ANURAG
Engineering Engineers

ANURAG GROUP OF INSTITUTIONS

(AUTONOMOUS)

(Formerly CVSR College of Engineering)

Venkatapur, Ghatkesar, Hyderabad – 500 088.
www.cvsr.ac.in

B.Tech. Programs:
Chemical Engineering
Civil Engineering
Computer Science and Engineering
Electrical and Electronics Engineering
Electronics and Communication Engineering
Information Technology
Mechanical Engineering

Pharmacy Programs:
B.Pharmacy
Pharma-D
Pharma-D (Post Baccalaureate)
M.Pharm (Pharmaceutics)
M.Pharm (Pharmacology)
M.Pharm (Pharmaceutical Analysis & Quality Assurance)
M.Pharm (Industrial Pharmacy)

M.Tech. Programs:
M.Tech (Computer Science and Engineering)
M.Tech (Software Engineering)
M.Tech (Computer Science)
M.Tech (Computer Networks & Information Security)
M.Tech (Power Electronics & Electrical Drives)
M.Tech (Electrical Power Systems)
M.Tech (CAD/CAM)
M.Tech (Machine Design)
M.Tech (VLSI System Design)
M.Tech (Embedded Systems)
M.Tech (Electronics & Communications Engineering)
M.Tech (Wireless & Mobile Communication)
M.Tech (Structural Engineering)
M.Tech (Construction Management)

Master of Business Administration
Master of Computer Application

COURSE STRUCTURE AND DETAILED SYLLABUS

II - B.TECH - I & II- SEMESTERS

ELECTRICAL & ELECTRONICS ENGINEERING

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2014-2015)

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COURSE STRUCTURE AND DETAILED SYLLABUS

ELECTRICAL & ELECTRONICS ENGINEERING

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2012-2013)

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II YEAR I SEMESTER **COURSE STRUCTURE**

Code	Subject Name	Lectures	T/P/D	Credits
A53007	Mathematics-IV	4	1	4
A53008	Fluid Mechanics & Hydraulic Machinery	3	1	3
A53009	Electronic Devices and Circuits	4	1	4
A53010	Network Theory	3	1	3
A53011	Electro Magnetic Fields	3	1	3
A53012	Electrical Machines –I	4	1	4
A53203	Fluid Mechanics & Hydraulic Machinery Lab	-	3	2
A53204	Electrical Circuits Lab	-	3	2
	Total	**21**	**12**	**25**

II YEAR II SEMESTER **COURSE STRUCTURE**

Code	Subject Name	Lectures	T/P/D	Credits
A54006	Electronic Circuits	4	1	4
A54007	Managerial Economics and Financial Analysis	3	1	3
A54008	Power Systems –I	3	1	3
A54009	Control Systems	4	1	4
A54010	Environmental Studies	3	1	3
A54011	Electrical Machines –II	4	1	4
A54204	Electrical Machines Lab-I	-	3	2
A54205	Electronic Devices and Circuits lab	-	3	2
	Total	**21**	**12**	**25**

Note: All End Examinations (Theory and Practical) are of three hours duration.

T – Tutorial P – Practical D – Drawing

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II Year B.Tech. EEE - I Sem	L	T / P / D	C
	4	1	4

MATHEMATICS-IV

Course Objectives:

- Analyze the characteristics and properties of Fourier transforms
- To introduce the basic theory of functions of a complex variable and complex analysis methods.
- To find the limits of functions and determine continuity of functions and use power series and line integrals to construct differentiable functions.
- To find Laurent series about isolated singularities and determine residues and use the residue theorem to compute several kinds of real integrals.
- To use conformal mapping to solve the Dirichlet problem in region.

UNIT-I: Fourier Transformations

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms – properties –inverse transforms – Convolution theorem – Finite Fourier transforms.

UNIT-II: Functions of a complex variable

Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method. Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties – General power Z (c is complex), principal value.

UNIT-III: Complex Integration and Complex Power series

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.
Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity.

UNIT-IV: Contour Integration

Residue – Evaluation of residue by formula and by Laurent series - Residue theorem.
Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)\,dx$ (b) $\int_{0}^{2\pi} f(\cos\theta, \sin\theta)\,d\theta$

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(d) Integrals by indentation.

UNIT-V:

Conformal m*nz*ZZZe,,ln,2(n positive integer), Sin z, cos z, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points .

TEXT BOOKS

1. A text Book of Engineering Mathematics, Vol-III T. K. V. Iyengar, B. Krishna Gandhi and
Others, S. Chand & Company.
2. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna
Publishers.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
5. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

REFERENCE BOOKS:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thamson Book Collection.
4. Shahanaz Bathul (2010), Engineering Mathematics - III, 2nd Edition, Hyderabad, PHI Learning Private Limited.
5. Schaum's outline series on Complex Anlysis.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.apping
Transformation by

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Determine Fourier transform, Fourier sine and cosine transform of a function
- Apply complex analysis in the study of mechanics of solids and liquids, thermodynamics, electrical fields etc
- Apply Taylor's and Laurent series in evaluation of both real and complex integrals in summation of series.
- Apply Residue theorem which is an elegant theorem in complex integration and useful in evaluating complicated real integrals.
- Apply conformal mapping in solving boundary value problems in two dimensional potential theories by transforming a complicated region to simpler region as it preserves solutions of two dimensional Laplace equations.
- Develop alternative ways to solve a problem and systematic approach of a solution for a real time applications.

