DEPARTMENT OF ELECTRICAL ENGINEERING
SYLLABUS FOR COURSES OFFERED
B.TECH ELECTRICAL ENGINEERING

SEMESTER I

	Course Code	Course title	Credit			
			L	T	P	Total
1	LNG-302	Professional Communication-I	3	0	0	3
2	MAS-411	Engineering Mathematics –I	3	1	0	4
3	EE-302	Electrical Engineering	2	1	1	4
4	ME-301	Engineering Graphics-I	0	0	2	2
5	GPT -301	Moral & Value Education	3	0	0	3
6	PHY-311	Engineering Physics-I	3	0	1	4
7	CE-401	Engineering Mechanics	2	1	0	3
8	ME-302	Introduction to Manufacturing Process	2	0	0	2

SEMESTER II

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	LNG-303	Professional Communication-II	3	0	0	3
2	MAS-490	Engineering Mathematics –II	3	1	0	4
3	ME-401	Engineering Graphics –II	0	0	2	2
4	CHEM-521	Engineering Chemistry	3	1	1	5
5	CSIT-401	Computer & Languages	2	1	1	4
6	ECE-301	Basic Electronics	2	1	1	4
7	ME-304	Workshop Practice & Technology	2	0	2	4
8	PHY-312	Engineering Physics-II	3	0	1	4

SEMESTER III

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	EE-401	Networks & Systems	3	1	1	5
2	MAS-590	Engineering Mathematics –III	3	1	0	4
3	EE-405	Electrical Measurement & Measuring Instruments	3	1	1	5
4	ECE-401	Solid State devices & Circuits	3	1	1	5
5	ECE-402	Switching Theory & Logic Design	2	1	0	3
6	CSIT-302	Introduction to Information Technology	2	1	1	4
7	ENV-415	Environmental Studies -I	2	0	0	2
8	ECE-403	Electronic Workshop and P.C.B Lab.	0	0	2	2

SEMESTER IV

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	ECE-406	Signals & System	3	1	0	4
2	CSIT-412	Computer Organizations	3	1	0	4
3	EE-403	Electrical Machines – I	3	1	1	5
4	EE-404	Electrical Engineering Materials	2	1	0	3
5	EE-406	Electromagnetic Field Theory	3	1	0	4
6	MAS-491	Computer based numerical and statistical Techniques	3	1	0	4
7	SES- 416	Environmental Studies -II	2	0	0	2
8	EE-505	Electrical Engineering Drawing	0	0	2	2

SEMESTER V

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	BAM-315	Elements of Economics & Principle of Management Science	3	1	0	4
2	EE-501	Electrical Machines – II	3	1	1	5
3	EE-502	Control System	3	1	1	5
4	EE-503	Elements of Power System	3	1	0	4
5	ECE-504	Electronics Circuit Design	3	1	1	5
6	EE-508	Utilization of Electrical Energy	3	1	0	4
7	EE-400	Training – I	0	0	1	1

SEMESTER VI

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	EE-504	Power Electronics	3	1	1	5
2	EE-506	Power System Analysis	3	1	0	4
3	EE-507	Power Station Practice	2	1	0	3
4	EE-511	Electrical Machine Design - I	3	1	1	5
5	EE-605	Advance Electrical Machine	3	1	0	4
6	ECE-405	Microprocessor and Application	3	1	1	5
7	EE-580	Seminar -I	0	0	1	1

SEMESTER VII

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	EE-606	Non- Conventional Energy Sources	3	1	0	4
2	EE-601	Switch Gear & Protection	3	1	1	5
3	EE-602	Electrical Machine Design - II	3	1	1	5
4	EE-603	Modern Control System	3	1	0	4
5	EE-500	Training - II	0	0	1	1
6	EE-680	Seminar -II	0	0	1	1
7	EE-699a	Project (Project Formulation)	0	0	2	2

