SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

Sree Sainath Nagar, Tirupati - 517 102

Department of Electrical and Electronics Engineering

B.Tech. (EEE) Course Structure
2010 - 2011

II YEAR : I SEMESTER

Subject Code	Subject	Periods per Week			C	Scheme of Examination Maximum Marks		
		L	T	P		Internal	External	Total
10BT3BS03	Special Functions and Complex Analysis	4	1	-	4	30	70	100
10BT30121	Fluid Mechanics and Hydraulic Machinery	4	1	-	4	30	70	100
10BT30401	Semiconductor Devices and Circuits	4	1	-	4	30	70	100
10BT40404	Switching Theory and Logic Design	4	1	-	4	30	70	100
10BT30201	Electrical Circuits	4	1	-	4	30	70	100
10BT30202	DC Machines	4	1	-	4	30	70	100
10BT40112	Fluid Mechanics and Hydraulic Machinery Lab	-	-	3	2	25	50	75
10BT30211	DC Machines Lab	-	-	3	2	25	50	75
	Total	**24**	**6**	**6**	**28**	**230**	**520**	**750**

II YEAR : II SEMESTER

Subject Code	Subject	Periods per Week			C	Scheme of Examination Maximum Marks		
		L	T	P		Internal	External	Total
10BT40421	Analog Electronic Circuits	4	-	-	4	30	70	100
10BT40201	Network Analysis and Synthesis	4	-	-	4	30	70	100
10BT40202	Electromagnetic Fields	4	1	-	4	30	70	100
10BT40203	Generation of Electrical Power	4	-	-	4	30	70	100
10BT40204	Electrical Measurements	4	1	-	4	30	70	100
10BT40205	Transformers and Induction Machines	4	1	-	4	30	70	100
10BT30411	Semiconductor Devices and Circuits Lab	-	-	3	2	25	50	75
10BT40211	Electrical Circuits and Simulation Lab	-	-	3	2	25	50	75
10BT4HS02	**Audit Course:** Advanced English Communication Skills	-	3	-	-	-	-	-
	Total	**24**	**6**	**6**	**28**	**230**	**520**	**750**

B.Tech. II Year I Semester

10BT3BS03 : SPECIAL FUNCTIONS AND COMPLEX ANALYSIS

(Common to EEE, ECE, EIE & EConE)

L	T	P	C
4	1	-	4

UNIT-I : PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations, solutions of first order partial differential equations using Lagrange's method, method of separation of variables - solutions of one dimensional wave equation - heat equation- two dimensional Laplace equation under boundary conditions.

UNIT-II : SPECIAL FUNCTIONS

Euler's Integrals - beta and gamma functions - properties - relationship between beta and gamma functions- applications - evaluation of improper integrals using Beta and Gamma functions

Bessel function: Generating function-properties of Bessel functions - recurrence relations-Orthogonality.

UNIT-III : LIMITS AND CONTINUITY - ANALYTIC FUNCTIONS

Exponential, Trigonometric, logarithmic, Hyperbolic and general power (Z^c) - separation of real and imaginary parts - Limits and Continuity of functions. Differentiability - Analyticity - Cauchy Riemann equations- conjugate and harmonic conjugate functions - Milne Thompson method- potential functions.

UNIT-IV : COMPLEX INTEGRATION

Line integral - evaluation of line integrals along curves and closed contours - Cauchy's Integral theorem - Cauchy's integral formula - Derivatives of analytic function - generalized integral formula.- Evaluation of integrals using integral formulae.

UNIT-V : COMPLEX POWER SERIES

Taylor theorem (with proof) - Laurent's theorem (without proof) - Taylor and Laurent series expansions of complex functions - Singularities - types - residues - poles of order m.

UNIT-VI : RESIDUE CALCULUS

Residue theorem - proof - applications - evaluation of integrals using residue theorem - evaluation of improper and real integrals of the type

i) $\int_{-\infty}^{\infty} f(x)dx$ ii) $\int_{0}^{2\Pi} f(\cos\theta, \sin\theta)d\theta$ iii) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

UNIT-VII : ROUCHE'S THEOREM - APPLICATIONS

Argument principle - Rouche's theorem - determination of number of zeros of complex polynomials - maximum modules principle - Fundamental theorem of Algebra - Cauchy's inequality - Liouville's theorem.

UNIT-VIII : CONFORMAL MAPPING

Definitions and examples, Mappings defined by $w = e^z$, ln z, z^2, sinz, cosz. Translation, Rotation, Inversion and Bilinear transformation - properties - fixed point - cross ratio - invariance of circles under bilinear transformation - determination of bilinear transformation using three given points.

TEXT BOOKS:

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganatham and M.V.S.S.N. Prasad, *Mathamatical Methods*, 5th Revised Edition, S. Chand & Company, 2010.
2. T.K.V. Iyenger, B. Krishna Gandhi..et al., *Text book of Engineering Mathematics*, Vol-III, 8th edition, S. Chand & Company, 2011.

REFERENCE BOOKS:

1. Grewal, B.S., *Higher engineering Mathematics*, 36th edition, Khanna Publishers, Delhi.
2. Kreyszig, E., *Advanced Engineering Mathematics*, 8th edition, John-Wiley.

B.Tech. II Year I Semester

10BT30121 : FLUID MECHANICS AND HYDRAULIC MACHINERY

L	P	T	C
4	1	-	4

UNIT-I : PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENT

Dimensions and units: physical properties of fluids- mass density, specific weight, specific volume - specific gravity, viscosity surface tension- capillarity, bulk modulus, compressibility-ideal and real fluids- Newtonian and non Newtonian fluids - vapor pressure and its influence on fluid motion- atmospheric gauge and vacuum pressure -measurement of pressure- Piezometer, U-tube and differential manometers.