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II Year B.Tech. EEE - I Sem	L	T/P/D	C
	3	1	3

FLUID MECHANICS AND HYDRAULIC MACHINERY

Course Objectives:
- Learn the units and dimensions and their applications,
- Study fluid statics and fluids in motion,
- Study fluid behavior of fluids under various flow conditions and fluid friction in pipes leading to design procedures for flow systems.
- Principles of operation of different types of pumps and hydraulic machinery.

UNIT – I

FLUID STATICS: Dimensions and units: physical properties of fluids - specific gravity, viscosity, surface tension – vapour pressure and their influence on fluid motion – atmospheric, gauge and vacuum pressures – measurement of pressure – Piezometer, U-tube and differential manometers.

FLUID KINEMATICS: Steam line, path line and streak lines and steam tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rational & irrational flows-equation of continuity for one dimentional flow and three dimentional flows.

UNIT – II

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

CLOSED CONDUIT FLOW: Reynold's experiment-Darcy Weisbach equation-Minor losses in pipes – pipes in series and pipes in parallel – total energy line – hydraulic gradient line. Measurement of flow: pitot tube, venture meter and orifice meter, Flow nozzle.

Measurement of flow: Pitot tube, Venturi meter and Orifice meter, Flow nozzle.

UNIT – III

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip velocity diagrams, work done and efficiency, flow over radial vanes.

Hydroelectric power stations: Elements of hydro electric power station- types –concept of pumped storage plants-storage requirements, mass curve(explanation only) estimation of power developed from a given catchment area, heads and efficiencies.

UNIT – IV

HYDRAULIC TURBINES: Classification of turbines, Heads and efficiencies, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design – draft tube theory – functions and efficiency.

UNIT – V

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

CENTRIFUGAL PUMPS: Classification, working, work done – manometric head – losses and efficiencies, specific speed – pumps in series and parallel - performance characteristic curves, NPSH.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hyraulic machinery - MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines - Rajput.

REFERENCES:

1. Fluid Mechanics and fluid power Engineering - D.S Kumar, Kotaria & sons.
2. Fluid Mechanics and machinery - D. Rama Durgaiah, New Age international.
3. Hydraulic Machines - Banga & Sharma, Khanna Publishers.

Course Outcomes:

After completion of this course the average student is expected to be able to:

1. Learn the units and dimensions and their applications,
2. Study fluid statics and fluids in motion,
3. Study fluid behavior of fluids under various flow conditions and fluid friction in pipes leading to design procedures for flow systems.
4. Study the performance of Pumps and hydraulic machines.

ANURAG GROUP OF INSTITUTIONS
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II Year B.Tech. EEE - I Sem	L	T/P/D	C
	4	1	4

FLUID MECHANICS AND HYDRAULIC MACHINERY

Course Objectives:

- Learn the units and dimensions and their applications,
- Study fluid statics and fluids in motion,
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- Principles of operation of different types of pumps and hydraulic machinery.

UNIT – I

FLUID STATICS: Dimensions and units: physical properties of fluids - specific gravity, viscosity, surface tension – vapour pressure and their influence on fluid motion – atmospheric, gauge and vacuum pressures – measurement of pressure – Piezometer, U-tube and differential manometers.

FLUID KINEMATICS: Steam line, path line and streak lines and steam tube, classification of flows-steady & unsteady, uniform & non uniform, laminar & turbulent, rational & irrational flows-equation of continuity for one dimentional flow and three dimentional flows.

UNIT – II

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

CLOSED CONDUIT FLOW: Reynold's experiment-Darcy Weisbach equation-Minor losses in pipes – pipes in series and pipes in parallel – total energy line – hydraulic gradient line. Measurement of flow: pitot tube, venture meter and orifice meter, Flow nozzle.

Measurement of flow: Pitot tube, Venturi meter and Orifice meter, Flow nozzle.

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Hydroelectric power stations: Elements of hydro electric power station- types –concept of pumped storage plants-storage requirements, mass curve(explanation only) estimation of power developed from a given catchment area, heads and efficiencies.

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UNIT – V

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

CENTRIFUGAL PUMPS: Classification, working, work done – manometric head – losses and efficiencies, specific speed – pumps in series and parallel - performance characteristic curves, NPSH.

TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hyraulic machinery - MODI and SETH.
2. Fluid Mechanics and Hydraulic Machines - Rajput.

REFERENCES:

1. Fluid Mechanics and fluid power Engineering - D.S Kumar, Kotaria & sons.
2. Fluid Mechanics and machinery - D. Rama Durgaiah, New Age international.
3. Hydraulic Machines - Banga & Sharma, Khanna Publishers.

Course Outcomes:

After completion of this course the average student is expected to be able to:

1. Learn the units and dimensions and their applications,
2. Study fluid statics and fluids in motion,
3. Study fluid behavior of fluids under various flow conditions and fluid friction in pipes leading to design procedures for flow systems.
4. Study the performance of Pumps and hydraulic machines.

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II Year B.Tech. EEE - I Sem	L	T/P/D	C
	4	1	4

ELECTRONIC DEVICES AND CIRCUITS

COURSE OBJECTIVIES

•Study the Behavior of an electron under the influence of the Electric and Magnetic field.
•Study the working of CRO&CRT and the application of CRO.
•To familiarize student with principle of operation analysis and design of junction diode, BJT and FET Amplifier circuits, Transistors and field effect Transistors
•To understand Diode as Rectifier.