SEMESTER VIII

S. No.	Course Code	Course title	Credit			
			L	T	P	Total
1	EE-604	Instrumentation & Process Control	3	1	0	4
2	EE-621-625	Elective –I	3	1	0	4
3	EE-626-630	Elective –II	3	1	0	4
4	EE-631-635	Elective –III	3	1	0	4
5	EE-699b	Project (Project Execution & Report)	0	0	6	6

Elective – I

S. No.	Course code	Course title	Credit			
			L	T	P	Total
1.	EE-621	Network Synthesis	3	1	0	4
2.	EE-622	Power System Operation & Control	3	1	0	4
3.	EE-623	Advance Power Electronics	3	1	0	4
4.	EE-624	Modelling & Simulation of Electrical Machines	3	1	0	4
5.	EE-625	Power Quality Monotoring & Conditioning	3	1	0	4

Elective – II

S. No.	Course code	Course title	Credit			
			L	T	P	Total
1.	EE-626	Energy Efficient Machine	3	1	0	4
2.	EE-627	Energy Auditing	3	1	0	4
3.	EE-628	Transducers & Signal Conditioning	3	1	0	4
4.	EE-629	Generation of Electric Power	3	1	0	4
5.	EE-630	Electric Traction	3	1	0	4

Elective – III

S. No.	Course code	Course title	Credit			
			L	T	P	Total
1.	EE-631	Energy Efficiency & Conservation	3	1	0	4
2.	EE-632	Power System Dynamics & Reliability	3	1	0	4
3.	EE-633	EHV Power Transmission	3	1	0	4
4.	EE-634	Computer Aided Machine Design	3	1	0	4
5.	EE-635	High Voltage Engineering	3	1	0	4

PROFESSIONAL COMMUNICATION-I

Course Code: LNG-302 **Credits 3(3-0-0)**

1. Study of selected Literacy Texts:
(a) Collection of short essays
(b) Collection of short stories
2. Testing Written Comprehension Ability:
Comprehension Passages of 500 words
3. Composition & Grammar:
4. Report Writing:
Characteristics of Business Reports
Structure of Reports: Front matter, Main Body, and Back matter. Style of Reports: Definition, the Scientific Attitude. Readability of Reports, Choice of Words Construction and length of Sentences, Construction and length of Paragraphs. The lineout or break up of a format report. Blank Form Report, Frozen Report. Memoranda form Report. Periodic Report, Miscellaneous Report. Speech Drills Using the language laboratory to develop speaking Communication skills.
(1) Word Accent: Production of correct accentual patterns. Involving two and three syllabi Words.
(2) Rhythm: Stress- tone rhythm in sentences
(3) Intonation: Rising Tone and Talking Tone Ear Training and Production Tests.

References:
1.Close R.A.A University Grammar of English Workbook. Longman London, 1998
2.Jones, Daniel, English Pronouncing Dictionary. ELBS London, 1999
3.Sharma. S.D.A. Textbook of Spoken & Written English, Vikas, 1994
4.Alvarez, Joseph A. The Elements of Technical Writing , New' York: Harcourt, 1998 .
5.Bansal, R.A. Spoken English for India, Orient Longman,1993.

ENGINEERING MATHEMATICS-1

Course code: MAS—411 **Credits 4(3-1-0)**

1. Matrices:
Elementary row and column transformation, Linear dependence, Rank of matrix, Consistency of system of Linear equation and solution of linear system of equations, Characteristic equation. Cayley- Hamilton theorem Eigen- values and Eigen vectors, Diagonalisation , Complex matrices
2. Vector Calculus:
Interpretation of Vectors & scalars, Gradient, divergence and curl of a vector and their Physical interpretations. Gauss Divergence theorem and stokes theorem.
3. Differential Calculus:

Leibnitz theorem partial differentiation, Euler's theorem. Asymptotes, Curve tracing Envelopes and evaluates. Change of variables, Jacobian, expansion of function of one And several variables .Cylindrical and spherical coordinate system, Approximation of Errors, Extreme of function of several variables, Lagrange's method.

