star networks.
8. Design a three-phase balanced and unbalanced delta networks.
9. Design Wheatstone's and Kelvin double bridge circuits.
10. Design AND, OR, NAND and NOR gates using transistors.

B.Tech.(IV Sem.)	20HS01 – UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY	L	T	P	Cr.
		3	0	0	3

Pre-requisites: Nil

Course Educational Objective: To become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

COURSE OUTCOMES: At the end of the course, the student will be able to-

CO1: Apply the value inputs inlife and profession **(Apply – L3)**

CO2: Distinguish between values and skills, happiness and accumulation of physical facilities, the self, and the Body**(Understand – L2)**

CO3: Understand the role of a human being in ensuring harmony in society **(Understand – L2)**

CO4: Understand the role of a human being in ensuring harmony in the nature and existence. **(Understand – L2)**

CO3: Distinguish between ethical and unethical practices (**Apply – L3**)

UNIT-I:Need, Basic Guidelines, Content and Process for Value Education

'Natural Acceptance' and ExperientialValidation- as the process for self-exploration; Continuous Happiness and Prosperity- A look at basic Human Aspirations; Right understanding, Relationship and Physical Facility, Understanding Happiness and Prosperity

UNIT-II: Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'; Understanding the needs of Self ('I') and 'Body' - happiness and physical facility; Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer);

Understanding the characteristics and activities of 'I' and harmony in 'I'; Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

UNIT-III: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship;

Understanding the harmony in the society: Resolution, Prosperity, fearlessness

and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family, Gratitude as a universal value in relationships.

UNIT-IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature; Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and selfregulation in nature; Understanding Existence as Co-existence of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence.

UNIT-V: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics, Strategy for transition from the present state to Universal Human Order

Text Book:

Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi

B.Tech. (IV Sem.)	20EE08-POWER SYSTEMS-I	L	T	P	Cr.
		2	1	0	3

Pre-requisites: Fundamentals of Electrical Engineering & Basic Civil and Mechanical Engineering

Course Educational Objective: This course enables the student to learn different types of non-renewable power generation methods, various types of renewable power sources, the modes of power transmission, the economic aspects of power generation , tariff methods and design aspects of transmission lines.

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

CO1: Understand the operation of non-renewable electrical power generating stations **(Understand-L2)**

CO2: Illustrate the economic aspects of power generation **(Apply-L3)**

CO3: Understand the a.c distribution system and performance of insulated cables **(Understand-L2)**

CO4: Evaluate the electrical and mechanical parameters of transmission lines **(Apply-L3)**

CO5: Analyze operation of overhead line insulators and phenomena of corona **(Understand-L2)**

UNIT-I: POWER GENERATION METHODS

Introduction to typical layout of an electrical power system, present power scenario in India, Generation of electric power: non-renewable sources (Qualitative): Hydro station, Steam power plant, Nuclear power plant and Gas turbine plant.

UNIT-II: ECONOMICS OF GENERATION

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT-III: AC DISTRIBUTION & CABLES

AC Distribution: Introduction, AC distribution, Single phase, 3-phase-3wire, 3 phase 4 wire system, bus bar arrangement, Selection of site and layout of substation.

Insulated Cables: Introduction, insulation, insulating materials, extra high voltage cables, grading of cables, insulation resistance of a cable, capacitance of a single core and three core cables, overhead lines versus underground cables, types of cables.

Unit-IV: ELECTRICAL AND MECHANICAL DESIGN OF TRANSMISSION LINES

Transmission line sag calculation: The catenary curve, sag tension calculations, supports at different levels, stringing Chart, inductance and capacitance calculations of transmission lines: line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance.

UNIT-V: CORONA& INSULATORS

Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines, Numerical problems.

Overhead Line Insulators: Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators.

TEXT BOOKS:

1. Soni, Gupta & Bahtnagar, Power Systems Engineering, Dhanpat Rai & Sons, 2016.
2. C.L. Wadhwa, Electrical Power Systems, 6th Edition, New AgeInternational,2009.

REFERENCE:

1. M.V.Deshpande, Elements of Electrical Power Station Design, 3rd, Wheeler Pub.1997.
2. C.L. Wadhwa, Generation, Distribution and Utilization of Electrical Energy, 3rd Edition, New AgeInternational,2015.

3. V K Mehta & Rohit Mehta, Principles of Power Systems (Multicolor Edition), 24/e, S.Chand Publishing, 4th Edition ,2005.
4. W.D.Stevenson, Elements of Power System Analysis, 4th Edition, McGraw Hill, 1982.