UNIT-II : FLUID KINEMATICS AND DYNAMICS

Stream line, path line and streak lines and stream tube, classification of flows-steady & unsteady, uniform, non uniform, laminar, turbulent, rotational, and irrotational flows-equation of continuity for one dimensional flow. Surface and body forces -Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III : FLOW THROUGH PIPES AND ITS MEASUREMENT

Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line. Measurement of flow: pilot tube, venturimeter, and orifice meter, Flow nozzle-power transmission through transmission through pipes.

UNIT-IV : IMPACT OF JETS

Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT-V : HYDROELECTRIC POWER STATIONS

Layout of hydro electric power station - types-concept of pumped storage plants - storage requirements, mass curve (explanation only) estimation of power developed from a given catchment area, heads and efficiencies.

UNIT-VI : HYDRAULIC TURBINES

Classification of turbines, impulse and reaction turbines - construction and working of Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design - draft tube theory - functions and efficiency.

UNIT-VII : PERFORMANCE OF HYDRAULIC TURBINES

Geometric similarity, Performance under unit head - specific speed - characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

UNIT-VIII : PUMPS

Classification, working, work done - manometric head- losses and efficiencies, specific speed - pumps in series and parallel-performance characteristic curves, Net Positive Suction Head - Reciprocating pumps - Working, Discharge, slip, indicator diagrams, Machinery.

TEXT BOOKS:

1. Modi and Seth, *Hydraulics, fluid mechanics and Hydraulic Machinery,* 18th edition, Standard book house, New Delhi.
2. Rajput, *Fluid Mechanics and Hydraulic Machines*, 4th edition, S. Chand Publications, New Delhi.

REFERENCE BOOKS:

1. D.S. Kumar, *Fluid Mechanics and Fluid Power Engineering*, 2nd edition, Kotaria & Sons.
2. R.K. Bansal, *Fluid Mechanics and Hydraulic Machinery,* 9th edition, Laxmi Publications Pvt., Ltd., New Delhi.

B.Tech. II Year I Semester

10BT30401 : SEMICONDUCTOR DEVICES AND CIRCUITS

(Common to EEE, ECE, EIE & EConE)

L	T	P	C
4	1	-	4

UNIT-I : PN JUNCTION DIODE

PN junction diode equation, Volt-Ampere (V-I) characteristics, temperature dependence of V-I characteristics, ideal versus practical, static and dynamic resistances, diode equivalent circuits, junction capacitances, break down mechanisms in semiconductor diodes, Zener diode characteristics.

UNIT-II : RECTIFIERS, FILTERS AND REGULATORS

Halfwave rectifier and fullwave rectifiers (Qualitative and quantitative analysis), harmonic components in a rectifier circuit, inductor filter, capacitor filter, L - section filter, Π - section filter, comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Problems on rectifier circuits.

UNIT-III : BIPOLAR JUNCTION TRANSISTOR

Transistor construction, BJT operation, transistor as an amplifier, transistor currents and their relations, input and output characteristics of a transistor in common emitter, common base and common collector configurations, BJT specifications.

UNIT-IV : TRANSISTOR BIASING AND STABILIZATION

Operating point, DC and AC load lines, importance of biasing, fixed bias, emitter feedback bias, collector to emitter feedback bias, voltage divider bias, bias stability, stabilization against variations in V_{BE} and β, bias compensation using diodes and transistors, thermal runaway, condition for thermal stability in CE configuration, problems on biasing circuits.

UNIT-V : SMALL SIGNAL ANALYSIS OF BJT AMPLIFIERS

BJT Modeling, hybrid modeling, determination of h-parameters from transistor characteristics, measurement of h-parameters, analysis of CE, CB and CC configurations using h-parameters, comparison of CB, CE and CC configurations, simplified hybrid model, Millers theorem, dual of Millers theorem.

UNIT-VI : FIELD EFFECT TRANSISTOR

Construction, principle of operation and characteristics of JFET and MOSFET (enhancement & depletion), small signal model of JFET and MOSFET.

UNIT-VII : FET AMPLIFIERS

Common source and common drain amplifiers using FET, generalized FET amplifier, biasing of FET, FET as voltage variable resistor, comparison between BJT and FET.

UNIT-VIII : SPECIAL PURPOSE ELECTRONIC DEVICES

Principle of operation and characteristics of tunnel diode, uni-junction transistor (UJT), varactor diode, Silicon Control Rectifier (SCR). principle of operation of Schottky barrier diode.

TEXT BOOKS:

1. J. Millman, Christos C. Halkias, *Electronic Devices and Circuits,* 1991 edition, Tata McGraw-Hill, 2008.
2. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits,* 9th edition, Prentice Hall India, 2006.
3. David A. Bell, *Electronic Devices and Circuits,* 5th edition, Oxford University press, 2008.

REFERENCE BOOKS:

1. J. Millman and C.C. Halkias, *Integrated electronic*, 2nd edition, Tata McGraw-Hill, 1998.
2. K. Lal Kishore, *Electronic Devices and Circuits*, 2nd edition, BSP, 2005.
3. Robert T. Paynter, *Introductory Electronic Devices and Circuits*, 7th edition, Prentice Hall India, 2005.
4. S. Salivahana, N. Suresh Kumar, A. Vallavaraj, *Electronic Devices and Circuits*, 2nd edition, Tata McGraw-Hill, 2008.
5. Henry and Jeager, *Semiconductor Devices and Circuits,* Mc-Graw Hill.

B.Tech. II Year I Semester

10BT40404: SWITCHING THEORY AND LOGIC DESIGN

(Common to EEE, EIE & EConE)

L	T	P	C
4	1	-	4

UNIT-I : NUMBER SYSTEMS & CODES

Philosophy of number systems – complement representation of negative numbers, binary arithmetic, binary codes, error detecting & error correcting codes, hamming codes.

UNIT-II : BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS

Fundamental postulates of boolean algebra, basic theorems and properties, switching functions, canonical and standard forms, algebraic simplification, digital logic gates, properties of XOR gate, universal gates, multilevel NAND/NOR realizations.