4. Probability and Statistics:

Binomial distribution, Normal distribution and Poison distribution, correlation and regression

References:

1. Shanti Narayan: A Text book of Matrices, S. Chand & Co.
2. Thomasl Finney: Calculus and Analytic Geometry, Narosa pub. House.
3. J.N. Kapur: Mathematical Statistics, S. Chand & Co.
4. C. Prasad: Mathematies for Engineers, Prasad Mudranalaya.

ELECTRICAL ENGINEERING

Course code: EE-302 **Credits 4(2-1-1)**

1. Sinusoidal Steady State circuit Analysis:

Voltage , Current, Sinusoidal & Phasor representation 1 Phase A.C. Circuit behavior of Resistance, Inductance.
And Capacitance and their combination, impedance concept of power , power factor, series & parallel resonance – band width and quality factor.

2. Network theory:

Introduction to basic physical laws, Network theory, Thevenin , Norton, Maximum Power transfer theorems, Star- delta transformation, Circuit theory Concepts : Mesh and nodal analysis.

3. Three phase supply:

Star / delta connections, line and phase voltage / current relations , three phase power and its measurement.

4. Basic Instruments:

Instruments for measurement of voltage, Current, power and energy: Construction , principal and application.

5. Magnetic Circuit And Transformer:

Magnetic circuit concept, Theory and working principle of single phase transformer.

6. Rotating Machines:

Principles of energy conversion, Basic concepts of rotating machines, DC Machines, Different
types and their Characteristics & application, Elementary idea of operation of synchronous and induction
machines. Single Phase induction & stepper motors, Applications.

References:

1.V. Del Toro: Principles of Electrical Engg –PHI.
2.W. H Hayt & J.E Kennedy : Engg. Circuit Analysis, Mc Graw Hill.
3.I.J Nagrath : Basic Electrical Engg. Tat Mc Graw Hill.
4.A.E Fitzgerald : Electronic Instruments & Measurement techniques, PHI.

List of Experiments:

1. Verify the Norton's theorem.

2. Verify the Thevenin's theorem.
3. Verify the Superposition theorem.
4. Verify the Kirchoff's theorem.
5. To find the Impedance and power factor in a RLC Series Circuit.
6. To find the Impedance and power factor in a RLC Parallel Circuit.
7. To Plot the resonance curve between Current and frequency in RLC series circuit by frequency variation.
8. To perform open circuit and short circuit test on, a single- phase transformer.
9. To draw magnetizing curve of a single- phase transformer.
10. To find the relation in Star & Delta connection.
11. To calibrate a given energy meter with the help of Wattmeter and Load.

ENGINEERING GRAPHICS-1

Course code: ME- 301 **Credits 2(0-0-2)**

1. Introduction:
Graphics as a tool to communicate ideas, lettering and dimensioning. Construction of geometrical figures like pentagon and hexagon .

2. Orthographic Projection:
Principles of orthographic projection, principal and auxiliary planes, First and third angle projections. Projection of points, pictorial view .Projections of lines parallel to both the plane. Parallel to one and inclined to other, inclined to both the Planes Application to practical problems. Projection of solid 1h simple position , Axis or slant edge inclined to one and parallel to other plane, Solids lying on a face or generator on a plane. Sectioning of solids lying in various positions, true shape of the section. Development of lateral surfaces, sheets metal drawing.

3. Isometric Projection:
Principles of isometric projection, Isometric projection using box and Offset methods.

References;
1. Bhatt. N.D.: Elementary Engineering Drawing , Charothar Publishing.
2. Lamxi Narayan V & Vaish W. : A textbook of practical Geometry on geometrical drawing.

