FACULTY OF ENGINEERING AND TECHNOLOGY

REGULATIONS - 2017

CURRICULUM AND SYLLABUS

FROM

I & II SEMESTERS

FOR

B.TECH . – ELECTRICAL AND ELECTRONICS ENGINEERING

(PART TIME)

FACULTY OF ENGINEERING AND TECHNOLOGY

REGULATIONS-2017

CHOICE BASED CREDIT SYSTEM

CURRICULUM FROM I TO II SEMESTERS FOR

B.TECH - ELECTRICAL AND ELECTRONICS ENGINEERING (PART TIME)

SEMESTER –I

Sl.No	Course Code	Course Title	Dept. Offering the course	L	T	P	C
	THEORY						
1.		Engineering Mathematics	Mathematics	3	1	0	4
2.		Environmental Sciences& Engineering	Chemistry	3	0	0	3
3.		Electron Devices	ECE	3	0	0	3
4.		Electric Circuit Analysis	EEE	3	1	0	4
	PRACTICAL						
5.		Electric Circuits Laboratory	EEE	0	0	3	2
		TOTAL		**12**	**2**	**3**	**16**

SEMESTER -II

Sl.No	Course Code	Course Title	Dept. Offering the course	L	T	P	C
	THEORY						
1.		Advanced Engineering Mathematics	Mathematics	3	1	0	4
2.		Electro Magnetic Theory	EEE	3	1	0	4
3.		Electrical Machines - I	EEE	3	0	0	3
4.		Measurement and Instrumentation	EEE	3	0	0	3
	PRACTICAL						
5.		Electrical Machines- I Laboratory	EEE	0	0	3	2
		TOTAL		**12**	**2**	**3**	**16**

YEAR	I	ENGINEERING MATHEMATICS	L	T	P	C
SEMESTER	I	(COMMON TO MECH,ECE,CSE,EEE, CIVIL, IT, MECHTRONICS, AERONAUCTICAL ,AUTOMOBILE BRANCHES)	3	1	0	4

UNIT – I MATRICES **9**

Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT – II ORDINARY DIFFERENTIAL EQUATIONS **9**

Solutions of First and Second order linear ordinary differential equation with constant coefficients – Method of variation of parameters –Simultaneous first order linear equations with constant coefficients.

UNIT – III MULTIPLE INTEGRALS AND VECTOR CALCULUS **9**

Double integration - Cartesian and polar coordinates –Area as a double integral – Triple integration – volume as a triple integral- Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal- vector fields – vector integration.

UNIT – IV LAPLACE TRANSFORMS **9**

Laplace transform – transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals – initial and final value theorems – Transform of periodic functions.

UNIT – V APPLICATIONS OF LAPLACE TRANSFORMS **9**

Inverse Laplace transform – Convolution theorem – Initial and Final value theorem-Solution of linear ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms.

Total hours : 60

Lecture Hours: 45

Tutorial Hours: 15

TEXT BOOKS

1. "Engineering Mathematics" by Department of Mathematics, VMU

2. Veerarajan, T., "Engineering Mathematics", Tata McGraw Hill Publishing Co., NewDelhi, 2006.

3. Prof.Dr.A .Singaravelu , Engineering Mathematics Volume I & Volume II by Meenakshi Publications.

REFERENCE BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics" (36th Edition), Khanna Publishers, Delhi 2001.

2. Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.

3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics", Volumes I &

II (4th edition), S.Chand & Co., New Delhi., 2001.

YEAR	I	ENVIRONMENTAL SCIENCE AND ENGINEERING (Common to All Branches)	L	T	P	C
SEMESTER	I		3	0	0	3

UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

10

Definition, scope and importance – need for public awareness- forest resources: use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their ground water, floods, drought, conflicts over water, dams-benefits and problems-mineral resources: use effects on forests and tribal people-water resources: use and over-utilization of surface and exploitation, environmental effects if extracting and using mineral resources, case studies-food resources: world food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity, case studies-energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies –land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification –role of an individual in conservation of natural resources-equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets-river / forest. / grassland / hill / mountain.