UNIT-III : MINIMIZATION OF SWITCHING FUNCTIONS

Map method, prime implicants, don't care combinations, minimal SOP and POS forms, tabular method, prime-implicant chart, simplification rules.

UNIT-IV : COMBINATIONAL LOGIC DESIGN

Design using conventional logic gates- binary adders, subtractors, look ahead carry generator, decimal adder-BCD adder, binary multiplier, modular design using IC chips- magnitude comparator, encoder, decoder, multiplexer- MUX realization of switching functions, De-multiplexer, parity bit generator, code-converters, hazards and hazard free realizations.

UNIT-V : PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC

Basic PLD's-ROM, PROM, PLA, PAL, realization of switching functions using PLD's, capabilities and limitations of threshold gate, synthesis of threshold functions, multigate synthesis.

UNIT-VI : SEQUENTIAL CIRCUITS - I

Classification of sequential circuits (synchronous, asynchronous, pulse mode, level mode with examples), basic flip-flops, triggering and excitation tables, steps in synchronous sequential circuit design, design of synchronous counters – modulo-N, up/down counter, ring counter, Johnson counter, design of asynchronous counter-modulo-N , sequence detector, serial binary adder.

UNIT-VII : SEQUENTIAL CIRCUITS - II

Finite state machine-capabilities and limitations, Mealy and Moore models, minimization of completely specified and incompletely specified sequential machines, partition techniques and Merger chart methods, concept of minimal cover table.

UNIT-VIII : ALGORITHMIC STATE MACHINES

Salient features of the ASM chart, Simple examples, system design using data path and control subsystems, control implementations, examples of weighing machine and binary multiplier.

TEXT BOOKS:

1. Morris Mano, *Digital Design,* 3rd edition, Prentice Hall India.
2. Zvi Kohavi, *Switching & Finite Automata theory,* 2nd edition, Tata McGraw-Hill.

REFERENCE BOOKS:

1. Charles H. Roth, *Fundamentals of Logic Design*, 5th edition, Thomson Publications, 2004.
2. Fletcher, *An Engineering Approach to Digital Design,* 1st edition, Prentice Hall India, 2005.
3. John M. Yarbrough, *Digital Logic Applications and Design,* Thomson Publications, 2006.
4. A Anand Kumar, *Switching Theory and Logic Design,* Prentice Hall India, 2008.

B.Tech. II Year I Semester

10BT30201 : ELECTRICAL CIRCUITS

L	T	P	C
4	1	-	4

UNIT-I : FUNDAMENTALS OF ELECTRICAL CIRCUITS

Concepts of charge, current, voltage and power, active & passive elements, reference concepts of direction for voltages & currents, voltage and current relationships for passive elements, Ohm's law, Kirchoff Laws, current division and voltage division rules, Network reduction techniques - series, parallel, series-parallel circuits, star-delta and delta-star transformations, source transformation.

UNIT-II : BASIC NODAL & MESH ANALYSIS

Basic definitions: node, path, loop, branch - nodal analysis and super node concept - mesh analysis and super mesh concept - problems.

UNIT-III : FUNDAMENTALS OF AC CIRCUITS

Introduction - advantages of AC supply, types of waveforms, importance of sinusoidal waveforms, basic definitions: waveform, cycle, time period, frequency, amplitude- determination of average, RMS value, form factor & peak factor for different alternating waveforms, phase and phase difference.

UNIT-IV : SINGLE PHASE AC CIRCUITS

Sinusoidal response of R, L, C and combination of R, L, C circuits, concept of impedance and power triangles, power factor, resonance, bandwidth and quality factor for series and parallel networks, locus diagram.

UNIT-V: POLYPHASE SYSTEMS

Advantages of polyphase system over single phase system, phase sequence, star & delta connections, relationship between phase and line quantities, balanced and unbalanced circuits, power measurement in three phase systems using two wattmeter method-problems.

UNIT-VI : MAGNETICALLY COUPLED CIRCUITS

Coupled circuits, self & mutual inductance, DOT convention, co-efficient of coupling, analysis of magnetic circuits: series, parallel and composite, comparison of electrical and magnetic circuits.

UNIT-VII : NETWORK THEOREMS - I

Thevenin's, Norton's, Maximum Power Transfer and Superposition theorems for DC and sinusoidal excitations-applications.

UNIT-VIII : NETWORK THEOREMS - II

Tellegen's, Millman's, Reciprocity, Substitution and Compensation theorems for DC and sinusoidal excitation-applications.

TEXT BOOKS:

1. A. Sudhakar & Shyam Mohan, *Electric Circuits,* 3rd Edition, McGraw Hill Company, 2007.
2. A. Chakrabarthi, *Circuit Theory*, Dhanpat Rai & Co, New Delhi, 2009.

REFERENCE BOOKS:

1. M.E. Van Valkenberg, *Network Analysis*, Pearson Publications, 3rd edition, New Delhi 2006.
2. William H. Hayt & Jack E. Kennedy & Steven M. Durbin, *Engineering Circuit Analysis*, 6th edition, Tata Mc GrawHill Company, 2009.
3. J.A. Edminister & M.D.Nahvy, *Theory and Problems of Electric Circuits, Schaums Outline series*,4th edition, TATA Mc Graw Hill company, New Delhi, 2004.
4. G. K. Mittal, Ravi Mittal, *Network Analysis*, 14th Edition, Khanna Publishers, New Delhi, 1997.
5. C. K. Alexander and M. N. O. Sadiku, *Fundamentals of Electric Circuits,* 3rd Edition, Tata Mc Graw hill Publishing Company Limited, New Delhi, 2010.

B.Tech. II Year I Semester

10BT30202 : DC MACHINES

L	T	P	C
4	1	-	4

UNIT-I : ELECTROMECHANICAL ENERGY CONVERSION

Electromechanical energy conversion, forces and torque in magnetic field systems, energy balance, energy and force in a singly excited magnetic field system, determination of magnetic force and co-energy, multi excited magnetic field systems.