UNIT – I : Electron Dynamics and CRO

Motion of charged particles in electric and magnetic fields. Simple problems involving electric and magnetic fields only. Electrostatic and magnetic focusing. Principles of CRT, deflection sensitivity (Electrostatic and magnetic deflection). Applications of CRO: Voltage, current and frequency Measurements.

UNIT II – p-n Junction Diode and Rectifiers: Quantative Theory of p-n junction, p-n junction as diode, diode equation, volt-ampere characteristics, temperature dependence of VI characteristic, transition and diffusion capacitances, diode equivalent circuits, breakdown mechanisms in semi conductor diodes, Zener diode characteristics.

The p-n junction as a rectifier, half wave rectifier, full wave rectifier bridge rectifier harmonic components in a rectifier circuit, inductor filters, capacitor filters, l-section filters, π-section filters, comparison of filters, voltage regulation using zener diode.

UNIT III-Bipolar junction transistor and Field Effect Transistor: The junction transistor, transistor current components, transistor as an amplifier transistor construction, BJT operation, BJT symbol, Transistor as an amplifier, common base, common emitter and common collector configurations, limits of operation, BJT specifications.
The junction field effect transistor (construction, principle of operation, symbol)- pinch –off voltage –volt –ampere characteristics, the JFTE small signal model, MOSFET (construction, principle of operation, symbol) MOSFET characteristics in enhancement and depletion modes.

UNIT IV-Transistor Biasing and stabilization: Operating point, the DC and AC load lines, need for biasing, fixed bias, collector feedback bias, emitter feedback bias, collector emitter feedback bias, voltage divider bias, bias stability, stabilization factors. Stabilization against variation in v3E and β2 bias compensation using diodes and transistors. Thermal runway, stability, biasing FET.

UNIT V-BJT AND FET AMPLIFIERS: BJT Hybrid model, determination of h-parameters from transistor characteristics, analysis of a transistor amplifier circuit using h-parameters, comparison of a transistor amplifier circuit using h-parameters comparison of CB, CE and CC Amplifier configurations.
FET Common source amplifier, common drain amplifier, generalized FET amplifier, FET, as voltage variable resistor, comparison of BJT and FET, the Uni junction transistor

TEXT BOOKS:
1. Electronic Devices and Circuits – J.Millman, C.C.Halkias, and Satyabratha Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.
3. Introduction to Electronic Devices and Circuits- Rober T. Paynter PE

REFERENCE BOOKS:
1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S. Publications, 2nd Edition, 2005.

COURSE OUTCOMES
After the completion of their course the students will be able to
· Understand the behavior of Electron under Electric and Magnetic fields, Working of CRT and applications of CRO.
· Understand and analysis the different types of Diodes operation and its characteristics.3. Design and analysis the DC Bias circuits of BJT and FET.
· To analyze and design Diode application circuits, Amplifier circuits employing BJT and FET devices.

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II Year B.Tech. EEE - I Sem	L	T / P / D	C
	3	1	3

NETWORK THEORY

Course Objectives:

- To understand Three phase circuits.
- To analysis transients in Electrical systems.
- To perform Synthesis on given Electrical Network from a given impedance/ admittance function
- To evaluate Network parameters of given Electrical network and design of filters.
- To apply Fourier analysis to Electrical systems.

UNIT –I: NETWORK TOPOLOGY: Definitions - Graph - Tree, Basic cut-set and Basic Tie-set matrices for planar networks - Duality & Dual networks.
THREE PHASE CIRCUITS: Phase sequence- Star and delta connection- Relation between line and phase voltages and currents in balanced systems- Analysis of balanced and unbalanced three phase circuits-Measurement of active and reactive power.

UNIT-II: D.C AND A.C TRANSIENT ANALYSIS
Transient response of R-L, R-C, R-L-C circuits (series and parallel) for D.C excitation- Initial conditions- Solution method using differential equation and Laplace transforms .
Transient response of R-L, R-C, R-L-C circuits (series only) for sinusoidal excitation- Initial conditions- Solution method using differential equation and Laplace transforms .

UNIT-III: NETWORK FUNCTIONS
The concept of complex frequency, Physical interpretation of complex frequency, Transform impedance and Transform circuits, Series and Parallel combination of elements, Terminal pairs or ports, Network functions for the one port and two port, poles and zeros of network functions, Significance of poles and zeros, Properties of driving point functions, Properties of transfer functions, Necessary conditions for driving point function, Necessary conditions for transfer functions, Time domain response from pole zero plot.

UNIT-IV: NETWORK PARAMETERS
Two port network parameters- Z, Y, A, B, C, D and Hybrid parameters and their relations.

Cascaded networks, Concept of transformed network- Two port network parameters using transformed variables.

UNIT-V: FILTERS AND FOURIER ANALYSIS OF A.C CIRCUITS

Low pass, High pass, Band pass, Band Elimination, Prototype filter design. The Fourier theorem, Fourier series consideration of symmetry, exponential form of Fourier series.

TEXT BOOKS:

1. Electric circuits - A.Chakrabarthy, Dhanpat Rai & Sons,2006.
2. Circuits & Networks - A.Sudhakar and Shyammohan S.Palli, Tata McGraw-Hill, 2012.

