ELECTRONIC DEVICES AND CIRCUITS (IEC-301) **L T P**
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OBJECTIVE OF COURSE:

1. To study the methods of transistor & MOSFET biasing.
2. To design the amplifier circuits.
3. To design analyze and test the multi stage amplifier.
4. To study the Feedback Amplifiers, Oscillators & Voltage Regulator.

PREREQUISITES OF COURSE:

1. Basic Electronics
2. Intermediate Physics

UNIT-I

Diode

PN Junction Diode- application oriented diode characteristics, simple dc circuit applications, space charge and the diode capacitances, switching characteristics.

Special purpose diodes: Tunnel diode, Varactor Diode, Schottkey Diode, Light Emitting Diode, photo voltaic cell, Laser Diode with their working principle and characteristics

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UNIT-II

Bipolar Junction Transistor

Review of Configuration and characteristics of BJT, Early effect, Ebers-Moll Model, charge control model, biasing the BJT for discrete circuit design, Bias compensation, Small signal and low frequency analysis of BJT amplifier, Darlington pair, cascode amplifier, bootstrapping circuits.

Parasitic capacitances & high frequency analysis of BJT amplifiers-CE configuration.

Classification of Amplifiers : Class A,B,C amplifiers, Coupling methods, Audio Amplifiers, Wide band amplifier. Power amplifier.

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UNIT-III

MOSFET

MOSFET : Review of device structure, operation & V I characteristic. Ohmic and saturation region equations. Classification of MOS (NMOS, PMOS, CMOS, principle of working and comparison, MOSFET as an amplifier and switch, biasing of MOS amplifier circuit, CS, CG, CD configuration using NMOS, frequency response of a single stage CS amplifier. MOS internal capacitance and high frequency model (CS configuration only).

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UNIT-IV

Feedback Amplifiers

Feedback Amplifiers: Basic concept of feedback, General Characteristics of negative feedback amplifiers, Classification of feedback, Voltage/Current shunt and series feedback, stability of feedback amplifiers, Multistage Amplifiers, Tuned Amplifier.

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UNIT-V

Oscillators & Voltage Regulator

Oscillators; Condition for oscillation, generalized form of oscillator circuit, The phase shift oscillator, Hartley & Colpitt‟s oscillator. The Wein Bridge oscillator, Crystal oscillator, frequency stability. Regulated Power Supplies: Series/Shunt voltage regulator, Monolithic regulators, SMPS,UPS (block diagram)

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Text Book:

1. Millman & Halkias/ Integrated Electronics / McGraw-Hill Education India.
2. Sedra, and Smith,/ Microelectronic Circuits/ Oxford University Press India/ 5th Edition.
3. Diffenderfer Robert/Electronic Devices: Systems and Applications/Cengage Learning.

References:

1. Shilling & Belove/ Electronic Circuit/ McGraw-Hill Education India.
2. Streetman, B.G. Banerjee, Sanjay/ Solid State Electronic Devices/ PHI.
3. Salivahanan, Kumar, Suresh & Vallavraj/ Electronic Devices & Circuits/ McGraw-Hill Education India

OUTCOME

On completion of this course the student will understand

1. Gain knowledge about the design & analysis of basic analog circuits.
2. Learn how to design & analyze basic amplifier circuit.

ELECTROMAGNETIC FIELD THEORY (IEC-302)

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3 1 0

OBJECTIVE OF COURSE:

1. To analyze field and potential due to the static charges.
2. To evaluate static magnetic fields.
3. To understand how material effect from the electric & magnetic field.
4. To study the relation between the electric & magnetic field under time varying condition.
5. To understand the fundamental of propagation of uniform plane wave.

PREREQUISITES OF COURSE:

1. Engineering Mathematics
2. Intermediate Physics

UNIT-I

Introduction to Electromagnetic Fields

Vector Calculus, Co-Ordinate systems, Gradient, Divergence and curl, Gauss Theorem, Stoke's Theorem, Electric Field due to Point Charges, electrostatic Potential, Solution of Laplace and Poisson's equation in one dimension, methods of Images applied to plain boundaries, Electric flux Density, Boundary conditions, Electrostatic Energy.

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UNIT-II

Magneto-static Fields

Ampere law of force, Magnetic flux density, Ampere's circuital law, Boundary conditions, Faraday's Law, Energy stored in magnetic fields.

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UNIT-III

Time-Varying Fields

Continuity equation, Displacement current, Maxwell ' s equation, boundary conditions, plane wave equation and its solution in conducting and non conducting media. Phasor notation, phase velocity, group velocity, Depth of penetration, conductors and dielectrics, impedance of

conducting medium, Polarization, Reflection and refraction of plane waves at plane boundaries, Poynting vectors, and Poynting theorem.