UNIT-II : DC GENERATORS - CONSTRUCTION & OPERATION

DC Generators - principle of operation, function of commutator, constructional features, armature windings: lap and wave windings, simplex and multiplex windings, single and multi layer windings, equalizer rings and dummy coils, EMF equation, losses- constant & variable losses, calculation of efficiency, condition for maximum efficiency, reduction of losses - problems.

UNIT-III: TYPES OF DC GENERATORS

Methods of excitation - separately excited and self excited generators, build-up of EMF, critical field resistance and critical speed, causes for failure of self excitation and remedial measures.

UNIT-IV : ARMATURE REACTION IN DC MACHINES

Armature reaction, cross magnetizing and demagnetizing AT/pole, compensating winding, commutation, reactance voltage, methods of improving commutation-problems.

UNIT-V : CHARACTERISTICS OF DC GENERATORS AND PARALLEL OPERATION

Load characteristics of shunt, series and compound generators, parallel operation of DC generators, use of equalizer bar and cross connection of field windings, load sharing-problems.

UNIT-VI : DC MOTORS

DC Motors - principle of operation, back EMF, torque equation, characteristics and applications of shunt, series and compound motors, armature reaction and commutation-problems.

UNIT- VII : SPEED CONTROL OF DC MOTORS

Speed control of DC motors (Shunt & Series), armature voltage and field flux control methods, Ward-Leonard system, 3-point and 4-point starters - problems.

UNIT-VIII : TESTING OF DC MACHINES

Brake test, Swinburne's test, Hopkinson's test, Field's test, Retardation test, separation of stray losses - problems.

TEXT BOOKS:

1. JB Gupta, *Theory and Performance of Electrical Machines (DC Machines, Polyphase circuits & AC Machines) in SI Units,* 14th edition, S.K. KATARIA & Sons, New Delhi, 2006.
2. I.J. Nagrath & D.P. Kothari, *Electric Machines*, 7th edition, Tata McGraw-Hill Publishers, New Delhi, 2005.

REFERENCE BOOKS:

1. Albert E Clayton & N N Hancock, *Performance and Design of Direct Current Machines*, 3rd edition, CBS Publishers, New Delhi, 2004.
2. S.K. Bhattacharya, *Electrical Machines*, Tata McGraw-Hill Publishers, New Delhi, 2001.
3. P.S. Bimbhra, *Electrical Machinery*, 7th edition, Khanna Publishers Delhi, 2005.
4. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*, 6th edition, McGraw-Hill Companies, New Delhi, 2008.

B.Tech. II Year I Semester

10BT40112 : FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

L	T	P	C
-	-	3	2

Any TWELVE experiments are to be conducted

1. Calibration of venturimeter
2. Calibration of orificemeter
3. Determination of coefficient of discharge for small orifice by con stant head method
4. Determination of coefficient of discharge for external mouthpiece by variable head method
5. Calibration of rectangular notch
6. Calibration of triangular notch
7. Determination of loss of head due to sudden contraction
8. Determination of loss of head due to sudden expansion
9. Determination of friction factor for pipes
10. Verification of Bernoulli's equation
11. Impact of jet on vanes
12. Study of hydraulic jump
13. Performance test on Pelton wheel turbine
14. Performance test on Francis turbine
15. Performance test on Kaplan turbine
16. Performance test on single stage centrifugal pump
17. Performance test on multi stage centrifugal pump
18. Performance test on reciprocating pump

B.Tech. II Year I Semester

10BT30211 : DC MACHINES LAB

L	T	P	C
-	-	3	2

PART A: (for demo only):

1. Demonstration of parts of DC Machine-explaining their significance and the materials used
2. Demonstration of DC windings
3. Study of DC motor starters

The following experiments are required to be conducted as compulsory experiments:

PART B:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed
2. Load test on DC shunt generator. Determination of characteristics
3. Load test on DC series generator. Determination of characteristics
4. Load test on DC compound generator (cumulative and differential connection). Determination of characteristics
5. Hopkinson's test on DC shunt machines. Predetermination of efficiency
6. Field's test on DC series machines. Determination of efficiency
7. Swinburne's test on DC shunt machine. Predetermination of efficiencies
8. Speed control of DC shunt motor by
    a. Armature control method
    b. Field flux control method
9. Brake test on DC compound motor. Determination of performance curves.
10. Brake test on DC shunt motor. Determination of performance curves
11. Brake test on DC series motor. Determination of performance curves
12. Separation of losses in DC shunt machine

B.Tech. II Year II Semester

10BT40421 : ANALOG ELECTRONIC CIRCUITS

L	T	P	C
4	-	-	4

UNIT-I : SINGLE STAGE AMPLIFIERS

Classification of amplifiers – distortion in amplifiers, analysis of CE, CC and CB configurations with simplified hybrid model, analysis of CE amplifier with emitter resistance and emitter follower, design of single stage RC coupled amplifier using BJT.

UNIT-II : BJT FREQUENCY RESPONSE

Logarithms, decibels, general frequency considerations, frequency response of BJT amplifier, analysis at low and High frequencies, Effect of coupling and bypass capacitors, the hybrid –Pi (π) – common emitter transistor model, CE short circuit current gain, current gain with resistive load, single stage CE transistor amplifier response, gain – bandwidth product, emitter follower at higher frequencies.

UNIT-III : FEEDBACK AMPLIFIERS

Concept of feedback, classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics- voltage series- voltage shunt, current series and current shunt feedback configurations- simple problems.

UNIT-IV : OSCILLATORS

Conditions for oscillations, RC and LC type oscillators, crystal oscillators, frequency and amplitude stability of oscillators, feneralized analysis of LC oscillators, Quartz, Hartley and Colpitts oscillators, RC-phase shift and Wein- bridge oscillator

UNIT-V : LARGE SIGNAL AMPLIFIERS

Class-A aower amplifier, maximum value of efficiency of class-A amplifier, transformer coupled amplifier- push pull amplifier- complimentary symmetry circuits (Transformer less class B power amplifier)- phase inverters, transistor power dissipation, thermal runway, heat sinks.