REFERENCE BOOKS:

1. Electric Circuit analysis - B.Subrahmanyam, I.K International
2. Network analysis - Mahmood Nahvi, Joseph Edminister, Schaum's Outlines, 4th edition, McGraw-Hill Companies,Incorporated, 2003.
3. Network Analysis - M.E Van Valkenberg. Prentice-Hall, 1974.
4. Electric circuit analysis - C.L.Wadhwa, New Age International, 2006.
5. Electrical circuits theory-K.Rajeswaran, Pearson Education, 2004.
6. Basic circuits analysis - D.R Cunningham. & J.A. Stuller, Jaico Publications, 1993.

Course Outcomes:

- After Concluding the Course student should be able to:
- Describe The importance of three phase circuit for balanced and unbalanced conditions
- Analyze the transient behavior of electrical networks in time domain and frequency domain.
- Illustrate the concept of complex frequency, transform impedance, significance of poles and zeros of a given transfer function and network synthesis.
- Describe The properties of Fourier transforms and their applications to Electrical Systems.

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II Year B.Tech. EEE - I Sem	L	T/P/D	C
	3	1	3

ELECTRO MAGNETIC FIELDS

Course Objectives:

•To introduce the concepts of electric field
•To introduce the concepts magnetic fields
•To use field applications which will be utilized in the development of the theory for power transmission lines and electrical machines.

UNIT – I: Electrostatics:

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems – Divergence theorem –Stoke's theorem. Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential– Properties of potential function – Potential gradient – Guass's law – Application of Guass's Law – Maxwell's first law. Laplace's and Poison's equations – Solution of Laplace's equation in one variable.

UNIT – II: Conductors, Dielectric & Capacitance :

Electric dipole – Dipole moment – potential and EFI due to an electric dipole and Torque – Behaviour of conductors in an electric field – Conductors and Insulators. Electric field inside a dielectric material – polarization – Dielectric – Conductor and Dielectric – Dielectric boundary conditions, Capacitance – Capacitance of parallel plate and spherical and co-axial capacitors with composite dielectrics – Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

UNIT – III: Magneto Statics, Ampere's circuital law:

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation. Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long current carrying filament – Point form of Ampere's circuital law – Maxwell's third equation, Field due to a circular, rectangular and square loops.

UNIT –IV: Force in Magnetic fields, Magnetic Potential:

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

Scalar Magnetic potential and its limitations – vector magnetic potential and its properties – vector magnetic potential due to simple configurations – vector Poisson's equations.

UNIT – V: Inductance, Time Varying Fields :

Self and Mutual inductance – Neumans's formulae – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field. Introduction to permanent magnets, their characteristics and applications.

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

TEXT BOOKS:

1. Engineering Electromagnetics - William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon, 2012.
2. Electromagnetic Fields - Sadiku, Oxford Publications, 7th edition, 2006.

REFERENCE BOOKS:

1. Introduction to Electro Dynamics - D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd editon, 1989.
2. Electromagnetic - J P Tewari, Khanna Publishers, 2nd edition, 2005.
3. Electromagnetics - J. D Kraus, Mc Graw-Hill Inc, 4thedition 1992.
4. Electromagnetic fields - S. Kamakshaiah, Right Publishers, 2007.

Course Outcomes:

Upon completion of this course, students must be able to understand:

- Electrostatics, Conductors, Dipole, Dielectric and Capacitance.
- Magneto Statics, Ampere's Circuital law and its application
- Magnetic forces, Magnetic Potential and Time Varying Fields

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II Year B.Tech. EEE - I Sem	L	T/P/D	C
	4	1	4

ELECTRICAL MACHINES-1

Course objectives:

- To understand electromechanical energy conversion
- To understand the construction, operation and performance of DC machines
- To know the different testing methods for dc machines

UNIT – I: ELECTROMECHANICAL ENERGY CONVERSION

Electromechanical Energy conversion – forces and torque in magnetic field systems – energy balance – energy and force in a singly excited magnetic field system, determination of magnetic force - co-energy – multi excited magnetic field systems.

UNIT – II: D.C. GENERATORS – CONSTRUCTION & OPERATION

D.C. Generators – Principle of operation – Action of commutator – constructional features – classification of DC generators – separately excited and self excited generators – armature windings – lap and wave windings – simplex and multiplex windings – use of laminated armature – E. M.F Equation – Problems – Armature reaction – cross magnetizing and demagnetizing AT/pole – compensating winding – commutation – reactance voltage – methods of improving commutation.

UNIT –III: OPERATING CHARACTERISTICS OF D.C. GENERATORS

Build up of EMF – magnetization curve/occ characteristics – critical field resistance and critical speed – causes of failure to self excite – remedial measures – load characteristics of d.c shunt, series and compound generators – parallel operation of d.c series generators – use of equalizer bar and cross connection of field windings – load sharing – problems.

UNIT – IV: D.C. MOTORS

D.C Motors – Principle of operation – Back E.M.F. - Torque equation – characteristics and application of shunt, series and compound motors – Armature reaction and commutation – speed control of D.C. Motors: armature voltage and field flux control methods – Ward-Leonard system.
Principle of 3 point and 4 point starters – protective devices.

UNIT – V: TESTING OF D.C. MACHINES

Testing of D.C. machines: Losses – Constant & Variable losses – calculation of efficiency – condition for maximum efficiency

Methods of Testing – direct, indirect and regenerative testing – brake test – Swinburne's test – Hopkinson's test – Field's test – Retardation test – separation of stray losses in a D.C. motor test.

TEXT BOOKS:

1. Electric Machinery- P.S. Bimbra, Khanna Publishers, 7th edition, 2010,
2. Theory and performance of Electrical machines – J.B Gupta, S.K Kataria & Sons publishers, 2009.