MORAL AND VALUE EDUCATION

Course code: GPT-301 **Credits 3(3-0-0)**

My country and my people, the many Indians, Being and becoming an Indian, Nationalism and Internationalism. Some life issues- love, Sex and Marriage, men and money- value of time, meaning Of work Human Communication, human Suffering, Addiction, Ecology, Women's Issues Corruption Understanding One's neighbor. Neighborhood groups : their structure and functions. Patterns of Social interaction of group dynamics Preparation for a career, Choice of vocation, Motivation for study and Research, the present educational system: Curriculum and Syllabus, Teaching Methods, examination and work experience. Definition of value Education, Moral and Ethics, laws and Morale Based on Ten Commandments and two great commandments Discovery of Self, Self- Awareness Growth of Intellect- man's Spiritual Nature Emotions, Will respect the right of life, Liberty,

property, Truth reputation. Sin, Origin of Sin, Manifestation of Sin, The results of Sin, the remedy of Sin , Sin as an act, Sin as a State, Sin as a nature. Conscience – as defined in Oxford Dictionary and Winston dictionary. Type of Consciousness (Such as Evil, Convicted , purged, pure, Weak, Good, Void of Offence)

ENGINEERING PHYSICS

Course code: PHY-311 **Credits 4(3-0-1)**

1. Special Theory of Relativity:
Michelson Morley experiment, Inertial frames of reference, postulates of special theory of relativity, Lorentz transformation equation of space and time, length contraction, time dilation . Addition of velocities, variation of mass with velocity, mass energy equivalence.

2. Optics:
Interference : coherent sources , conditions of interference, Fresnel's biprism experiment, And Displacement of fringes, interference in thin films wedge- shaped – film, Newton's rings.
Diffraction: single slit and doubles sit diffraction, diffraction grating, and Raleigh's criterion of limit of Resolution, resolving power of telescope, microscope and grating
Polarization: polarization of, light , pictorial representation of polarized light , Brewster's law , Malus law, phenomenon of double refraction, Geometry of calcite crystal,Optic axis. Principal Section , Ordinary and extra- ordinary rays, construction And working of Nicole, circularly and elliptically polarized light, retardation Plates, Production and analysis of plane, optical activity, Specific orientation, Polarimeter.

3. Fields:
Scalar and vector fields gradient of scalar field, divergence & curl of a vector field, line Integral, conservative vector field , Gauss divergence theorem, stoke's theorem.

4. Electrostatics:
Gauss ' law and it's applications, Poisson and Laplace equations .Maxwell's Equations, basic Concept of electromagnetic Waves and its solution in Free space.

5 .Magnetic Properties of Materials:
Para, dia , Ferro, antihero and ferro – magnetie materials , hysteresis , Methods of plotting hysteresis curve of a ferromagnetic materials and their uses, magnetic circuits.

6. X-Ray's:
Origin of X-rays, continuous and characteristic X- ray spectra, Moseley's law, Absorption of xrays, diffraction of X-rays, Bragg's law, Bragg's spectrometer, practical applications of X-rays, Compton effects. (4)

7. Quantum Theory:
Wave particle duality, de Broglie concept of matter Waves, Davisson and Germer experiment, Heisenberg uncertainty principle, Schrodinger Wave equation and its solution.

8. Laser:
Spontaneous and stimulated emission of radiation, Einstein's coefficients, Main components of a laser, types of lasers and their applications.

Reference:
1. Arthur Beiser: ' Colilcept of modem physics, TMH.
2. Subrahmanyam & Brij Lal: A Text Book of Optics S. Chand & Co.
3. K.K. Tiwari: Electricity & Magnetism, S. Chand & Co.
4. Brij Lal & Subrahmanyam: Electricity & Magnetism.
5. Wehr, Richardo & Adair: physics of the Atom

ENGINEERING MECHANICS

Course Code: CE –401 **Credits 3(2-1-0)**

1. Force and equilibrium:
Basic Concepts, force Moment and couple , Principle of transmissibility, Verigonon's theorem, resultant of force Systems concurrent and Non- concurrent coplanar Force, funicular polygons. Free body diagram.

2. Trusses:
Plane structures, Various method of analysis of Trusses, method of joints, Method of sections and Graphical method.

3. Moment of inertia:
Center of gravity, centroids of line, Area, volume and composite Bodies, Area moment of inertia and Mass moment of Inertia for plane figures and bodies including – composite Bodies, Product Moment of inertia, parallel axis theorem. Principal moment of inertia.