UNIT – II ECOSYSTEMS AND BIODIVERSITY 14

Concept of and ecosystem –structure and function of an ecosystem-producers, consumers and decomposers-energy flow in the ecosystem-ecological succession-food chains, food webs and ecological pyramids-introduction, types, characteristic features, structure and function of the (a)forest ecosystem (b). grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers oceans, estuaries)-introduction to biodiversity- definition: genetic, species and ecosystem diversity-biogeographical classification of India-value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values-biodiversity at global, national and local levels-India as a mega-diversity nation-hot-spots of biodiversity-threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts-endangered and endemic species of India –conservation of biodiversity: in-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT – III ENVIRONMENTAL POLLUTION 8

efinition-causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards – solid waste management: caused, effects and control measures of urban and industrial wastes-role of an individual in prevention of pollution-pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site-urban / rural / industrial / agriculture

UNIT – IV SOCIAL ISSUES AND THEIR ENVIRONMENT 7

From unsustainable to sustainable development-urban problems related to energy- water conservation, rain water harvesting, watershed management –resettlement and rehabilitation of people, its problems and concerns, case studies – environmental ethics: issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – wasteland reclamation-consumerism and waste products-environment protection act-air (prevention and control of pollution) act-water (prevention and control of pollution) act- wildlife protection act-forest conservation act-issues involved in enforcement of environmental legislation-public awareness.

UNIT – V HUMAN POPULATION AND THE ENVRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme-environment and human health – human rights- value education- HIV/ AIDS – women and child welfare –role of information technology in environment and human health –case studies.

Total Hours : 45

TEXT BOOK:

1. Raman Sivakumar, Environmental Science and Engineering, Vijay Nicole imprints Pvt.Ltd.

REFERENCE BOOKS :

1. Bharucha Erach, The Biodiversity of India, publishing Pvt. Ahmedabad, India,
2. Trivedi R.K. Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards, Vol. and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, jaicao., House, Mumbai, 2001.
4. Weger K.D., Environmental Management, W.B. Saunders, Co., Philadelphia, USA., 1998.
5. Gilbert M.Masters, Introduction to Environmental Engineering and science, pearson Education Pvt., Ltd., Second Edition, 2004
6. Miller `T.G. Jr., Environmental Science, Wadsworth Publishing Co.
7. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science Trivedi
8. R.K And P.K. Goel, Introduction to air pollution, Techno-Science publications.

YEAR	I	ELECTRIC CIRCUIT ANALYSIS	L	T	P	C
SEMESTER	I		3	1	0	4

AIM

- To study concepts of basic circuits, Network theorems, resonance and coupled circuits, balanced and unbalanced circuits and transient analysis of circuits.

OBJECTIVE:

- To understand basic circuit concepts.
- To study networks and solution of DC and AC circuits.
- To understand series and parallel resonance concepts and analysis of coupled circuits.
- To understand transient analysis of RL, RC and RLC circuits with DC and sinusoidal excitations
- To study protection of balanced and unbalanced loads and measurement of power and power factor in three phase circuits.

UNIT - I BASIC CIRCUIT ANALYSIS 12

Ohm's law, Kirchoff's laws. DC and AC circuits. Resistors in series and parallel circuits. Mesh current and node voltage method of analysis for DC and AC circuits (AC circuits at elementary level only)

UNIT – II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12

Network reduction : Voltage and current division-Source Transformation-Star, delta conversion, The venin's Theorem and Norton's Theorem-Superposition Theorem-Maximum power transfer Theorem.

UNIT – III RESONANCE AND COUPLED CIRCUITS 12

Series and Parallel resonance- their frequency response - Quality factor and Bandwidth - Self and Mutual inductance- Co-efficient of coupling- Tuned circuits- Single Tuned circuits and double Tuned circuits.

UNIT – IV TRANSIENT RESPONSE OF DC AND AC CIRCUITS. 12

Transient response of RL, RC, and RLC circuits using Laplace Transform for DC input and AC sinusoidal inputs only.

UNIT – V ANALYSIS OF THREE PHASE CIRCUITS 12

Three phase balanced and unbalanced voltage sources- Analysis of three phase 3 wire and 4 wire circuits with star and delta connected loads- balanced and unbalanced phasor diagram of voltages and currents - Power and power factor measurements in three phase circuits.

TOTAL: 60

TEXT BOOKS:

1. Electric Circuit Theory, Dr.M.Arumugam, N.Premkumaran, 6th Edition, Khanna publishers, New Delhi - 6.
2. Electric Circuit Analysis, Sudhakar.A and Shyam Mohan.SP, 2nd Edition,2009, Tata Mc-Graw Hill Publications, New Delhi.

