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<td>10BT30411</td>
<td>Semiconductor Devices and Circuits Lab</td>
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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 (∑) – 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, generalized 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:

REFERENCE BOOKS:
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
Transer 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

REFERENCE BOOKS:
1. A. Chakrabarthi, Circuit Theory (Analysis and Synthesis), 1st edition, Dhanpat Roi & Co. New Delhi,
2009.
Tata McGraw-Hill publishing Company Ltd.,
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:

REFERENCE BOOKS:
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:

REFERENCE BOOKS and WEBSITE:
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

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:
REFERENCE BOOKS:
B.Tech. II Year II Semester
10BT40205 : TRANSFORMERS AND INDUCTION MACHINES

UNIT-I : CONSTRUCTION AND OPERATION OF SINGLE PHASE TRANSFORMERS
Single phase transformers-types, constructional details, minimization of hysteresis 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 Zp, Zs and Zt, 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:

REFERENCE BOOKS:
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. Half wave Rectifier With and without filters
6. Full wave 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
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
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:

SUGGESTED SOFTWARE:
1. TOEFL, GRE and IELTS (Kaplan, Aarco and Barrons, Cliffs)
2. Softwares from 'train2success.com'
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.