REFERENCE BOOKS:

1. Electrical Machines – S.K. Bhatta Charya, Tata Mc. Hill Publications, 2007.
2. Electrical Machines - I.J. Nagrath & Kothari, Tata Mc Graw-Hill Publishers, 3rd edition, 2004.
3. Electric Machines – M.V. Deeshpande, Wheeler Publishing, 1997.
4. Electrical machinery - A.E. Fritzgerald C. Kingsley and S. Umans, Mc Graw-Hill Companies, 5th edition, 2010.

Course Outcomes :

Upon the completion of this subject, the student will be able

- To specify the constructional aspects of DC machines
- To carry out different testing methods to predetermine the efficiency of DC machines

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II Year B.Tech. EEE - I Sem	L	T	/P/D	C
	0	0	3	2

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Course Objectives:

•To understand the basic concepts and types of pumps and study their performance.
•To analyze the impact of fluid jet on structure of vanes.
•To understand the types of turbines and their overall efficiency.
•To determine the losses in pipes due to different pipe fittings.
•To analyze the characteristics and applications of flow measuring devices

Any 10 of the below experiments are to be conducted.

1. Impact of jets on Vanes
2. Performance test on Pelton wheel
3. Performance test on Francis Turbine.
4. Performance test on single stage centrifugal pump.
5. Performance test on Multi stage centrifugal pump.
6. Performance test on Reciprocating pump.
7. Calibration of Venturimeter.
8. Calibration of Orifice mater.
9. Determination of friction factor for a given pipe line.
10. Determination of loss of head due to sudden contraction in a pipeline.
11. Turbine flow meter.

Course Outcomes:

After completion of this course the average student is expected to be able to:
•Understand the basic concept of types of pumps and study their performance.
•Analyze the impact of fluid jet on structure of vanes.
•Understand the types of turbines and their overall efficiency.
•Determine the losses in pipes due to different pipe fittings.
•Analyze the characteristics and applications of flow measuring devices

ANURAG GROUP OF INSTITUTIONS
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II Year B.Tech. EEE - I Sem	L	T	/P/D	C
	0	0	3	2

ELECTRICAL CIRCUITS LAB

Course Objectives:

•To design electrical systems
•To analyze a given network by applying various methods like Theorem applications
•To measure Three phase Active and Reactive power.

PART-A

1) Verification of Kirchhoff's current law and Kirchhoff's Voltage law.
2) Verification of Thevenin's, Norton's and Maximum Power Transfer Theorems.
3) Verification of Superposition theorem.
4) Verification of Compensation Theorem.
5) Verification of Reciprocity and Millmann's Theorems.
6) Time response of first order RL/RC network for periodic non-sinusoidal inputs-time constant and steady state error determination.
7) Series and Parallel Resonance.
8) Determination of Self, Mutual Inductances and Coefficient of coupling.
9) Verification of Z and Y Parameters.
10) Transmission and hybrid parameters.
11) Measurement of Active Power for Star and Delta connected balanced loads.
12) Measurement of Reactive Power for Star and Delta connected balanced loads.
13) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads.
14) Locus Diagrams of RL and RC Series Circuits.

PART-B: PSPICE SIMULATION

1) Simulation of DC Circuits & AC Circuits.
2) DC Transient response.
3) Mesh Analysis.
4) Nodal Analysis.

NOTE:

• PSPICE Software Package is necessary.
• Eight experiments are to be conducted from PART-A and any Two from PART-B

Course Outcomes :

After Concluding the Course student should be able to

- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems

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ELECTRONIC CIRCUITS

Course Objectives :

•To explain the operation, design and Analysis of multistage amplifiers using BJT and
•MOSFET.
•To analyze feedback amplifiers, large signal and tuned amplifiers.
•To analyze different oscillators

Course Outcomes :

After going through this course the student will be able to
•Apply the knowledge of BJT to design practical amplifier circuits.
•Design electronic sub systems such as feedback amplifiers, oscillators and power amplifiers to meet the required specifications.
•Design clamper and clipper circuits with different inputs.

UNIT-1: SINGLE STAGE AMPLIFIERS DESIGN AND ANALYSIS:

Review of CE, CB, CC& CS amplifiers-Classification of Amplifiers, Distortion in amplifiers-Approximate analysis, CE, CB, CC amplifiers comparison.

BJT& FET Frequency response - Low frequency analysis-Low frequency response of BJT amplifiers-Low frequency response of FET amplifier-Miller effect capacitance-High frequency response of BJT amplifier-Square wave testing

UNIT II: 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.

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 Wien-bridge oscillators.

UNIT III: LARGE SIGNAL AMPLIFIERS:
Class –A Power 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 IV: CLIPPERS AND CLAMPERS:
Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT V: SWITCHING CHARACTERISTICS OF DEVICES
Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

MULTIVIBRATORS
Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using transistors.

TEXT BOOKS:
1. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nasheisky, 9th Edition
2007, Pearson Education
2. Electronic Devices and Circuits by S. Salivahanan, N. Suresh Kumar and A. Vallavaraj, 2nd edition 2008, Tata McGraw Hill Companies.
3. Solid State Pulse Circuits by David A. Bell, 4th Edition, Prentice Hall of India

REFERENCE BOOKS:
1. Introductory Electronic Devices and Circuits (Conventional flow version) – Robert T. Paynter, 7th Edition, 2009, PEI.
2. Electronic Devices and Circutits, Anil K. Maini, Varsha Agrawal, 1st Edition, WILEY.
3. Pulse, Digital & Switching Waveforms by Jacob Milliman, Harbert Taub and Mothiki S Prakash rao, 2nd edition 2008, Tata McGraw Hill Companies.