B.Tech. (IV Sem.) **20EE09-CONTROL SYSTEMS**

L	T	P	Cr.
2	1	0	3

Pre-requisites: Electrical circuit Analysis and Applied Physics

Course Educational Objective: The objective of this course is to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

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

CO1: Develop mathematical models of systems in terms of transfer function and state-space. **(Apply-L3)**

CO2: Analyze control systems in time domain **(Apply-L3)**

CO3: Analyze control systems in frequency domain **(Apply-L3)**

CO4: Understand the concepts of controllers and compensators. **(Understand-L2)**

UNIT-I: MATHEMATICAL MODELLING OF CONTROL SYSTEMS

Concepts of Control Systems- Open Loop and Closed Loop control systems. Mathematical modeling –Transfer function, Modeling of electrical systems, mechanical systems, Electrical analogy of mechanical systems. Block diagram representation of systems - Block diagram algebra. Signal flow graph – reduction using Mason's gain formula. Feedback Control System Characteristics- Sensitivity of Control Systems to Parameter Variations, Disturbance Signals in a Feedback Control System.

UNIT – II: TIME RESPONSE ANALYSIS-I

Standard test signals, Step response of first order and second order systems, Time response specifications, Time response specifications of second order systems, steady state errors and error constants. Introduction to PI, PD and PID Controllers (excluding design).

UNIT – III: TIME RESPONSE ANALYSIS-II

Concepts of stability, Necessary conditions for Stability, Routh stability criterion, Relative stability analysis- Introduction to Root Locus Technique, Construction of root loci.

UNIT – IV: FREQUENCY RESPONSE ANALYSIS

Frequency domain specifications, Frequency response of standard second order system. Bode Plot - determination of frequency domain specifications - phase margin and gain margin, determination of transfer function from the Bode Plot. Polar plot, Nyquist plot- Nyquist Stability criteria. Introduction to Lag, Lead, Lead-Lag Compensator (excluding design).

UNIT – V: STATE SPACE ANALYSIS

Concept of state variables – State models for linear and time invariant Systems – The Transfer Function from the State Equation, Solution of state equation– State transition matrix and it's properties Concepts of controllability and observability.

TEXT BOOKS:

1. B. C. Kuo , "Automatic Control Systems" John Wiley and Sons ,9th edition,2014.
2. I. J. Nagrath and M. Gopal, "Control Systems Engineering", New Age International (P) Limited Publishers,6th edition,2018.

REFERENCE:

1. Katsuhiko Ogata , "Modern Control Engineering", Prentice Hall of India Pvt. Ltd., 5th edition,2009
2. Norman S. Nise, Control Systems Engineering, 8th Edition, John Wiley, New Delhi,
3. Richard C Dorf, Robert H Bishop, Modern control systems , 12thedition, Prentice Hall (Pearson education, Inc.), New Delhi 2010.

4. Benzamin C. Kuo and Farid Golnaraghi, Automatic Control Systems,10th Edition, John Wiley, New Delhi, 2017.
5. Rao V. Dukkipati,"Analysis and Design of Control Systems using MATLAB", NewAge Publishers, 2e, 2009.

B.Tech. (IV Sem.)	20EE10-ANALOG ELECTRONICS	L	T	P	Cr.
		2	1	0	3

Pre-requisite : Electronic Circuits and Devices and Network Theory

Course Educational Objective : This course enables the student to analyze various electronic circuits like large signal amplifiers, feedback amplifiers, high pass, low pass RC circuits, clippers, clampers comparators etc.

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

CO1: Analyze different types of feedback amplifiers **(Understand-L2)**

CO2: Design oscillators for different frequencies **(Apply-L3)**

CO3: Analyze High pass, low pass RC circuits **(Apply-L3)**

CO4: Apply passive filters for linear &Non-linear wave shaping **(Apply-L3)**

UNIT – I: TRANSISTOR AT HIGH FREQUENCY

The hybrid Π Common Emitter Transistor model. Hybrid Π conductance in terms of low frequency h parameters- Transconductance, Input Impedance, Feedback conductance, Base spreading resistance, output conductance and hybrid Π capacitances. The CE short circuit current gain obtained with the hybrid-Π model- Bandwidth f_β and parameter f_T**,** Current gain with resistive load.

UNIT – II: LARGE SIGNAL AMPLIFIERS

Classification of large signal Amplifiers, Distortion in Amplifiers- Second harmonic Distortion and Higher order harmonic distortion. Class A power amplifier- Direct coupled and Transformer Coupled Power Amplifier, Class B power amplifier- Push Pull and Complementary Symmetry power Amplifier., Class AB power amplifier, Class C power amplifier, Class D and S power Amplifiers.

