

SEMESTER III

(Applicable to the students admitted from the Academic year 2006 – 2007 onwards)

THEORY			L	T	P	M
1.		Advanced Engineering Mathematics	3	1	0	100
2.		Material Science	3	1	0	100
3.		Electronic Devices	3	1	0	100
4.		Electrical Machines – I	3	1	0	100
5.		Circuit Theory	3	1	0	100
6.		Thermodynamics & Fluid Machinery	3	1	0	100
PRACTICAL						
1.		Electrical Machines Laboratory – I	0	0	3	100
2.		Electric circuits & Electron Devices Lab	0	0	3	100

SEMESTER III
ADVANCED ENGINEERING MATHEMATICS
(Common to CIVIL, MECH, MECHAT, ECE, EEE, E&I, IT)

- 1. PARTIAL DIFFERENTIAL EQUATIONS** **9**
Formation – Solutions of standard types of first order equations – Lagrange’s 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**
Definition of z transform, linearity, transforms of simple sequence, solution of difference equations. Inversion of z transforms by partial fraction and power series

Total =45 Hrs

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.

REFERENCES

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., “Engineering Mathematics”, Volumes II & III (4th Revised Edition), S. Chand & Co., New Delhi, 2001.
2. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., “Advanced Mathematics for Engineering Students”, Volumes II & III (2nd Edition), S. Viswanathan (Printers & Publishers, Pvt, Ltd.) 1992.
3. Venkataraman, M.K. “Engineering Mathematics” Volumes III – A & B, 13th Edition National Publishing Company, Chennai, 1998.
4. Shanmugam, T.N. : <http://www.annauniv.edu/shan/trans.htm>

MATERIAL SCIENCE

1. CONDUCTING MATERIALS

9

Classical free electron theory of metals – electrical conductivity expression – drawbacks of classical theory, quantum theory, free electron theory of metals – it's importance density of states – fermi- dirac statistics – calculation of fermi energy and it's importance – effective mass of electron – concept of hole- origin of band gap in solids (qualitative treatment only) conductors, copper and aluminum – high resistivity alloys – super conductors – properties and applications.

2. SEMICONDUCTOR MATERIALS

9

Elemental and compound semiconductors and their properties – carrier concentration in n type and p type semiconductors- variation of carrier concentration with temperature and its influence – Hall effect – experimental arrangement- applications of hall effect.

3. MAGNETIC AND DIELECTRIC MATERIALS

9

Different types of magnetic material and their properties – Heisenberg and domain theory of ferromagnetism – hysteresis – energy product of a magnetic material – ferrite and their applications – magnetic recording materials – tapes and discs – metallic glasses – active and passive dielectrics and their frequency and temperature dependence – internal field and deduction of clausius mosotti equation – dielectric loss – different types of dielectric breakdown – classification of insulating materials and their applications .

4. OPTICAL MATERIALS

9

optical properties of metals, insulators and semiconductors – excitons, traps, colour centers and their importance – phosphorescence and fluorescence – different phosphors used in CRO screens – liquid crystal as display materials- twisted pneumatic display – construction and working of LED – LED materials – thermography and it's applications – photoconductivity and Photo conducting materials.

5. MODERN ENGINEERING MATERIALS

9

Metallic glasses as transformer core material – nano phase material – shape memory alloys – advanced ceramic materials – polymers – biomaterials – non-linear materials and their applications.

L = 45, TOTAL = 45

TEXT BOOK

1. Arumugam.M, 'Material science', Anuradha Technical book Publishers, Kumbakonam1997.

REFERENCES

1. Pillai S. O, 'Solid state physics', New age Inc, 1998.
2. Van Vlac.L, 'Material science for engineers', Addison Wesley, 1995.
3. Kingery.W.D., Bowen H.K. and Unimann,D.R., 'Introduction to Ceramics', John

- Wiley and sons. 2nd Ed.1991.
4. Raghavan, V. 'Materials science and Engineering', Prentice Hall of India, New Delhi, 1993.

SEMESTER III ELECTRONIC DEVICES

- 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

ELECTRICAL MACHINES -1

1. ELECTROMECHANICAL ENERGY CONVERSION AND ROTATING MACHINES

Principles of energy conversion – coupling field reaction- energy storage in singly and multiple excited systems- stored energy and mechanical force – concept of co energy and force equation – faraday’s law of electro magnetic induction and ampere’s law of force - electromechanical transducers- rotating machines.

2. DC MACHINES

Constructional features of dc machines- EMF equation – armature winding fundamentals- characteristics of different types of dc generators- commutation and armature reaction DC motors –torque equation- types – characteristics –starters- speed control.

3. TESTING, BRAKING AND PARALLEL OPERATION OF DC MACHINES

Swinburne’s test-hopkinson’s test- retardation test- load test- electric braking- parallel operation of DC generators.

4. TRANSFORMERS – PRINCIPLES AND CHARACTERISTICS

principle of operation, types, constructional features of single phase transformer- EMF equation- transformer on no load and on load- effects of resistance and leakage reactance of the windings- phasor diagram- equivalent circuit – regulation and efficiency.

5. CONNECTION AND TESTING OF TRANSFORMER

Three phase transformer constructional features and connection – Scott connection- auto transformer- all day efficiency- sumpner’s test- parallel operation of transformer- no load and on load tap changing transformers.