REFERENCES:

1. Engineering Circuit Analysis, W.H.Hayt & J.K.Kemmerly and Steven M.Durbin, 7th Edition, 2007, Tata Mc-Graw Hill Publications, New Delhi.
2. Circuit Theory, A.Chakabarthi, 5th Edition, 2006, Dhanpatrai & Co, New Delhi.

YEAR	I	ELECTRON DEVICES	L	T	P	C
SEMESTER	I		3	0	0	3

AIM

The purpose of this course is to provide a basis for understanding the characteristics, operation and limitations of various semiconductor devices.

OBJECTIVES

1. To understand the basics of electrons and to find the motion of charges in electrostatic and magnetic fields.
2. To understand the basics and characteristics of a Semiconductor and its types in Equilibrium and Non-Equilibrium conditions.
3. To understand the working of PN junction diodes and special purpose diodes.
4. To understand the basic operations of BJT and its characteristics.
5. To understand the Constructional features working and characteristics of FET, UJT and SCR

UNIT – I ELECTRON BALLISTICS AND INTRINSIC SEMICONDUCTORS 9

Force on charge in electric field - Motion of Charge in uniform and time varying electric fields - Force on a moving charge in a magnetic field - calculation of cyclotron frequency - calculation of electrostatic and magnetic deflection sensitivity.

Energy band structure of conductors, semiconductors and insulators - Density distribution of available energy states in semiconductors - Fermi- Diac probability distribution function at different temperatures - Thermal generation of carriers - Calculation of electron and hole densities in intrinsic semiconductors - Intrinsic concentration - Mass Action Law.

UNIT – II EXTRINSIC SEMICONDUCTOR AND PN JUNCTIONS 9

N and P type semiconductors and their energy band structures - Law of electrical neutrality - Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors - Mobility, drift current and conductivity - Diffusion current - Continuity equation - Hall effect. Band structure of PN Junction - Current Component in a PN Junction - Derivation of diode equation - Temperature dependence of diode characteristics.

UNIT – III SWITCHING CHARACTERISTICS OF PN JUNCTION AND SPECIAL DIODES 9

Calculation of transition and diffusion capacitance - Varactor diode - charge control description of diode - switching characteristics of diode - Mechanism of avalanche and Zener breakdown - Temperature dependence of breakdown voltages - Backward diode - Tunneling effect in thin barriers Tunnel diode - Photo diode - Light emitting diodes.

UNIT – IV BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9

Construction of PNP and NPN transistors - BJT current components - Emitter to collector and base to collector current gains - Base width modulation CB and CE characteristics - Breakdown characteristics - Ebers - Moll model - Transistor switching times.

Construction and Characteristics of JFET - Relation between Pinch off Voltage and drain current - Derivation. MOSFETS - Enhancement and depletion types.

UNIT – I METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICE 9

Metal Semiconductor Contacts - Energy band diagram of metal semiconductor junction Schottky diode and ohmic contacts. Power control devices: Characteristics and equivalent circuit of UJT -intrinsic stand off ratio. PNPN diode - Two transistor model, SCR, Triac, Diac.

TOTAL HOURS : 45

TEXT BOOKS:

1. Jacob Millman & Christos C.Halkias, ‘‘Electronic Devices and Circuits” Tata McGraw-Hill,1991 .

REFERENCES:

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices - Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A.Neaman,” Semiconductor Physics and Devices” 3rd Ed., Tata McGraw-Hill 2002.
3. S.M.Sze, Semiconductor Devices - Physics and Technology, 2nd edn. John Wiley, 2002.
4. Ben G.Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.
5. Anokh Singh, Principles of Communication Engineering, S.Chand & Co, 1994
6. V.K.Mehta,”Principles of Electronics’’S.Chand&Co,2002

YEAR	I	Practicals ELECTRIC CIRCUITS LAB	L	T	P	C
SEMESTER	I		0	0	3	2

1. Verification of Kirchhoff's Law.
2. Verification of The venin's Theorem.
3. Verification of Norton's Theorem.
4. Verification of super position Theorem.
5. Verification of compensation Theorem.
6. Verification of Reciprocity and Maximum Power Transfer Theorem.
7. Series Resonance Circuits
8. Parallel Resonance Circuits.
9. Transients in RLC Circuits.
10. Series AC Circuits and Phasor Diagram.