4. Friction:
introduction, Dry friction, co-efficient of static friction. Friction cone, Screw jack and belt friction.

5. Beams:
Bending moment and shear force diagrams for statically determinate beams.

6. Kinematics of Rigid Bodies:
plane motion, Absolute motion , Relative motion, Translating axes and rotating axes .

7. Kinetics of Rigid Bodies:
Plane motion, force, Mass and acceleration, work and energy, Impulse and momentum, principles of energy conservation, principle of Virtual work, D' Alembert's Principal and dynamic equilibrium.

Reference :

1. Beer. F.P. and Johnston, F.R.: Mechanics for engineers , Mc Graw Hill.
2. Meriam, J.L.: Statics, john Wiely
3. Meriam, J.L.: Dynamics, John Wiley
4. Shames, I.H.: Engineering Mechanics , Prentice Hall of India'
5. Dayaratnam, p.: Statics, Tata Mc Graw Hill.

INTRODUCTION TO MANUFACTURING PROCESSES

Course Code: ME- 302 **Credits 2(2-0-0)**

1. **Introduction to Engineering Materials:**
   Metals and alloys- composition, properties and uses
2. **Manufacturing Processes:**
   Classification of manufacturing processes, Mechanization, Automation, Interchangeability, Role of computers in manufacturing, CAD, CAM, CIM, MRP, GT, FMS.
3. **Metal Forming:**
   Brief introduction to Presses, Sheet metal process, Forging operations like Drop forging, Roll forging, Drawing, Extrusion, Rolling, Swaging etc.
4. **Machine Tools:**

Introduction to machine tools, Introduction to Lathe, Milling, Drilling, Shaper, slotting, Planer, Boring Machines.

5. **Machine operations:**
   Turning, Threading, Boring, Drilling, Milling, Shaping, Grinding etc.
6. **Plastic processing**
7. **Metal Casting:**
   Brief introduction to pattern, pattern material, mould making, melting operation Inspection of castings.

References:

1. Introduction to Manufacturing processes- R. S. Khurmi S. Chand & Co.Delhi
2. A Text book of Production Technology - P.C.sharma

PROFESSIONAL COMMUNICATION – II

Course Code: LNG-303 **Credits 3(3-0-0)**

Technical Written Communication:
(a) Nature, origin and development of technical written communication.
(b) Salient features
(c) Difference between technical writing and general writing. Pre- requisites of Scientific and
Technical Communication:
(a) Fragmented sentences
(b) Parallel comparisons.
(c) Elements of a series
(d) Squinting construction and split infinitive.
(e) Modifiers, connectives, antecedents and clause subordination
(f) Dangling participles and gerunds
(g) Ellipsis
(h) Coherence, Unity, chronological method, spatial method, inductive method, Linear
(i) Method, deductive method, interrupted method.
Business Correspondent:
(a) General principles of business correspondence
(b)Ramifications, of business letters.
(c) Letters giving instructions, inquiries and answers to inquires, complaints and adjustments, letters urging action, employment letters,
Application and resumes.
Proposal Writing:
(a) Proposal : Definition and kinds.
(b) Division of format proposals (front matter, title page, summary abstract, Table of Contents etc.
(c) Statement of request, body- statement of problem, background, scope, methodology,
(d) Advantages and disadvantages.
Writing Scientific, and Semi –technical articles:
(a) Source material, topic sentence, literature review

(b) Tables, figures footnotes, bibliography.

References:

(i) Arora, V.n. (etal), Improve your writing (Delhi: oxford University Press, 1981.

ENGINEERING MATHEMATICS—II

Course code: MAS- 490 **Credits 4(3-1-0)**

1. Multiple integral:
Double and triple integrals Change of order of integration, Change, of variables, Application To area: volume , center of gravity, moment – of inertia and product of inertia. Gamma and Beta function, Drichlet's integral and its application.

2. Fourier Series:
Periodic functions, Fourier series of functions with period 2n, Range of interval, Half range Sine and cosine series.