UNIT-VI : LINEAR AND NON – LINEAR WAVE SHAPING

Linear wave shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs.

Non- linear wave shaping: Diode clippers, transistor clippers, clipping at two independent levels, comparators, applications of voltage comparators, clamping operation, clamping circuits taking source and diode resistances into account, clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage.

UNIT-VII : SWITCHING CHARACTERISTICS OF DEVICES

Diode as a switch, piecewise linear diode characteristics, Diode switching times, transistor as a switch, break down voltages, transistor in saturation, temperature variations of saturation parameters, transistor-switching times, silicon-controlled-switch circuits.

UNIT-VIII : MULTIVIBRATOR CIRCUITS

Analysis and design of bistable, monostable, astable multivibrators and schmitt trigger

Circuit using BJT, concept of triggering, symmetrical and asymmetrical configurations.

TEXT BOOKS:

1. Jacob Milliman, Christors C Halkias, *Integrated Electronics,* 1s edition, Tata McGraw-Hill, 2004.
2. R. L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, 9th edition, Pearson Education, 2007.
3. J. Millman and H. Taub, *Pulse, Digital and Switching Waveforms*, McGraw-Hill, 1991.

REFERENCE BOOKS:

1. S. Salivahana, N. Suresh Kumar, A. Vallavaraj, *Electronic Devices and Circuits*, 2nd edition, Tata McGraw-Hill, 2008.
2. David A. Bell, *Solid State Pulse Circuits*, 4th edition, Prentice Hall of India, 2002.
3. Robert T. Paynter, *Introductory Electronic Devices and Circuits*, 7th edition, Prentice Hall India, 2005.
4. A. Anand Kumar, *Pulse and Digital Circuits*, 2nd edition, Prentice Hall India, 2005.

B.Tech. II Year II Semester

10BT40201 : NETWORK ANALYSIS AND SYNTHESIS

L	T	P	C
4	-	-	4

UNIT-I : NETWORK TOPOLOGY

Concept of network graph, basic definitions: branch, graph, tree, node, twigs, links-properties of a tree, incidence matrix - properties, reduced incidence matrix- cutset and tieset matrices - examples, Dual networks.

UNIT-II : FOURIER SERIES

Introduction-trigonometric Fourier series, evaluation of Fourier coefficients, waveform symmetry, Exponential form, effective value, Fourier transforms, effective value of non sinusoidal wave, relationship with Laplace transforms.

UNIT-III : LAPLACE TRANSFORMS

Definition of Laplace transform, advantages, basic theorems(differentiation and integration), Laplace transform of important functions, inverse Laplace transform, transform impedance of network elements (R, L & C), application of Laplace transform- series RL, RC, RLC, parallel RLC circuits, initial and final value theorem.

UNIT-IV : TWO PORT NETWORKS

Two port networks - Z-parameters, Y-parameters, ABCD parameters and H-parameters - symmetry and reciprocity property in two port networks - interrelationships of different parameters , interconnection of two port networks.

UNIT-V : DC TRANSIENT ANALYSIS

Transient response of RL, RC and RLC series circuits- initial conditions- solution method using differential equation and Laplace transforms, response of RL and RC networks to pulse excitation.

UNIT-VI : AC TRANSIENT ANALYSIS

Transient response of RL, RC and RLC series circuits - initial conditions-solution method using differential equation and Laplace transforms.

UNIT-VII : NETWORK FUNCTIONS

Introduction -network functions, determinants and co-factors for determining network function , necessary conditions for driving point function and transfer functions, applications of network analysis in deriving network functions, transient response.

UNIT-VIII : NETWORK SYNTHESIS

Introduction - positive real functions, driving point and transfer impedance function, LC network, synthesis of dissipative networks, two terminal RL and RC network.

TEXT BOOKS:

1. A. Sudhakar, Shyammohan S Palli, *Circuits and Networks (Analysis and Synthesis)*, 3rd edition, Tata McGraw-Hill Publishing.
2. D. Roy Chowdary, *Networks and Systems*, 1st Edition, New Age International Publishers.

REFERENCE BOOKS:

1. A. Chakrabarthi, *Circuit Theory (Analysis and Synthesis)*, 1st edition, Dhanpat Roi & Co. New Delhi, 2009.
2. M.E. Van Valkenburg, *Network Analysis*, 3rd edition, Prentice Hall India.
3. William H Hayt, Jr. Jack E. Kemmerly, Steven M. Durbin, *Engineering Circuit Analysis*, 6th edition, Tata McGraw-Hill publishing Company Ltd.,
4. Umesh Sinha, *Network Analysis and Synthesis*, 5th edition, Satyaprakashan, New Delhi.

B.Tech. II Year II Semester

10BT40202 : ELECTROMAGNETIC FIELDS

L	T	P	C
4	1	-	4

REVIEW OF VECTOR ALGEBRA:
Scalar and vector fields, Vector algebra, Cartesian, Circular Cylindrical and Spherical co-ordinate systems, Divergence Theorem, Stoke's Theorem

UNIT-I : ELECTROSTATICS
Electrostatic fields-Coulomb's law, Electric Field Intensity (EFI), various charge distributions, EFI due to a continuous line charge, surface charge and volume charge distribution, electric flux density,Gauss's Law, applications of Gauss law to symmetrical charge distributions and differential volume element, Maxwell's first equation (point and integral form).

UNIT-II : ENERGY & POTENTIAL IN ELECTRIC FIELDS
Energy expended in moving a point charge in an electric field, Maxwell's second equation (point and integral form), concept of potential and potential gradient-potential for different charge distributions, energy density in electrostatic fields, electric dipole, dipole moment, potential and EFI due to an electrical dipole, torque on an electric dipole in an electric field.