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UNIT-IV

Transmission Lines

Transmission line equations, Characteristic impedance, Distortion-less lines, Input impedance, lossless lines, Open and short circuited lines, Standing wave and reflection losses, Impedance matching, Application of smith chart, Introduction to guided waves.

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UNIT-V

Waveguides

Rectangular Waveguide, Circular Waveguide Transverse Electric (TE) and Transverse Magnetic (TM) Modes, Wave Propagation in the Guide, Power Transmission & Attenuation, Waveguide Resonators.

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Text Book:

1. M. N. O. Sadiku, “Elements of Electromagnetics”, 4th Edition, Oxford University Press. India. (TBS 621.34 SAD/P)

References:

1. Nathan Ida, “Engineering Electromagnetism”, Second Edition, Springer India Private Limited. (TBS 621.34 IDA/E)
2. Rakesh Singh Kshetrimayum, "Electromagnetic Field Theory", Cengage Learning India Publication, First Edition, 2012
3. W. H. Hayt and J. A. Buck, “Electromagnetic field theory”, Seventh Edition, McGraw Hill Education.

OUTCOME

On completion of this course the student will understand

1. Different coordinate systems, application of Vector calculus and different theorem involved in the different fields.

2. Calculate the electric field, scalar potential, stored energy, and capacitance associated with simple distributions of charge
3. Calculate the magnetic field, stored energy, and inductance for simple distributions of current density.
4. Identify an electromagnetic wave and determine parameters (frequency, phase constant and velocity, associated intrinsic impedance) and power density.
5. Apply boundary conditions to determine current and charge densities produced on conducting boundaries by applied fields.
6. Identify Maxwell's equations and apply them in both their integral and differential forms to time-varying field problems.
7. Determine the attenuation constant, phase constant, and skin depth for waves in a lossy medium, where the conductivity may range from low to high.
8. Distinguish between linear polarization, circular polarization, and elliptical polarization.
9. Calculate reflection and transmission coefficients and fields for uniform plane waves normally-incident and obliquely-incident on planar interfaces.
10. Determine parameters associated with waves on lossless and lossy transmission lines, including frequency, phase velocity & attenuation.
11. Design transmission line terminations to minimize reflections and maximize received power.
12. Determine frequency-domain parameters associated with a transmission line system, including input impedance, reflection coefficient, and SWR.
13. Analyze transmission line problems in the frequency domain with complex load impedance, to determine input and load voltage/current, power delivered.
14. Introductory detail about the microwave waveguide.

SEMI CONDUCTING MATERIAL & POWER DEVICES (IEC-303)

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3 1 0

OBJECTIVE OF COURSE:

1. To introduce the fundamentals of science for engineering applications.
2. Different type of Engineering Materials, their properties & uses
3. To enable the students to correlate theoretical principles with application oriented studies.

PREREQUISITES OF COURSE:

1. Basic Electronics
2. Intermediate Physics

UNIT-I

Conductivity of Metals

Free electron theory of metals (explanation of ohm's law, thermal conductivity and thermionic emission).factors affecting the electrical conductivity of metals, Thermal conductivity of metals, mechanism of thermal and electrical conductivity, Thermoelectric effect (Seeback, Peltier and Thomson) and its applications, Elementary approach to super conductivity, London Equation, High Tc Super Conductivity, Properties and applications of high and low resistivity materials.

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UNIT-II

Mechanism of Conduction in Semiconductors

Atomic bonding, crystallinity, Structural imperfections, Energy Band theory, Band structure for typical semi conducting materials such as Ge, Si, GaAs, GaAsP, classifications of materials using energy band theory, Semiconducting materials for LED, LASER and GUNN DIODE, Organic semiconductors. Polarization mechanism and dielectric constant , Behavior of polarization under impulse and frequency switching , Dielectric loss ,Dielectric strength, Spontaneous polarization, Smart material, Piezoelectricity ,introduction to pyroelectricity.

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UNIT-III

Power Converter Components

Silicon controlled rectifier, basic operation, principle of an SCR, V-I Characteristics two transistor analogy, turn on and turn off process of thyristor, gate characteristics of an SCR, firing circuits of thyristor, dynamic characteristics of SCR, series and parallel of SCR, protection of thyristo, thyristor family, GTO, IGBT.

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UNIT-IV

Controlled rectifiers

Analysis of single phase controlled rectifiers (half wave and full wave and bridge)with different types of load, effect of source impedance on performance of single phase full converter, Three phase converters, line commutated inverters, dual converter, introduction to cycloconverters.

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UNIT-V

Inverters & Choppers

Principles of inverters, classification of inverters, single phase bridge inverters, series inverters, parallel inverters, PWM inverters, principle of choppers, analysis of chopper circuits, multi quadrant choppers, commutation of choppers.