UNIT – III: FEEDBACK AMPLIFIERS

Open loop Amplifiers- Voltage Amplifier, Current Amplifier, Transresistance Amplifier and Transconductance Amplifier. Closed loop Amplifiers- Classification of Negative Feedback Amplifiers and their analysis, Characteristics of Negative Feedback Amplifiers.

UNIT – IV: OSCILLATORS

Oscillators-Introduction- Barkhausen Criterion, Classification of Oscillators, RC Oscillators- RC Phase shift Oscillator using FET, RC Phase shift Oscillator using BJT, Wein Bridge Oscillator. LC Oscillators- Hartley Oscillator, Colpitts Oscillator, Clapp Oscillator, Crystal Oscillator, Frequency and Amplitude Stability of Oscillators.(**Qualitative analysis only**).

UNIT – V: LINEAR & NON-LINEAR WAVESHAPING

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator, integrator and attenuators.

NON-LINEAR WAVE SHAPING: Diode clippers, Transistor clippers, clipping at two independent levels, Zener diode clippers, Comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem.

TEXT BOOKS:

1. Jacob Millman, Christos C Halkias and SatyabrataJit, Millman's" Electronic Devices and Circuits", Tata McGraw Hill, 3rd Edition, New Delhi, 2010.
2. J. Millman and H. Taub–"Pulse, Digital and Switching Waveforms" - McGraw-Hill, 1991

REFERENCE:

1. R.L. Boylestad and Louis Nashelsky," Electronic Devices and Circuits", Pearson/Prentice Hall, 11th Edition,2012.
2. S Salivahanan, N.Suresh Kumar and A Vallavaraj, "Electronic Devices and Circuits", McGraw Hill, 4th edition, 2017.

B.Tech(IV SEM) **20EE11- ELECTRICAL MACHINES – I**

L	T	P	Cr.
2	1	0	3

Pre-requisite : Electric and magnetic fields

Course Educational Objective: This course enables the student to learn the principle, construction and performance characteristics of DC Machines and Transformers, methods of speed control of a DC motor and different connections of poly-phase transformers.

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

CO1 :Understand the concepts of construction, operation and performance of dc generators. **(Understand-L2)**

CO2 :Analyze the operation and performance of dc motors. **(Understand-L2)**

CO3: Evaluate the performance of single phase transformers. **(Apply-L3)**

CO4: Analyze the performance of three phase transformers. **(Understand-L2)**

UNIT – I: D.C. GENERATORS

Construction & Principle of Operation of D.C. Generators –E.M.F Equation- Types of D.C Generators –Armature reaction –Methods of reducing the effects of armature reaction– Compensating winding-Commutation– Methods of improving commutation.– losses in a dc machine-power stages-condition for maximum efficiency-problems.

UNIT – II: CHARACTERISTICS OF DC GENERATORS

O.C.C-Voltage build up in generators-Critical field resistance and critical speed - Causes for failure to self excite and Remedial measures–Load characteristics of shunt, series and compound generators.

UNIT –III: D.C MOTORS

Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation–Speed control methods, starters-3 point and 4 point starters–Constant and Variable losses-calculation of efficiency – condition for maximum efficiency-problems, Test on dc motors- Brake test – Swinburne's test –Hopkinson's test- Retardation Test.

UNIT – IV: SINGLE PHASE TRANSFORMER

Constructional details-core, windings, insulation, bushings, cooling, Transformer types, emf equation - operation on no-load and on-load - phasor diagrams– Equivalent circuit – losses, efficiency and regulation. All day efficiency-effect of frequency & supply voltage on core losses-minimization of hysteresis and eddy current losses. Parallel operation with equal and unequal voltage. Testing- O.C and S.C tests - Sumpner's (back to back) test - predetermination of efficiency and regulation-separation of losses, load test.

UNIT – V: AUTO TRANSFORMERS & POLY PHASE TRANSFORMERS

Auto transformers- comparison with two winding transformers-Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ - open Δ-Scott connection -three winding transformers-tertiary windings-off load and on load tap changing.

TEXT BOOKS:

1. P.S. Bimbra, "Electrical Machinery" , Khanna Publishers, 7th Edition, 2014.
2. I.J.Nagrath & D.P.Kothari, "Electric Machines", Tata Mc Graw Hill, 7th Edition.2004

REFERENCE:

1. M.G. Say ,"Alternating Current Machines", John Wiley & Sons, 5th edition, 2002.
2. A. E. Fitzgerald, C. Kingsley, S. Umans ,"Electric Machinery ", Tata Mc Graw Hill, 7th editon, 2013.

