SEMESTER III

THEORY:

S.No	Subject Name	L	P	M
1.	Advanced Engineering Mathematics	4	0	100
2.	Circuit Theory	4	0	100
3.	Electronic Devices	4	0	100
4.	Digital Logic Theory and Design	4	0	100
5.	Electromagnetic Theory	4	0	100
6.	Electrical Machines	4	0	100

PRACTICALS:

S.No	Subject Name	L	P	M
1.	Devices and Circuits Laboratory	0	3	100
2.	Analog and Digital Laboratory	0	3	100

ADVANCED ENGINEERING MATHEMATICS

(Common to CIVIL, MECH, MECHAT, ECE, EEE, CSE, E&I, IT)

1. PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation - Solutions of standard types of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

2. FOURIER SERIES **9**

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity – Harmonic Analysis.

3 BOUNDARY VALUE PROBLEMS **9**

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

4. FOURIER TRANSFORMS **9**

Statement of Fourier integral theorem - Fourier transform pairs - Fourier Sine and Cosine transforms – Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

5. Z TRANSFORMS **9**

Definition of Z Transforms; linearity; transforms of simple sequences; solution of difference equations. Inversion of Z transform by partial fractions & power series.

Total hours: 45

TEXT BOOKS:

1. Kreyszig, E., " Advanced Engineering Mathematics " (8th Edition), John Wiley and Sons, (Asia) Pte Ltd.,Singapore, 2000.
2. Grewal, B.S., " Higher Engineering Mathematics " (35th Edition), Khanna Publishers, Delhi 2000.

SEMESTER III

CIRCUIT THEORY

(COMMON FOR ECE & EIE)

1. BASICS OF CIRCUIT ANALYSIS **9**

Kirchoff's laws, DC and AC excitation, Series and parallel circuits, Sinusoidal steady state analysis, Mesh current and node voltage method of analysis, Matrix method of analysis.

2. NETWORK THEOREMS **9**

Thevenin's and Norton's theorems, Super position theorem, Compensation theorem, Reciprocity theorem, Maximum power transfer theorem, Millman's theorem, Tellegen's theorem.

3. RESONANCE AND COUPLED CIRCUITS **9**

Series and parallel resonance, Quality factor and Bandwidth, Multi resonance circuits, Coupling co-efficient, Frequency response and bandwidth, Tuned circuit.

4. TRANSIENTS **9**

Transient response of RL, RC and RLC circuits to DC excitation, Natural and forced oscillations.

5. DUALITY AND TOPOLOGY **9**

Concept of duality, Dual network, Graphs of a network, Trees, Chords and branches, Tieset and cutset of a graph, Application to network analysis.

Total : 45

Text Books:

1. William H. Hayt and Jack E. Kemmerly, " Engineering Circuit Analysis ", McGraw Hill International Edition, 1993.

References:

1. Joseph Edminister and Mahmood Nahri, " Electric Circuits ", Third Edition, Tata McGraw Hill, New Delhi, 1999.
2. Soni ML. & Gupta J.C., " A Course in Electrical Circuit Analysis ", Dhanpath Rai and Sons, New Delhi, 1981.
3. Umesh Sinha, " Network Analysis ", Satayaprakasan, New Delhi, 1986.
4. Paranjothi S.R., " Electric Circuit Analysis ", New Age International Ltd., New Delhi, 1996.
5. Chakrabati A., " Circuit Theory (Analysis and Synthesis) ", Dhanpath Rai & Sons, New Delhi, 1999.
6. Roland E. Thomas and Albert J. Rosa, " The Analysis and Design of Linear Circuits ", Prentice Hall International, 2nd Edition, 1988.

SEMESTER III

ELECTRONIC DEVICES
(Common to EEE,EIE & BME)

1. BASICS OF SEMICONDUCTORS **9**

Motion of charged particle in electric, magnetic and combined Fields-Semiconductor fundamentals-Fermi Level –Energy Band Diagram-Intrinsic and Extrinsic semiconductors-Carrier concentration - Drift and Diffusion currents-Space charge effect.

2. CHARACTERISTICS OF DIODES **9**

PN junction diode-theory and operation-Diode Equation- Minority carrier Concentration-Varactor diode-Avalanche and Zener breakdown-Zener diode-Tunnel diode-PIN diode – Photo diode - Photo Voltaic cell-LED-LCD-Light dependant resistor-Thermistors.