UNIT-III : CONDUCTORS, DIELECTRICS AND CAPACITANCE
Current density, conduction and convection current density, Ohm's law in point form, current continuity equation, conductors and dielectric materials, behaviour of conductors in an electric field, boundary conditions, polarization, capacitance, capacitance of parallel plate, spherical and co-axial capacitors with composite dielectric Laplace and Poisson's equations, solutions of Laplace equation in one variable.

UNIT-IV : MAGNETOSTATICS
Static magnetic fields - Biot-Savart's law, Oesterd's experiment, Magnetic Field Intensity(MFI), MFI due to a straight current carrying filament, circular, square, solenoid and toroid current carrying wire, relation between magnetic flux, magnetic flux density and MFI, Maxwell's third equation (point and integral form), magnetic dipole and dipole moment, torque on a current loop placed in a magnetic field.

UNIT-V : AMPERE'S CIRCUITAL LAW AND ITS APPLICATIONS

Ampere's Circuital law, Maxwell's fourth equation(point and integral form), applications of Ampere's circuital law to infinite line current, infinite sheet of current, infinitely long co-axial transmission line, solenoid and toroid, field due to a circular loop, rectangular and square loops, scalar magnetic potential and its limitations, vector magnetic potential due to simple configurations, vector Poisson's equation.

UNIT-VI : FORCE IN MAGNETIC FIELDS

Magnetic forces, forces due to magnetic fields, force: on charged particle, current element and between two current elements - Lorentz force equation, force on a straight and long current carrying conductor in a magnetic field, force between two straight, long and parallel current carrying conductors, magnetic dipole and dipole moment, torque on a current loop placed in a magnetic field.

UNIT-VII : MAGNETIC MATERIALS AND INDUCTANCE

Magnetization, classification of magnetic materials, B-H curve, magnetic boundary conditions, self and mutual inductance,coefficient of coupling(K), Neumann's formulae, self-inductance of a solenoid, toroid, co-axial cable, two wire transmission line, energy stored and density in magnetic field, analogy between Electric and magnetic circuits.

UNIT-VIII : TIME VARYING FIELDS

Time varying fields, Faraday's laws of electromagnetic induction,displacement current, statically and dynamically induced EMF, Maxwell's four equations in point and integral form for time varying fields - simple problems, Poynting theorem and Poynting vector.

TEXT BOOKS:

1. William H. Hayt & John A. Buck, *Engineering Electromagnetics*, 7th edition, McGraw-Hill Companies, 2006.
2. Sadiku, *Elements of Electro Magnetic Fields*, 4th edition, Oxford Publications.

REFERENCE BOOKS:

1. J D Kraus, *Electromagnetics*, 4th edition, McGraw-Hill, 1992.
2. K.A.Gangadhar & P.M. Ramanathan, *Field Theory*, 5th edition, Khanna Publishers, New Delhi, 2003.

B.Tech. II Year II Semester

10BT40203 : GENERATION OF ELECTRIC POWER

L	T	P	C
4	-	-	4

UNIT-I : INTRODUCTION

Overview of conventional and non-conventional sources of energy, structure of electric power system, growth of power system in India, requirements of an electric power system, concept of GRID formation, different types of energy sources and efficiency in their use.

UNIT-II : HYDROELECTRIC POWER STATIONS

Location of hydroelectric power station, types of hydroelectric power stations, reserve plant components, concept of pumped storage plants, storage requirements, mass curve.

UNIT-III : THERMAL POWER STATIONS

Layout of thermal plant, use of lignite and coal, showing paths of coal, steam, water, air, ash and flue gases, brief description of thermal power station components: economizer, boilers, super heaters, turbines and condenser, chimney and cooling towers.

UNIT-IV : NUCLEAR POWER STATIONS

Nuclear fission, chain reaction, principle of operation of nuclear reactor, nuclear fuel, moderator, control rods, reflectors and coolants, shielding and safety precautions, radiation hazards, nuclear reactors, PWR, BWR and breeder reactor, overview of gas power stations: principle of operation and components.

UNIT-V : DISTRIBUTION SYSTEMS

Classification of distribution systems-comparison of DC and AC, AC single phase and three phase three wire and four wire systems, Kelvin's law, most economical size of conductor, voltage drop calculations(numerical problems) in AC and DC for radial and ring main distribution.

UNIT-VI: SUBSTATIONS

Classification of substations: indoor and outdoor substation, substation layouts, various equipment of substations, bus bar arrangements: single sectionalized, main and transfer, ring main and group switching schemes, line diagram of gas insulated substations, working mechanism, comparison of air insulated substations and gas insulated substations.

UNIT-VII : ECONOMIC ASPECTS OF POWER GENERATION

Load curve, load duration and integrated load duration curve, load, demand - diversity - capacity - utilization and Plant use factors. Costs of generation - depreciation - methods of calculations - Tariffs - flat rate - block rate - two part - three part and power factor tariffs - numerical problems

UNIT-VIII: POWER FACTOR IMPROVEMENT

Disadvantages of low power factor - methods of improving power factor - static capacitors, synchronous condensers and phase advancers - most economical power factor for constant kW and constant kVA type loads.

TEXT BOOKS:

1. V.K.Mehta and Rohith Mehta, *Principles of Power Systems*, Schand & Company Ltd, New Delhi 2004.
2. M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, *A Text Book on Power System Engineering,* Dhanpat Rai & Co. Pvt. Ltd., 1999.

REFERENCE BOOKS and WEBSITE:

1. C.L.Wadhwa, *Electrical Power Systems*, New Age international (P) limited, 2005.
2. M.V.Deshpande, *Elements of Power Station Design and Practice*, Wheeler publishing, 1999.
3. http://www.nlcindia.com.

B.Tech. II Year II Semester

10BT40204 : ELECTRICAL MEASUREMENTS

L	T	P	C
4	1	-	4

UNIT-I : DC MEASUREMENTS

Measurements-significance of measurements, methods of measurements, classification of instruments, D' Arsonval galvanometer, deflecting, control and damping torques, types of damping systems, ammeters and voltmeters, PMMC, errors and compensations, extension of range using shunts and series resistance, Ballistic galvanometer constructional details, equation of motion - problems.