Course Outcomes :

After going through this course the student will be able to

•Apply the knowledge of BJT to design practical amplifier circuits.

•Design electronic sub systems such as feedback amplifiers, oscillators and power amplifiers to meet the required specifications.

•Design clamper and clipper circuits with different inputs.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To teach the fundamentals of the key elements of a business organization.
- To provide a critical perspective on theoretical knowledge and practical approach to various functional areas of management and decision making.
- To provide insights on Finance and Economics concepts and to built team work and leadership skills within them

UNIT – I

Introduction to Managerial Economics: Definition, Nature and scope of Managerial Economics – Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT – II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of inputs, Laws of Returns, internal and External Economics of scale.

Cost Analysis: Cost concepts, Opportunity cost, Out of pocket costs vs. Imputed costs. Break – even Analysis (BEA) – Determination of Break – Even Point (simple problems) – Managerial Significance and limitations of BEA.

UNIT – III

Introduction to Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, Price – Output determination in case of Perfect Competition

Objectives and Policies of Pricing – Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two – Part Pricing, Block Pricing, Peak Load Pricing, Cross Subsidization.

UNIT – IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements,Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index, Internal rate of return (simple problems)

UNIT – V

Introduction to Financial Accounting: Double – Entry Book Keeping, Journal, Ledger, and Trial Balance – Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis through ratios: Computation, Analysis and interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt – Equity, interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Profit Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri, Managerial Economics and Financial Analysis, TMH, 2009.
2. Varshney & Maheshwari; Managerial Economics, Sultan Chand, 2009.

REFERENCES:

1. Raghunatha Reddy & Narasimhachary; Managerial Economics & Financial Analysis, Scitech, 2009.
2. V. Rajasekarn & R.Lalitha, Financial Accounting, Pearson Education, New Delhi, 2010.
3. Suma Damodaran, Managerial Economics, Oxford University Press, 2009.
4. Domnick Salvatore; Managerial Economics in a Global Economy, 4th Edition, Cengage, 2009.
5. Subhash Sharma & M.P.Vittal, Financial Accounting for Management, Text & Cases, Machmillan, 2008.
6. S.N. Maheshwari & S.K .Maheshwari, Financial Accounting, Vikas 2008.
7. Truet and Truet; Managerial Economics; Analysis, Problems and Cases, Wiley, 2009.
8. Dwivedi; Managerial Economics, Vikas 2009.
9. M. Kasi Reddy, S.Saraswathi; Managerial Economics and Financial Accounting, PHI, 2007.
10. Erich A. Helfert; Techniques of Financial Analysis, Jalco, 2007.

Codes / Tables: Present Value Tables need to be permitted into the examinations Hall.

Course Outcomes :

On completion of this course, the graduate should be able:

- To have the knowledge on various Finance and Economic concepts of business management and approaches.
- To understand and analyze the interconnections between the development of key functional areas of business organization and the management thought process.
- To be ethically conscious and socially responsible managers, capable of contributing to the development of the nation and quality of life.

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POWER SYSTEMS-I

Course Objectives:

- To explain the various generation sources such as Thermal, Nuclear and Gas Power plants
- To describe DC and AC distribution systems and its voltage drop calculations
- To illustrate various Economic aspects of the Power plant erection, operation and different Tariff methods.
- To describe the transmission line parameters and its calculations

UNIT-I: Thermal Power Stations and Nuclear Power Stations
Thermal Power Stations: Line diagram of Thermal Power Station (TPS) showing paths of coal, steam, water, air, ash and flue gasses.- Brief description of TPS components: Economizers, Boilers, Super heaters, Turbines, Condensers, Chimney and Cooling towers, numerical problems.

Nuclear Power Stations: Nuclear Fission and Chain reaction - Nuclear fuels - Principle of operation of Nuclear reactor.-Reactor Components: Moderators, Control rods, Reflectors and Coolants - Radiation hazards: Shielding and Safety precautions.- Types of Nuclear reactors and brief description of PWR, BWR and FBR.

UNIT- II: Gas Power Stations, Substations and Gas insulated substations (GIS).
Gas Power Stations: Principle of Operation and Components (Block Diagram Approach Only)
Classification of substations: Air insulated substations - Indoor & Outdoor substations: Substations layout showing the location of all the substation equipment. Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, main and transfer bus bar system with relevant diagrams. Gas insulated substations (GIS) – Advantages of Gas insulated substations, single line diagram of gas insulated substations, bus bar, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT- III: General Aspects of Distribution Systems and DC and AC Distribution Systems
Classification of Distribution Systems - Comparison of DC vs AC and Under-

Ground vs Over - Head Distribution Systems- Requirements and Design features of Distribution Systems.

D.C. Distribution Systems: Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

A.C. Distribution Systems: Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.

UNIT- IV: Economic Aspects of Power Generation and Tariff Methods Load curve, load duration and integrated load duration curves-load, demand, diversity, capacity, utilization and plant use factors- Numerical Problems.

Tariff Methods: Costs of Generation and their division into Fixed, Semi-fixed and Running Costs. Desirable Characteristics of a Tariff Method.-Tariff Methods: Flat Rate, Block-Rate, two-part, three –part, and power factor tariff methods and Numerical Problems.