YEAR	I	ADVAVCED ENGINEERING MATHEMATICS	L	T	P	C
SEMESTER	II	(COMMON TO MECH,ECE,CSE,EEE, CIVIL, IT, MECHTRONICS, AERONAUCTICAL ,AUTOMOBILE BRANCHES)	3	1	0	4

UNIT – I 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.

UNIT – II FOURIER SERIES **9**

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

UNIT – III BOUNDARY VALUE PROBLEMS **9**

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation

UNIT – IV 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.

UNIT – V Z - TRANSFORM **9**

Z-Transform – Elementary Properties – Inverse Z-Transform – Convolution Theorem – Formation of Difference Equations – Solution of Difference Equations using Z-Transform.

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.
3. Prof.Dr.A .Singaravelu, Transform and Partial Differential Equations by Meenakshi Publications.

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 (2ndEdition), 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

YEAR	I	ELECTROMAGNETIC THEORY	L	T	P	C
SEMESTER	II		3	0	0	3

AIM

- To study the theory and designing equations of Electrostatics and Magnetostatics.

OBJECTIVES

- To impart knowledge on basic concepts of electromagnetic fields .
- To understand the Law of electrostatics.
- To gain knowledge about the concepts of Magneto statics.
- To gain knowledge about the perception of electromagnetic fields.
- To understand the generation and parameters of electromagnetic waves .

UNIT – I INTRODUCTION **8**

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems Divergence theorem – Stoke's theorem.

UNIT – II ELECTROSTATICS **10**

Coulomb's Law – Electric field intensity – Field due to point and continuous charges – Gauss's law and application – Electrical potential – Electric field and equipotential plots – Electric field in free space, conductors, dielectric – Dielectric polarization, Electric field in multiple dielectrics – boundary conditions, Poisson's and Laplace's equations – Capacitance-energy density – Dielectric strength.

UNIT – III MAGNETOSTATICS 9

Lorentz Law of force, magnetic field intensity – Biot–savart Law - Ampere's Law – Magnetic field due to straight conductors, circular loop, infinite sheet of current – Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization – Magnetic field in multiple media – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density – Magnetic circuits.

UNIT – IV ELECTRODYNAMIC FIELDS 8

Faraday's laws, induced emf – Transformer and motional EMF, Maxwell's equations (differential and integral forms) – Displacement current – Relation between field theory and circuit theory.

UNIT – V ELECTROMAGNETIC WAVES 9

Generation – Electro Magnetic Wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors-skin depth, Poynting vector – Plane wave reflection and refraction.

L = 45 T = 15 Total = 60

TEXT BOOKS

1. John.D.Kraus, „Electromagnetics", McGraw Hill book Co., New York, Fourth Edition, 1991.

2. William .H.Hayt, „Engineering Electromagnetics", Tata McGraw Hill edition, 2001.

REFERENCE BOOKS

1. Joseph. A.Edminister, „Theory and Problems of Electromagnetics", Second edition, Schaum Series, Tata McGraw Hill, 1993.
2. I.J. Nagrath, D.P. Kothari, „Electric Machines", Tata McGraw Hill Publishing Co Ltd, Second Edition, 1997.
3. Kraus and Fleish, „Electromagnetics with Applications", McGraw Hill International Editions, Fifth Edition, 1999.

YEAR	I	ELECTRICAL MACHINES - I	L	T	P	C
SEMESTER	II		3	0	0	3

AIM

- To study the theory, operation and performance of DC machines and Transformer.

OBJECTIVES

- To impart knowledge on basic concepts of rotating machines.
- To understand the principle of operation and performance of DC generator.
- To gain knowledge about construction, principle of operation and performance of DC motor.
- To gain knowledge about the construction, principle of operation and performance of Transformer.
- To understand the Performance constraints of DC machines by appropriate tests.

UNIT – I BASIC CONCEPTS OF ROTATING MACHINES 8

Principles of electromechanical energy conversion – Single and multiple excited systems – m.m.f of distributed A.C. windings – Rotating magnetic field – Generated voltage – Torque in round rotor machine.

UNIT – II DC GENERATORS 8

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Armature reaction and commutation – Parallel operation of DC shunt and compound generators.

UNIT – III DC MOTORS 9

Principle of operation – Back emf and torque equation – Characteristics of series, shunt and compound motors – Starting of DC motors – Types of starters – Speed control of DC series and shunt motors.