UNIT-II : AC MEASUREMENTS

Moving iron type instruments, expression for deflecting torque and control torque, extension of range using shunts and series impedances, Errors and Compensations, electrostatic voltmeters, electrometer type and attracted disc type, extension of range of electrostatic voltmeters.

Instrument transformers- CT & PT - ratio and phase angle errors, constructional details, characteristics of CT and PT, Testing of CT's-Silsbee's method, variable mutual induction methods-problems.

UNIT-III : MEASUREMENT OF POWER

Power measurements in DC circuits, single phase dynamometer wattmeter, LPF and UPF, double element and three element dynamometer wattmeter, constructional details, expression for deflecting and control torques, errors and compensations, extension of range of wattmeter using instrument transformers, Measurement of three phase active and reactive powers in balanced and unbalanced systems-problems.

UNIT-IV : MEASUREMENT OF ENERGY

Single phase induction type energy meter, driving and braking torques, errors and compensations, testing by phantom loading using RSS meter, three phase energy meter, trivector meter, maximum demand meters-problems.

UNIT-V : DC AND AC POTENTIOMETERS

Crompton potentiometer, principle and operation of DC Crompton's potentiometer, standardization, applications of DC potentiometer for measurement of resistance, calibration of ammeter, voltmeter and wattmeter - problems.

AC Potentiometers: Polar and coordinate potentiometers, AC potentiometer Standardization, applications of AC Potentiometer for calibration of voltmeter, ammeter - problems.

UNIT-VI : RESISTANCE MEASUREMENTS

Method of measuring low, medium and high resistances, sensitivity of Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method, ohmmeter, Meggar for measurement of earth and insulation resistance - problems.

UNIT-VII : AC BRIDGES

Measurement of inductance, quality factor, Maxwell's bridge, Hay's bridge, Anderson's bridge, Owens's bridge. Measurement of capacitance and loss angle, Desauty's bridge, Wien's bridge, Schering bridge, Modified Schering bridge, loss factor - problems.

UNIT-VIII : SPECIAL INSTRUMENTS

Power factor meters, dynamometer and moving iron type, single phase and three phase meters, frequency meters, resonance type and Weston type, synchroscopes.

Flux meter, constructional details, comparison with ballistic galvanometer, extension of flux meter, determination of B-H curve method of reversals, step by step method.

Concepts of: LVDT, RVDT, Q-meter, transducers, thermocouple, strain gauges, digital voltmeter.

TEXT BOOKS:

1. A.K.Sawhney, *A Course in Electrical and Electronic Measurements and Instrumentation,* Danpat Rai Publishers, 2010.
2. Golding & F.C.Widdis, *Electrical Measurements and Measuring Instruments*, 5th edition, Wheeler Publishers, 1997.

REFERENCE BOOKS:

1. R. K. Rajput, *Electrical & Electronic Measurement & Instrumentation,* 2nd Edition, S. Chand & Co.
2. Reissland, *Electrical Measurements: Fundamentals, Concepts and Applications,* New Age International Publishers, 2006.
3. Forest K. Harris, *Electrical Measurements,* Wiley, John & Sons, 1984.
4. J.B. Gupta, *Electrical Measurements,* S.K.Kataria publishers, 2004.
5. H. S. Kalsi, *Electronic Instrumentation*, 3rd Edition, Tata McGraw-Hill, 1996.

B.Tech. II Year II Semester

10BT40205 : TRANSFORMERS AND INDUCTION MACHINES

L	T	P	C
4	1	-	4

UNIT-I : CONSTRUCTION AND OPERATION OF SINGLE PHASE TRANSFORMERS

Single phase transformers-types , constructional details, minimization of hystersis and eddy current losses, emf equation, operation on no load and on load - phasor diagrams.

UNIT-II : PERFORMANCE OF SINGLE PHASE TRANSFORMERS

Equivalent circuit, losses and efficiency, regulation - All day efficiency, effect of variations of frequency and supply voltage on iron losses.

UNIT-III : TESTING OF SINGLE PHASE TRANSFORMER AND AUTOTRANSFORMER

OC and SC tests, Polarity test, Sumpner's test, predetermination of efficiency and regulation, separation of losses test, parallel operation with equal and unequal voltage ratios, auto transformers, equivalent circuit, comparison with two winding transformers.

UNIT-IV : THREE PHASE TRANSFORMERS

Three phase transformers - three phase connections - star/star, delta/star, delta/delta, star/delta and open delta , third harmonic in phase voltages, three winding transformers-tertiary windings, determination of Z_p, Z_s and Z_t, off load and on load tap changing, Scott connection - Problems.

UNIT-V : THREE PHASE INDUCTION MOTORS

Three phase induction motors, construction details of cage and wound rotor machines, production of rotating magnetic field, principle of operation, rotor emf and rotor frequency, rotor reactance, rotor current and power factor at standstill and during operation - problems.

UNIT-VI : INDUCTION MOTOR CHARACTERISTICS

Rotor power input, rotor copper loss and mechanical power developed and their inter relation, torque equation,deduction from torque equation, expressions for maximum torque and starting torque,torque slip characteristic, double cage and deep bar rotors,equivalent circuit, phasor diagram, crawling and cogging.

UNIT-VII : CONSTRUCTION OF CIRCLE DIAGRAM

Circle diagram, no-load and blocked rotor tests, stator resistance test,predetermination of performance, methods of starting and starting current and torque calculations.

UNIT-VIII : INDUCTION MOTOR SPEED CONTROL METHODS

Speed control:change of frequency, change of poles and methods of consequent poles, cascade connection, injection of an emf into rotor circuit (qualitative treatment only), induction generator - principle of operation - problems.

TEXT BOOKS:

1. JB Gupta, *Theory and performance of Electrical Machines (DC machines, Poly phase circuits & AC machines) in SI Units*, S.K. KATARIA & Sons,Delhi 2009.
2. P.S. Bimbhra, *Electrical Machinery,* 7th edition, Khanna Publishers, Delhi, 2005.