UNIT-V: Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems. Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

TEXT BOOKS:

1. A course in power systems - J.B. Gupta, S. K. Kataria & Sons, 2009.
2. Principles of Power Systems - V.K Mehta and Rohit Mehta, S.Chand& Company Ltd., New Delhi 2004.

REFERENCE BOOKS:

1. A Text Book on Power System Engineering - M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A.Chakraborti, Dhanpat Rai & Co. Pvt. Ltd., 1999.
2. Elements of Power Station design and practice - M.V. Deshpande, PHI, 2010.
3. Electrical Power Generation, Transmission and Distribution - S.N.Singh., PHI 2003.
4. Gas turbine performance- PP Wals, P.Fletcher, Blackwell Publisher, 2004
5. Generation, distribution and utilization of Electrical energy- C.L.Wadhawa, New age International (P) Limited, Publishers 1997.

Course Outcomes

After going through this course the student will be able to

- Draw and explain the layouts of Thermal Power station, Nuclear Power Plant and Gas Power plant
- Derive the equations for voltage drops in DC and AC distribution systems
- Define Load, diversity, demand and Plant use factors
- Describe various Tariff methods and various Power factor improvement methods
- Derive the equations for transmission line parameter calculations and its considerations.

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CONTROL SYSTEMS

Course objectives:

- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

UNIT – I: INTRODUCTION TO CONTROL SYSTEM

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions – Translational and Rotational mechanical systems and electrical systems.

TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor – AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-II: TIME AND FREQUENCY RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional-integral systems. sinusoidal transfer function , Determination of Frequency domain specifications

UNIT –III: STABILITY ANALYSIS IN FREQUENCY DOMAIN

The concept of stability – Routh's stability criterion and its limitations. qualitative stability and conditional stability .

Root Locus Technique: The root locus concept - construction of root loci-

effects of adding poles and zeros to G(s)H(s) on the root loci.
Bode plots: Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.
Polar plots and Nyquist Plots -.Nyquist stability criterion.

UNIT – IV: CLASSICAL CONTROL DESIGN TECHNIQUES
Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT – V :STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS
Concepts of state, state variables and state model, derivation of state models - Solving the Time invariant state Equations- State Transition Matrix and its Properties.

TEXT BOOKS:
Control Systems Engineering – I.J.Nagrath and M.Gopal, New Age International(P) Limited, Publishers, 2nd edition, 2009.
Automatic Control Systems - B. C. Kuo, John wiley and son's., 8th edition, 2003.

REFERENCE BOOKS:
Modern Control Engineering –Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
Control Systems - N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition,1998.
Control Systems Engg. -– John wiley, NISE, 4rd edition, 2007.
Control Systems – Nagoorkani, 1998.

Course outcomes:
After going through this course the student will be able to
- How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
- Apply various time domain and frequency domain techniques to assess the system performance
- Apply various control strategies to different applications .
- Test system Controllability and Observability using state space representation and applications of state space representation to various systems.

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ENVIRONMENTAL STUDIES

Course Objectives:

- To introduce the knowledge about Environment.
- To introduce students to the concepts of pollution, Biodiversity
- To develop an awareness about global Environmental problems.
- To learn to protect environment, legal issues, Sustainable development

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

(a) Ecosystems: Concept of an ecosystem – Classification, structure and function of different ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.

(b) Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. ICUN categories of biodiversity and RED DATA book - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - II

Natural Resources : Renewable and non-renewable – Natural resources and associated problems: Forest resources – Use and over – exploitation, deforestation,– Timber extraction, mining, dams and other effects on forest and tribal people: Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. 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.

UNIT – III

(a) Environmental Pollution: Definition, Cause, effects and control measures of different kinds of pollution (Air, Water , Soil , Marine , Noise , Thermal, Nuclear, e –Waste)

(b) Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management. -Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT – IV

(a) Waste management technology: Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.

Waste water and sewage treatment technology: primary, secondary and tertiary treatments. Bioremediation, Phyto-remediation, ZLD (zero liquid discharge), membrane technology. Application of GIS and GPS system in environmental science.

(b) Environmental policy, Rules and regulations. EIA (Environmental Impact Assessment) & EMP (ENVIRONMENTAL Management Plan) – Environment Protection Act. - Air (Prevention and Control of Pollution) Act. - Water (Prevention and control of Pollution) Act -Wildlife Protection Act –Forest Conservation Act.-Public awareness. Global environmental problems and global efforts.

UNIT – V

(a) Towards sustainable future: concept of sustainable development, threats of sustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Role of IT in environment, environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

(b) Field work: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds, Visit to effluent treatment plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.

Mini projects by students which is mandatory.

TEXT BOOK:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for
   University Grants Commission, University Press.
2. Environmental studies, From Crisis to cure by R.Rajagopalan,2005

REFERENCES:

1. Environmental Science: towards a sustainable future by Richard T.Wright.2008 PHL Learning Private Ltd .New Delhi
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P.Ela.2008 PHI Learning Pvt. Ltd.

Course Outcomes:

After the completion of this course student will be able to

•Conservation of natural resources
•Understand Requirement to conserve environment.
•Understand the National and international efforts to save globe.
•Know importance of sustainable developmen

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ELECTRICAL MACHINES – II

Course objectives:

•To understand the construction and operation of transformers
•To know the importance of transformers in power systems for reducing transmission losses
•To know the different testing methods for transformers
•To examine how induction motors are useful for electro-mechanical energy conversion

UNIT-I: Single phase transformers :

Types - constructional details- minimization of hysteresis and eddy current losses-emf equation - operation on no load and on load - phasor diagrams.
Equivalent circuit - losses and efficiency-regulation. All day efficiency - effect of variations of frequency & supply voltage on iron losses.