3. Ashfaq Husain, "Electric Machines", Dhanapati Rai & Co, New Delhi, 2nd edition, 2014.
4. Clayton. A.E, "Performance and Design of Direct Current Machines" CBS Publishers, 1st edition, 2004.

B.Tech. (IV Sem.) **20AD53-Programming using Python Lab**

L	T	P	Cr.
1	0	2	2

Pre-requisite : Programming languages like C Language.

Course Educational Objective:

The Objective of Python course is to lead the students from the basics of writing and running Python scripts in problem solving and also to design and implement the modules and understands the working of classes and objects in python.

Course Outcomes (COs): At the end of the course, the student shall be able to

CO 1: Identify various programming constructs available in Python and apply them in solving computational problems. (**Apply - L3)**

CO 2: Demonstrate data structures available in Python and apply them in solving computational problems. (**Apply - L3**)

CO 3: Implement modular programming, string manipulations and Python Libraries (**Apply - L3**)

CO 4: Improve individual / teamwork skills, communication & report writing skills with ethical values.

Introduction: Language basics and example problems (Two weeks)

Implement Python Script for checking the given year is leap year or not.

Implement Python Script for finding biggest number among 3 numbers.

Implement Python Script for displaying reversal of a number.

Implement Python Script to check given number is Armstrong or not.

Implement Python Script to print sum of N natural numbers.

Implement Python Script to check given number is palindrome or not.

Implement Python script to print factorial of a number.

Implement Python Script to print all prime numbers within the given range.

Implement Python Script to calculate the series: S=1+x+x2+x3+.....xn

Implement Python Script to print the following pattern:

```
    *
  *   *
*   *   *
```

Modue 1: Exercise Programs on Lists.

Write a Python script to display elements of list in reverse order.

Write a Python script to find the minimum and maximum elements without using built-in operations in the lists.

Write a Python script to remove duplicates from a list.

Write a Python script to append a list to the second list.

Write a Python script to count the number of strings in a list where the string length is 2 or more.

Module 2: Exercise Programs on Tuples.

Write a Python script to create a tuple with different data types.

Write a Python script to find the repeated items of a tuple.

Write a Python script to replace last value of tuples in a list.

Sample list: [(10, 20, 40), (40, 50, 60), (70, 80, 90)]

Expected Output: [(10, 20, 100), (40, 50, 100), (70, 80, 100)]

Write a Python script to sort a tuple by its float element.

Sample data: [('item1', '12.20'), ('item2', '15.10'), ('item3', '24.5')]

Expected Output: [('item3', '24.5'), ('item2', '15.10'), ('item1', '12.20')]

Module 3: Exercise Programs on Sets.

Write a Python script to add member(s) in a set.

Write a Python script to perform Union, Intersection, difference and symmetric difference of given two sets.

Write a Python script to test whether every element in S is in T and every element in T is in S.

Module 4: Exercise Programs on Dictionaries

Write a Python script to sort (ascending and descending) a dictionary by value.

Write a Python script to check whether a given key already exists or not in a dictionary.

Write a Python script to concatenate following dictionaries to create a new one.

Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60}

Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}

Write a Python script to print a dictionary where the keys are numbers between 1 and 15 (both included) and the values are square of keys.

Write a Python program to map two lists into a dictionary.

Module 5: Exercise Programs on functions and recursion.

a) Define a function max_of_three() that takes three numbers as arguments and returns the largest of them.

b) Write a program which makes use of function to display all such numbers which are divisible by 7 but are not a multiple of 5, between given range X and Y.

c) Define functions to find mean, median, mode for the given numbers in a list.

d) Define a function which generates Fibonacci series up to n numbers.

e) Implement a python script for factorial of number by using recursion.

f) Implement a python script to find GCD of given two numbers using recursion.

Module 6: Exercise programs on Strings

a) Implement Python Script to perform various operations on string using string libraries.

b) Implement Python Script to check given string is palindrome or not.

c) Implement python script to accept line of text and find the number of characters, number of vowels and number of blank spaces in it.

d) Implement python script that takes a list of words and returns the length of the longest one.

Module 7: Exercise programs on Regular Expressions

a) Write a Python script to check that a string contains only a certain set of characters (in this case a-z, A-Z and 0-9).

b) Write a Python script to check whether password is valid or not.

Conditions for a valid password are:

Should have at least one number.

Should have at least one uppercase and one lowercase character.

Should have at least one special symbol.