UNIT – IV TRANSFORMERS 12

Constructional details of core and shell type transformers – Types of windings – Principle of operation – emf equation – Transformation ratio – Transformer on no-load – Parameters referred to HV / LV windings – Equivalent circuit – Transformer on load – Regulation – Parallel operation of single phase transformers – Auto transformer – Three phase transformers – Vector group.

UNIT –V TESTING OF DC MACHINES AND TRANSFORMERS 8

Losses and efficiency in DC machines and transformers – Condition for maximum efficiency – Testing of DC machines – Brake test, Swinburne's test, Retardation test and Hopkinson's test – Testing of transformers – Polarity test, load test, open circuit and short circuit tests – All day efficiency.

Note : Unit5 may be covered along with Unit 2,3,and 4.

L = 45 T = 15 Total = 60

TEXT BOOKS

1. D.P. Kothari and I.J. Nagrath, „Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2002.

2. P.S. Bimbhra, „Electrical Machinery", Khanna Publishers, 2003.

REFERENCE BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, „Electric Machinery", Tata McGraw Hill publishing Company Ltd, 2003.
2. J.B. Gupta, „Theory and Performance of Electrical Machines, S.K.Kataria and Sons, 2002.
3. K. Murugesh Kumar, „Electric Machines, Vikas publishing house Pvt Ltd, 2002.

YEAR	I	MEASUREMENTS AND INSTRUMENTATION	L	T	P	C
SEMESTER	II		3	0	0	3

AIM

- To study the concepts of measurements and construction with operation of Electrical and Electronics Instruments.

OBJECTIVES

- To converse knowledge on basic functional elements and Performance characteristics of Instruments.
- To understand the construction and principle operation of Electrical and Electronics instruments.
- To gain knowledge about the construction and performance of signal conditioning circuits.
- To gain knowledge about the construction and principle operation of storage and display devices.
- To understand the classification and selection of transducers.

UNIT – I INTRODUCTION **6**

Functional elements of an instrument - static and dynamic characteristics – errors in measurement - statistical evaluation of measurement data - standard and calibration.

UNIT – II ELECTRICAL AND ELECTRONICS INSTRUMENTS **12**

Principle and types analog and digital ammeters and voltmeters – single and three phase Wattmeters and Energy meter - magnetic measurements – instrument transformers – instruments for measurement of frequency and phase.

UNIT – III SIGNAL CONDITIONING CIRCUITS **9**

Bridge circuits – differential and Instrumentation amplifiers - filter circuits - V/f and f/V converters – P/I and I/P converters – S/H Circuit, A/D and D/A converters - multiplexing and demultiplexing - data acquisition systems – grounding techniques.

UNIT – IV STORAGE AND DISPLAY DEVICES **8**

Magnetic disc and tape recorders – digital plotters and printers – CRT displays – digital CRO – LED, LCD and Dot matrix displays.

UNIT – V TRANSDUCERS **10**

Classification of transducers – selection of transducers – resistive, capacitive and inductive transducers – piezo electric transducers – optical and digital transducers. pH electrodes - transducers for measurement of displacement, temperature, level, flows, pressure, velocity, acceleration, torque, speed,Viscosity and moisture.

Total Hours = 45

TEXT BOOKS

1. Doebeling, E.O., 'Measurement Systems – Application and Design', McGraw Hill Publishing Company, 1990.
2. H.S.Kalsi, „Electronic Instrumentation", TMH Co., 1995.

REFERENCES

1. Stout M.B., 'Basic Electrical Measurement', Prentice Hall of India, 1986.
2. Dalley, J.W., Riley, W.F. and Meconnel, K.G., 'Instrumentation for Engineering Measurement', John Wiley & Sons, 1993
3. Moorthy, D.V.S., 'Transducers and Instrumentation', Prentice Hall of India Pvt. Ltd., 1995

YEAR	I	Practicals ELECTRICAL MACHINES LAB - I	L	T	P	C
SEMESTER	I		0	0	3	2

1. Open circuit and load characteristics of D.C separately and self excited shunt generator

2. Load characteristics of D.C. compound generator with differential and cumulative connection

3. Load characteristics of D.C. shunt and compound motor

4. Load characteristics of D.C series motor

5. Swinburnes test and speed control of D.C shunt motor

6. Hopkinsons test on D.C motor – generator set

7. Load test on single-phase transformer and three phase transformer connections

8. Open circuit and short circuit tests on single phase transformer

9. Sumpners test on transformers

10. Separation of no-load losses in single phase transformer

P = 45 Total = 45