Performance of transformers : OC and SC tests - Sumpner's test - predetermination of efficiency and regulation-separation of losses test.
Auto transformers- auto transformers- equivalent circuit - comparison with two winding transformers.

UNIT II:

Three phase Transformers

Poly-phase connections - Y/Y, Y/, /Y, / and open , Third harmonics in phase voltages-three winding transformers-tertiary windings. Determination of Zp, Zs and Zt transients in switching - off load and on load tap changing; Scott connection.
Parallel Operation of transformers
Parallel operation single phase transformers with equal and unequal voltage ratios – Problems- Parallel operation of three phase transformers (Basic concepts only)

UNIT III: Three Phase Induction Motors

Construction details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor reactance, rotor current and pf. at standstill and during operation.
Three Phase Induction motors : 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 IV: Performance of Three Phase Induction Motors

Circle diagram-no load and blocked rotor tests-predetermination of performance. Methods of starting , starting current and torque calculations of Induction Motors.

Speed control-change of frequency- change of poles and methods of consequent poles; cascade connection. injection of an emf in to rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT V: Single Phase Induction Motors:

Single phase Induction motor – Constructional features- Double revolving field theory Equivalent circuit- spilt –Phase motors- Capacitor start Capacitor run motors.

TEXT BOOKS:

1. Electric Machinery- P.S. Bimbra, Khanna Publishers, 7th edition, 2010.
2. Theory and Performance of Electrical Machines - JB Gupta, SK Kataria & lSons, 2009.

REFERENCE BOOKS:

1. Performance and Design of AC Machines - MG.Say, BPB Publishers, 1968.
2. Theory of Alternating Current Machinery- Langsdorf, Tata McGraw-Hill Companies, 2nd edition, 2001.
3. Electromechanics-II (transformers and induction motors) - S. Kamakashaiah, Hitech publishers.
4. Electric Machines – I.J.Nagrath & D.P.Kothari,Tata Mc Graw Hill, 7th Edition, 2005.
5. Electrical machinery - A.E. Fritzgerald C. Kingsley and S. Umans, Mc Graw-Hill
Companies, 5th edition, 2010

Course Outcomes :

Upon the completion of this subject, the student will be able

•To specify the constructional aspects of transformers

•To carry out different testing methods to predetermine the efficiency of transformers

•To draw the circle diagram for an induction motor to assess its performance

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ELECTRICAL MACHINES LAB-1

Course Objective:

- To expose the students to the operation of DC Generator
- To expose the students to the operation of DC Motor.
- To perform OC and SC tests on single phase Transformer

The following experiments are required to be conducted compulsory
Experiments:

1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
2. Load test on DC shunt generator. Determination of characteristics.
3. Load test on Dc series generator. Determination of characteristics.
4. Load test on DC compound generator. Determination of characteristics.
5. Hopkinson's tests on DC shunt machines. Predetermination of efficiency.
6. Fields test on DC series machines. Determination of efficiency.
7. Swinburne's test on DC shunt machine. Predetermination of efficiency at various loads as motor and generator.
8. Speed control of DC shunt motor.
9. Brake test on DC shunt motor. Determination of performance curves.
10. Brake test on DC compound motor. Determination of performance curves.
11. Separation of losses in DC shunt motor.
12. Retardation test on DC shunt motor. Determination of losses.
13. Ward Leonard system of speed control method for DC motor.

Course Outcomes:

After going through this course the student will be able to

- Differentiate between Different types of DC Machines.
- Analyze the characteristics of DC Generator.
- Analyze the characteristics of DC Motor.

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ELECTRONIC DEVICES AND CIRCUITS LAB

PART A: (Only for Viva-voce Examination)
ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):
1. Identification, Specifications, Testing of R, L, C, Components (Color Codes),
Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays,
Bread Boards, PCB's
2. Identification, Specification and Testing of Active Devices, Diodes, BJT's LOW power
JFET's MOSFET's, Power Transistors, LED's, SCR, UJT.
3.Study and operation of
- Multi-meters (Analog and Digital)
- Regulated Power Supplies
- Function Generator
- CRO

PART B (For Laboratory Examination – Minimum of 10 experiments)
1. Forward & Reverse Bias Characteristics of PN Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Half Wave Rectifier with & without filets.
4. Full Wave Rectifier with & without filters
5. Input &output characterizes of Transistor in CB Configuration.
6. Input &output Characteristic of Transistor in CE Configuration.
7. FET characteristics.
8. Measurement of h parameters of transistor in CB, CE, CC configurations
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of FET Amplifier (Common source).
12. SCR Characteristics
13. UJT Characteristics.

PART C: Equipment required for laboratories:

1. Regulated power supplies (RPS)	
2. CRO's	-0-20MHZ
3. Function Generator	-0-1 MHZ
4. Multimeters	
5. Decade Resistance Boxes / Rheostats	
6. Decade Capacitance Boxes	
7. Ammeters (Analog or Digital)	-0-20pA, 0-50pA -0100pA, -0-200pA, 0-10 mA
8. Voltmeters (Analog or Digital)	-050V,0-100V, -0-250V
9. Electronic Components	-Resistors, -Capacitors, BJTs,

LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, diodes Ge & Si type, Transistors npn, pnp type