Should be between 6 to 20 characters long.

Module 8 : Exercise programs on Matplotlib Library

a) Write a Python program to draw a line with suitable label in the x axis, y axis and a title.

b) Write a Python program to plot two or more lines with legends, different widths and colors.

c) Write a Python program to create multiple plots.

d) Write a Python programming to display a bar chart using different color for each bar.

e) Write a Python programming to create a pie chart with a title.

f)Write a Python program to draw a scatter plot with empty circles taking a random distribution in X and Y and plotted against each other.

B.Tech. (IV Sem.) **20EE56-ANALOG ELECTRONICS LAB**

L	T	P	Cr.
0	0	2	1

Pre requisite: Electronic Circuits and Devices and Analog Electronics.
Course Educational Objective: This course provides the practical exposure on designing of different single stage and multistage stage amplifiers, effect of capacitances on frequency response, analysis of power and feedback amplifiers.

Course Outcomes: At the end of the course, the student will be able to
CO1: Demonstrate the characteristics of Amplifiers, Oscillators, feedback amplifiers, and Multivibrators. **(Apply-L3)**
CO2: Analyze Timer circuits and its applications. **(Apply-L3)**
CO3: Design of feedback amplifiers, Power amplifiers and waveform generators using Electronic devices and components. **(Apply-L3)**

LIST OF EXPERIMENTS

1. Design and Realization of Low pass and High Pass filters using RC networks.
2. Design of clippers and clamper circuits.
3. Design and Realization of transistorized Astable Multivibtartor for the generation of square waveform.
4. Design and Realization of transistorized Monostable Multivibrator for the generation of voltage pulses.
5. Design and Realization of transistorized Schmitt Trigger
6. Determination of Gain and Bandwidth of two stage RC Coupled amplifier from the frequency response using simulation tools.
7. Study of transistorized Current series Feedback amplifier for Bandwidth improvement using simulation tools
8. Analysis of Stability and Gain of transistorized Current shunt Feedback amplifier using simulation tools.
9. Design and Realization of transistorized RC Phase shift Oscillator to generate a sinusoidal signal using simulation tools.
10. Design and Realization of transistorized Colpitts Oscillator to generate a sinusoidal signal using simulation tools.

Additional Experiments

11. Verify conduction angles of Class-A and Class-B Power Amplifiers.
12. Analysis of Stability and Gain of transistorized Voltage series Feedback amplifier.

L	T	P	Cr.
0	0	3	1.5

B.Tech (IVSEM). 20EE57-ELECTRICAL MACHINES - I LAB

Prerequisite: Applied Physics

Course Educational Objectives: This course enables the student to analyze the operation of dc machines and transformers, Give practical exposure on the performance of DC machines and transformers

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

CO1: Analyze the performance of DC generators **(Apply-L3)**

CO2: Examine the performance of DC motors by conducting different tests **(Apply-L3)**

CO3: Analyze the performance of transformers **(Apply-L3)**

LIST OF EXPERIMENTS

S.No	Name of the Experiment
1	Predetermination of Efficiency & Regulation of 1-phase transformer
2	Predetermination of Efficiency & Regulation of two identical 1-phase transformers
3	Determination of Efficiency & Regulation of 1-phase Transformer by direct test
4	Conversion of Three phase to two phase by using two identical transformers
5	Determination of Stray losses in a DC Shunt Motor by Retardation test
6	Determination of critical resistance and critical speed of D.C. shunt generator
7	Predetermination of Efficiency of D.C. shunt machine & Speed control of D.C. shunt motor
8	Performance characteristics of D.C. shunt motor by direct test
9	Determination of efficiency of DC shunt machine by conducting back to back test
10	Separation of stray losses in a D.C. shunt motor.
	Additional Experiments
11	Load characteristics of a separately excited D.C. Generator
12	Calculation of voltage regulation of single phase transformer using Lab view

B.Tech (IVSEM).	Skill Oriented Course-II IOT Applications of Electrical Engineering	L	T	P	Cr.
		1	0	2	2

List of Experiments

(Any TEN of the following Experiments are to be conducted)

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface temperature sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface Organic Light Emitting Diode (OLED) with Arduino/Raspberry Pi
6. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
8. Write a program on Arduino/Raspberry Pi to upload and retrieve temperature and humidity data to thingspeak cloud.
9. 7 Segment Display
10. Analog Input & Digital Output
11. Night Light Controlled & Monitoring System
12. Fire Alarm Using Arduino
13. IR Remote Control for Home Appliances
14. A Heart Rate Monitoring System
15. Alexa based Home Automation System