TEXT BOOKS

- 1.DR.S.K.BHATTACHARYA, “ ELECTRICAL MACHINES” TATA MC GRAW HILL
- 2.NAGRATH I.J. AND KOTHARI D.P. “ELECTRIC MACHINES “TATA MC GRAW HILL

REFERENCES

- 1.DR.K. MURUGESH KUMAR, ”DC MACHINES & TRANSFORMERS” VILAS PUBLISHING HOUSE PVT LTD
- 2.FITZGERALD A.E.,CHARLES KINGSLEY Jr,Stephen D.umans,”electric machinery” TATA MC GRAW HILL

3.SYED A. NASSAR," ELECTRIC MACHINES AND POWER SYSTEMS" VOLUME-1 ELECTRIC MACHINES, TATA MC GRAW HILL,NEWYORK-1995

4.THERAJA.B.L."ELECTRIC TECHNOLOGY" VOL-II AC/DC MACHINES

CIRCUIT THEORY

1. BASIC CIRCUIT CONCEPTS 9

Review of basic concepts- dc &ac circuits-R, L, and C elements phasor diagrams-complex impedance-real & reactive power- series & parallel circuits- Formation of matrix equations and analysis of complex circuits using mesh-current and nodal-voltage methods

2. NETWORK THEOREMS AND TRANSFORMATIONS. 9

voltage – current – source transformation.star delta transformation-Superposition theorem – reciprocity theorem – substitution theorem – maximum power transfer theorems – Thevenin's theorem – Norton's theorem and Millman's theorem with applications.

3. RESONANCE AND COUPLED CIRCUITS 9

series resonance and parallel resonance – bandwidth and Q factor. Inductively coupled-coefficient of coupling- dot conversion- multi winding coupled circuits- analysis of coupled circuits

4. THREE PHASE CIRCUITS 9

Solution of three-phase balanced circuits – power measurements by two-wattmeter methods – solution of three-phase unbalanced circuits.-three phase power measurement by three ammeter & three voltmeter method.

5. TRANSIENT ANALYSIS 9

Forced and free response of RL, RC and RLC circuits with D.C. and sinusoidal excitations. Using laplace method.

TEXT BOOKS

1.Dr.S.A arumugam,prem Kumar, circuit theory-kanna publishers

2.Sudhakar, A. and Shyam Mohan S.P., 'Circuits and Network Analysis and Synthesis', Tata McGraw-Hill Publishing C.Ltd., New Delhi, 1994.

REFERENCES

1. Paranjothi S.R., 'Electric Circuit Analysis', New Age International Ltd., Delhi, 2nd Edition, 2000.
2. Hyatt, W.H. Jr and Kemmerly, J.E., 'Engineering Circuits Analysis', McGraw-Hill International Editions, 1993.
3. Edminister, J.A., 'Theory and Problems of Electric Circuits', Schaum's outline series McGraw Hill Book Company, 2nd Edition, 1983.

SEMESTER III

THERMODYNAMICS AND FLUID MACHINERY

1. BASIC CONCEPTS AND LAWS OF THERMODYNAMICS

Thermodynamics systems – property, state, path and process, quasi static process, work, modes of work – Zeroth law of Thermodynamics – Concepts of temperature and heat. Concept of ideal and real gases. First law of thermodynamics – applications. Second Law of Thermodynamics – Reversibility and Irreversibility. Carnot cycle – Efficiency and COP, Concept of Entropy – Simple Problems on I and II Law and Carnot Cycle.

2. PRIME MOVERS

Internal Combustion Engines – Components and functions.

Steam Turbines – Impulse and Reaction turbine, Compound, Simple and multistage turbines

HEAT TRANSFER

Conduction, Convection and Radiation heat transfer. Heat Exchangers. Description only.

3. POWER PLANTS

Lay out of Steam Turbine Power plant , Gas Turbine Power Plant, Combined Cycle Power Plant and Nuclear Power Plant – Cogeneration

4.BASIC CONCEPTS OF FLUID MECHANICS

Introduction – Classification – types of fluids – properties – laws of pressure – atmospheric, gauge, absolute pressure, pressure measurement - manometers

Types of fluid flow – velocity – rate equation of continuity – energy of a liquid in motion – head of a liquid – Bernoulli's theorem – orifice and mouthpiece

5.PUMPS AND TURBINES

Introduction – types of pumps – reciprocating pump – Construction details – co-efficient of discharge – slip – power required – centrifugal pump – classification – working principle – specific speed – turbine – classification – working principle.

TEXT BOOKS

1. R.K.Rajput, Engineering Thermodynamics, Laxmi Publications, New Delhi.
2. C.P>Kothandaraman, Fundamentals of heat transfer, New age publishers, New Delhi
3. S.C Arora and Domkundwar, Power Plant Engineering, Tata Mc graw hill, New Delhi
4. Bansal.R.k., fluid Mechanics and Hydraulic Machines, Laxmi Publications

ELECTRICAL MACHINES LABORATORY – I

1. Load test on dc shunt motor
2. Load test on dc series motor
3. Speed control of dc shunt motor
4. Occ & load test on dc separately excited generator
5. Occ& load test on dc shunt generator
6. Load test on dc series generator
7. Load test on single phase transformer
8. Oc&sc test on single phase transformer
9. Swinburnes test
10. Separation of iron losses in dc machines
11. Hopkinson's test
12. Sumpner's test on 1-phase transformer
13. Study of three phase transformer connections.

Total = 45HRS

ELECTRIC CIRCUITS AND ELECTRON DEVICES LAB

ELECTRIC CIRCUITS

1. Verification of thevenin theorem
2. Verification of Norton's theorem
3. Verification of superposition theorem
4. Three phase power measurement by two wattmeter method.
5. Three phase power measurement by 3 ammeters and 3 voltmeter
6. Study of circuit transients by digital simulators.

ELECTRON DEVICES:

1. Characteristics of PN junction diode
2. Characteristics of zener diode

3. Characteristics of transistor (CE, CB, CC configurations)
4. Characteristics of FET
5. Characteristics of UJT
6. Characteristics SCR

TOTAL 45 HRS