3. BIPOLAR JUNCTION TRANSISTORS **9**

Principle of transistor action-Transistor Current Components- Ebers Moll equation-CE,CB,CC Configurations-input and output Characteristics-'h' parameters- low frequency and high frequency equivalent circuits-Transistor as a switch-RF transistors-Power Transistors.

4. **FET AND UJT** **9**

Constructional features of junction field effect transistor-Theory and characteristics of JFET and MOSFET-Depletion and Enhancement type-Threshold voltage-Gate capacitance-MOS as a Charge transferring device-CCD, BBD-Power MOSFET-Theory and characteristics of UJT.

5. SCR AND IC FABRICATION **9**

Working and VI Characteristics Features of silicon controlled rectifier, DIAC, TRIAC, GTO-Device Technology – Planar process-Diffusion-Ion Implementation-Vapour Deposition-NMOS, PMOS Fabrication-Twin Tub Process of CMOS-Thick film and thin film technology.

TEXT BOOKS:

1.Millman and Halkias, "Electron Devices and Circuits", Tata McGraw Hill, 1991.
2.David A. Bell, "Electron Devices and Circuits",3rd Edition, Prentice Hall of India,1999.

REFERENCES:

1.Jaspit Singh, "Semiconductor Devices an Introduction", McGraw Hill International Edition 1994.
2.Sze S.M.,"Physics of Semiconductor devices," Wiley interscience,1981
3.Yang,"Fundamentals of Semiconductor devices", Mc Graw Hill International Edition,1978
4. Street man "Solid State Electron Devices "'Prentice hall of India, IV Edition,1995

SEMESTER III

DIGITAL LOGIC THEORY AND DESIGN

1. NUMBER SYSTEMS & BOOLEAN ALGEBRA 10

Review of Number systems – codes – Boolean Algebra, Demorgan's theorem canonical forms, Representation of combinational circuits by switching functions, graphical representation of switching functions K-map , Simplification using K-maps & Quine Mclusky methods separable functions , duality, unistateness, Threshold logic.

2. IMPLEMENTATION OF COMBINATIONAL SYSTEMS 10

Gates, Universal set of modules, Standard combinational Modules (Decoders, Encoders, Multiplexers, Demultiplexers, ROM, PLA Adders, Comparators, Code Converters, Function realizations using gates, multiplexer's memories and threshold gates.

3. SPECIFICATIONS OF SEQUENTIAL CIRCUITS 10

Specification based on State, Finite state model capabilities and limitations of FSM – memory elements and their excitation functions, Shift registers, Design of Counters – Synchronous, Aschynchronous, Up down & Johnson counters.

4. DESIGN OF SYNCHRONOUS SEQUENTIAL CIRCUITS 10

Synthesis of Synchronous sequential Circuits, state equivalence & Machine Minimization, Timing and clocking issues, State assignment, completely and incompletely specified sequential machines.

5. ASYNCHRONOUS SEQUENTIAL CIRCUITS 5

Synthesis, State assignments in asynchronous sequential circuits.

Total Hours 45

TEXT BOOKS

1. W.H.Gothman,"Digital Electronics-An Introduction ,Theory and partice", Prentice Hall of India.

2. M.Morris Mano" Digital Logic And Computer Design " Prentice Hall of India Pvt Ltd,New Dellhi

REFERENCES

1. Kohavi, Z., Switching & Finite automata Theory, Tata McGraw-Hill, New Delhi, 1981

2.Hachtel, G.D. & Somenzi, F., Logic Synthesis and Verification algorithms, Kluwer academic press 1996.

SEMESTER III

ELECTROMAGNETIC THEORY
(Common to IV Sem EEE and BME, EIE – III Sem)

1. ELECTROSTATICS **9**

Introduction - Difference between field theory and circuit theory – Charge - Coulomb's law - Continuous charge distribution - Electric field intensity - Electric flux - Gauss's law – Potential - boundary value problems - Laplace and Poisson's equations -Electrostatic energy – dielectrics - Capacitance.

2. MAGNETOSTATICS **9**

Magnetic field - Magnetic flux - Magnetic flux density - Biot-Savart's law -Ampere's law - torque – force - vector potential - boundary value problem.

3. ELECROMAGNETIC FIELDS **9**

Faraday's law - Lenz's law - Self inductance - mutual inductance - co-efficient of coupling - Dot rule for coupled circuits - series, parallel - inductance of solenoid, Toroid, Maxwell's equations (boundary conditions) - displacement current - eddy current.