REFERENCE BOOKS:

1. A.E. Fitzgerald, C.Kingsley and S.Umans, *Electric Machinery*, 6th edition, Mc Graw-Hill Companies, New Delhi, 2008.
2. I.J. Nagrath & D.P.Kothari, *Electric Machinery,* 7thedition, Tata McGraw-Hill, 2005.
3. MG.Say, *Performance and Design of AC Machines,* BPB Publish ers.
4. Langsdorf, *Theory of Alternating Current Machinery,*2nd edition, Tata McGraw-Hill Companies.
5. B.L. Theraja and A.K. Theraja, *A. text book of Electrical Technol ogy in SI units,* S. Chand, Vol: 2, 2010.

B.Tech. II Year II Semester

10BT30411 : SEMICONDUCTOR DEVICES AND CIRCUITS LAB

L	T	P	C
-	-	3	2

PART A: (Only for viva voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCBs

2. Identification, Specifications and Testing of Active Devices, Diodes: BJTs, Low-power JFETs, MOSFETs, Power Transistors, LEDs, LCDs, Optoelectronic Devices, SCR, UJT, DIACs, TRIACs, Linear and Digital ICs

3. Study and operation of
   - Multimeters (Analog and Digital)
   - Function Generator
   - Regulated Power Supplies
   - CRO

PART B: (Minimum of 10 experiments to be conducted)

1. Forward and Reverse bias characteristics of PN Junction diode
2. Zener diode characteristics and Zener as Voltage Regulator
3. Input and Output characteristics of Transistor in CB Configuration
4. Input and Output characteristics of Transistor in CE Configuration
5. Halfwave Rectifier with and without filters
6. Fullwave Rectifier with and without filters
7. FET characteristics
8. Measurement of h parameters of transistor in CE configurations
9. Frequency response of CE Amplifier
10. Frequency response of CC Amplifier
11. Frequency response of Common Source FET Amplifier
12. SCR Characteristics
13. UJT Characteristics

B.Tech. II Year II Semester

10BT40211 : ELECTRICAL CIRCUITS AND SIMULATION LAB

L	T	P	C
-	-	3	2

Any EIGHT experiments to be conducted from part A

PART A : ELECTRICAL CIRCUITS

1. Verification of Superposition and Reciprocity theorems
2. Verification of Thevenin's and Norton's theorems
3. Verification of Maximum power transfer theorems for DC & AC excitations
4. Verification of Milliman's and Compensation theorems
5. Series and parallel resonance
6. Determination of self and mutual inductance and coefficient of coupling
7. Current locus diagrams of RL & RC series circuits
8. Z & Y parameters
9. Transmission and Hybrid parameters
10. Measurement of three phase active power and reactive power for balanced loads

Any FOUR experiments to be conducted from part B

PART B : PSPICE SIMULATION

1. Simulation of DC circuits
2. DC transient response
3. Mesh analysis
4. Nodal analysis
5. Simulation of AC circuits
6. AC transient response

B.Tech. II Year II Semester

10BT4HS02 : ADVANCED ENGLISH COMMUNICATION SKILLS(Audit Course)

(Common to EEE, EIE, EConE, ECE & BOT)

L	T	P	C
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UNIT-I : VOCABULARY BUILDING

Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.

Functional English: starting conversation, responding appropriately and relevantly, using the right body language, role play in different situations.

UNIT-II : READING COMPREHENSION

Reading for facts, guessing meanings from context, scanning, skimming, inferring meaning and critical reading.

UNIT-III : ACADEMIC ESSAY WRITING

Accuracy, brevity, clarity, brainstorm, list your ideas, sub-headings, revising content and organisation.

UNIT-IV : TECHNICAL REPORT WRITING

Types of formats and styles, subject-matter, subject-organization, clarity, coherence and style, planning, data-collection, tools, analysis.

UNIT-V : CAREER SKILLS

Career direction, exploring your talents, personality inventories, write a "Who I Am" statement, thinking further, perform career research, How do I get hired, creating job satisfaction, identify your satisfaction triggers, positive attitude, maintain a balanced lifestyle, analyze your job in terms of your interests, set goals to bring your interests and responsibilities in line, personal SWOT analysis, making the most of your talents and opportunities, shaping your job to fit you better, future proof your career, managing your emotions at work, get the recognition you deserve.

UNIT-VI : RESUME WRITING

Structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, cover letter.

UNIT-VII : GROUP DISCUSSION

Dynamics of group discussion, intervention, summarizing, modulation of voice, fluency and coherence, participation, relevance, assertiveness, eye contact and body language.

UNIT-VIII : INTERVIEW SKILLS

Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, *Effective Technical Communication Skills*, (2005), Tata McGraw-Hill, New Delhi.
2. Meenakshi Raman and Sangetha Sharma, *Technical Communi cation, Principles and Practice*", (2010) Oxford University Press, New Delhi.
3. Santha Kumar R, *Secrets of Success in Interviews*, (2007), Crucial Books, Secunderabad.
4. M. Ashraf Rizvi, *Resumes and Interviews - The Art of Wining*, (2008), Tata McGraw-Hill, New Delhi.
5. Gopala Swamy Ramesh and Mahadevan Ramesh,*The Ace of Soft Skills:Attitude, Communication and Etiquette for Success*, (2009), Pearson Education, New Delhi.

SUGGESTED SOFTWARE:

1. TOEFL, GRE and IELTS (Kaplan, Aarco and Barrons, Cliffs)
2. Softwares from 'train2success.com'
3. Resume Preparation, K-Van Solutions.
4. Facing Interviews, K-Van Solutions.
5. Study Skills Success, (Essay, Vocabulary strategies, IELTS), Young India Films.
6. Vocabulary Builder, Young India Films.
7. E-correspondence, Young India Films.
8. Group Discussions, (Ease - 2), Young India Films.
9. Report Writer, Young India Films.