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Text Book:

1. S.O Kasap/Principles of Electronic Materials & Devices/McGraw-Hill Education India.
2. Rashid, M.H. /Power Electronics, Devices and applications/ PHI.

References:

1. A. J. Dekker/Electrical Engineering Materials/ PHI.
2. C.S Indulkar & S.Thiruvegada/An Introduction Electrical Engineering Materials, S. Chand & Co.
3. Jacob, J.M. /Power Electronics : principles and applications/ Vikas Pub. House Pvt. Ltd.

OUTCOME

On completion of this course the student will understand

1. Basic of crystal physics, structure identification of engineering material.
2. Different type of power electronics devices & their application.

IEE 301 –Linear Network and Systems

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3 1 0

Unit-I

Kirchoff's law, Source transformation, loops variable analysis, node variable analysis and duality.
AC Network theorems: Superposition, Thevenin's, Norton's, Millman, Telegen's and maximum power transfer theorems.
Introduction to continuous time singles and system, Basic continuous time signals, unit, ramp, impulse and gate function. (8)

Unit-II

Transient and steady state analysis for R-L, R-C, RLC circuits, Use of Laplace transform, Initial value and final theorem, Solution of differential equations using lap lace transform Lap lace transform of complex waveforms, and waveform synthesis. Formulation for liner time invariant (LTI) continuous time systems, Time Domain analysis of LTI system using lap lace transforms (transient and steady State). (10)

Unit-III

Concept of poles and zeros, Stability, Frequency response Positive real function:
Definitions and properties. Synthesis of RC, LC and Networks using Cauer's and Foster's first and second form. (7)

Unit-IV

Two port networks, two port parameters, Inter-Conversion of two port Parameters, Network Functions: Driving point and transfer function Interconnections of Two port networks, Recipe Dance, and Symmetry, Ladder Networks, Image impedances, Characteristic impedance, T-pie transformation. (8).

Unit-V

Introduction to graph theory, Definitions, Graphs, Three, Walk, Path, Loop, Co- tree, Cut-set matrices for planer network, loop and nodal analysis. (7)

References:

1. M.E.Van Valkenburg, Network Analysis, PHI
2. J.A.Edminister, Electric Circuits, Schaum Series, PHI
3. W.H. Hayt and Jack.E.Kammerly, Engineering Circuit Analysis, Tata Mc Graw Hill
4. A.Hussain, Network and Systems, Khanna publications

CYBER LAW AND INFORMATION SECURITY
ICS-305

L T P
2 1 0

Unit1

Fundamentals of Cyber Law: Jurisprudence of Cyber Law, Object and Scope of the IT Act 2000, Introduction to Indian Cyber Law, Unicitral Model Law, ISP Guideline.
Intellectual property issues and cyber space, Indian perspective, Overview of Intellectual property related legislation in India, Patent, Copy Right, Trademark law, Law related to semiconductor layout & design. [7]

Unit 2

E - Commerce: Security Threats to E - Commerce, Virtual Organization, Business Transactions on Web, E-Governance and EDI, Concepts in Electronics payment systems, E-Cash, Credit/Debit Cards, E- Agreement, Legal recognition of electronic and digital records, E-Commerce Issues of privacy, Wireless Computing- Security challenges in Mobile devices.
Digital Signatures - Technical issues, legal issues, Electronic Records, Digital Contracts, Requirements of Digital Signature System. [8]

Unit 3

Investigation and Ethics: Cyber Crime, Cyber jurisdiction, Cyber crime and evidence act, Treatment of different countries of cyber crime, Ethical issues in data and software privacy, Plagiarism, Pornography, Tampering computer documents, Data privacy and protection, Domain Name System, Software piracy, Issues in ethical hacking.
Internet security treats: Hacking, Cracking, Sneaking, Viruses, Trojan horse, Malicious Code & logic bombs.
Introduction to biometric security and its challenges, Finger prints.
Cyber crime forensic: CASE STUDY in Cyber Crime. [8]

Unit 4

Information security- Information Systems and its Importance, Role of Security in Internet and Web Services, Principles of Information Security, Classification of Threats and attacks, Security Challenges, Security Implication for organizations, Security services - Authentication, Confidentiality, Integrity, Availability and other terms in Information Security, Information Classification and their Roles.
Introduction to Cryptography, Issues in Documents Security, Keys: Public Key, Private Key, Firewalls, Basic Concepts of Network Security, Perimeters of Network protection & Network attack, Need of Intrusion Monitoring and Detection. [8]

References:

1. Harish Chander "Cyber Law and IT Protection" , PHI Publication, New Delhi
2. Merkov, Breithaupt," Information Security", Pearson Education
3. "Cyber Law in India" - Farooq Ahmad-Pioneer books.
4. K. K. Singh, Akanshs Singh- "Information Security and Cyber law", Umesh Publication, Delhi