4. ELECTROMAGNETIC WAVES **9**

Introduction - Solution of wave equation in free space - Conducting media -Uniform plane wave propagation, phase velocity, Group velocity - Conductors and transmission lines - Pointing vector - Skin effect.

5. FIELD MODELLING AND COMPUTATION **9**

Problem formulation - boundary conditions – solutions - analytical methods - variables separable methods - conformal transformation - method of images - numerical methods - finite difference method - finite element method - charge simulation method.

Total Hours = 45

TEXT BOOKS

1. K.A.Gangahar, P.M.Ramanathan, "Field Theory", Khanna Publishers, New Delhi, 15th Edition, Second Reprint, 2003.

2. Joseph A Edminister, 'Theory and Problems of Electro magnetics', Schaums outline series 3. McGraw-Hill book company New York, 1986.
4. William H.Hayt, Jr., 'Engineering Electromagnetic,' Tata McGraw-Hill Edition, New Delhi, 1998.

REFERENCES

1. David J Griffith, 'Introduction to Electrodynamics,' Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 1997.
2.Richard E. Dubroff, S.V.Marshall, G.G.Skitek, 'Electromagnetic Concepts and Applications', Fourth Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1996.
3. Kraus and Fleish, 'Electromagnetics with Applications', McGraw-Hill International Editions Fifth Edition 1999.

SEMESTER III

ELECTRICAL MACHINES

1. D.C. MACHINES **10**

Construction of D.C. machines – theory of operation of D.C. generator – characteristics of D.C. generators – armature reaction – commutation – principle of operation of D.C. motor – voltage equation – type of D.C. motor and their characteristics – speed control of D.C. motors.

2. TRANSFORMER **10**

Theory of ideal transformer – EMF equation – constructional details of shell and core type transformer – test on transformer – equivalent circuit – phasor diagram – regulation and efficiency of a transformer.

3. SYNCHRONOUS MACHINES **9**

Principle of alternators – constructional details – equation of induced EMF – vector diagram – method of starting of synchronous motor – torque developed by the motor – V curves – speed control.

4. INDUCTION MACHINES **9**

Construction and principle of operation – classification of induction motor – relation between torque and rotor power factor – starting and running condition – condition for maximum torque – comparison between synchronous motor and induction motor – speed control of induction motor.

5. SPECIAL MACHINES **7**

Types of single phase motor – double revolving field theory – cross field theory – capacitor start capacitor run motors – shaded pole motor – repulsion type motor – universal motor – hysteresis motor.

Total Hours 45

TEXT BOOKS

1. B.L.Theraja and A.K Theraja"A text book of electrical technology vol II" McGraw Hill,Newyork,1995
2. Nagrath.I.J.and KothariD.P."Electrical Machines"T.M.H.Publishing co-ltd,New Delhi,1990

REFERENCES

1. Fitzgerald A.E., Kingsly C., Umans S.D., 'Electrical Machinery', McGraw-Hill, Singapore1990.
2. Cotton H. 'Advanced Electrical Technology', Sir Isaac Pitman and Sons Ltd., London, 1971.
3. Del Toro V. 'Electrical Engineering Fundamentals', Prentice Hall of India, New Delhi, 1995.

SEMESTER III

DEVICES AND CIRCUITS LABORATORY

1. Verification of Kirchhoff's Law.
2. Verification of Thevenin's and Norton's Theorem.
3. Verification of super position and compensation Theorem.
4. Verification of Reciprocity and Maximum Power Transfer Theorem.
5. Series and Parallel Resonance Circuits.
6. Transients in RLC Circuits.
7. Series and Parallel AC Circuits and Phasor Diagram.
8. Coupled Circuits and Tuned Circuits.
9. Characteristics of semiconductor Diode and Zener Diode.
10. Characteristics of Transistor under common Emitter configuration.
11. Characteristics of Transistor under Common Base Configuration.
12. Characteristics of Transistor under Common collector configuration.
13. Characteristics of UJT and FET.
14. Characteristics of SCR, DIAC and TRIAC.

Total Hours 45

SEMESTER III

ANALOG AND DIGITAL LABORATORY

1. CE, CB, CC amplifiers.
2. RC and LC Oscillators.
3. Bridge and instrumentation amplifiers.
4. Rectifiers and voltage regulators.
5. Phase locked loop.
6. Bootstrap circuit.
7. Binary adder/subtractor/comparator.
8. Shift register and counter.
9. DAC and ADC.
10. Multiplexer and demultiplexer.
11. Encoder and decoder.
12. Seven segment display.

Total Hours 45