3. Integral Transform:
Laplace transforms, Existence theorem, Laplace transform derivatives, Inverse Laplace transforms, Application to solve linear differential equations, Unit- step function, Dirac delta function, Laplace transform of periodic functions, Applications of Laplace Transforms, I Definition of Fourier and z transform and its simple applications.

4. Ordinary Differential Equations:
Introduction to order, degree and arbitrary constant, linear differential equations of n' order With constant coefficients, Complimentary functions and particular integrals. Homogeneous Differential equations, Simultaneous linear differential equations, Solution of second order Differential equation by changing, dependent and independent variables, Method of Variation –of parameters, Equation_ of the form y" = f (y). Applications to engineering Problems.

5. Solution of Equations and Curve Fitting:
Solution of cubic and bi –quadratic equations. Method of least squares and Curve Fitting.

References:

1. E. _ Kreyszig: Advanced Eragil: Jeering mathematics, Wiley Eastern Ltd.
2. B.S. Grewal: Higher Engineering mathematics, Khanna Publishers.
3. Jaggi & Mathur: Advanced Engineering Mathematics, Khanna Pub.
4. C. Prasad: Advansed Mathematics for Engineers

ENGINEERING GRAPHICS II

Course Code: ME-401 **Credits 2(0-0-2)**

1. Introduction:
Graphic language, Classification of drawings, principles of drawing: IS codes for Machine Drawing ,lines, Scales, Sections, Dimensioning, Standard abbreviations.

2. Orthographic Projections:
Principles of first and third angle projections, drawing and sketching of machine elements in Orthographic projections, spacing of views.

3. Screwed (Threaded) Fasteners:
Introduction, Screw thread nomenclature, forms of threads, Thread series, Thread Designation. Representation of threads, Bolted Joints, Locking arrangements, Foundation Bolts.

4. Keys and Cotters: Keys, Cotter Joints.
5. **Shaft Couplings**: Introduction, Rigid and flexible coupling.
6. **Riveted Joints:** introduction, Rivets and riveting, Rivet heads Classification of riveted
7. **Assembly drawing** : Introduction, Engine parts, Stuffing box etc.
8. Fee hand sketching: Introduction, Need for freehand sketching, Free hand of Sketching of some threaded fasteners and simple machine Components..

References:
1. N. Siddeshwar, p. Kannaiah, V.V.S. Shastry: Machine drawing , TMH, New Delhi.
2. K.L Narayana, P. Kannaiah, K. VenkatReddy: Machine drawing , New Age International Publication_ -2nd edition.
3. Engineering drawing practice for schools and' colleges, SP46-1998 (B18)

ENGINEERING CHEMISTRY

Course Code: CHEM-521 **Credits 5(3-1-1)**

1. General Chemistry:
Advanced Theory of Chemical Bonding: Valence bond and molecular orbital theory. Structure of NH3, HP, SO3 Pc15, XeO2 molecules, Theories of bonding in metals and semi, -conductors, n-type And ptype semiconductors, Imperfections in materials. Born- Haber cycle, Bragg's conditions.
2. Physical Chemistry:
Equilibrium on Reactivity: Bronsted and Lews Acids, pH, pKa, pKb Seale, Buffer solution. Stereochemistry of organic compounds, co-ordination chemistry, Nomenclature, Valence bond and Crystal field theory.
3. Chemical Kinetics & Catalysis: Rate law, Order of reactions, Parallel and reversible reactions. Catalysis, Homogeneous and heterogeneous catalysis. Characteristics of catalytic reactions,Catalyt ic promoters and poi-sons, Auto catalysis and negative catalysis. Activation energy and Catalysis, Theories of catalysis, Intermediate compound formation theory and Adsorption theory.
4. Environment Chemistry:
Atmospheric Chemistry & Air Pollution: Environment and Ecology, Environment segments, Structure and Composition of atmosphere, Radiation Balance of Earth and Green house Effect, Formation and depletion of Ozone layer, Chemical and photochemical reactions of various Species in atmosphere, Air- Pollution- Source, reactions and sinks for pollutants , Acid Rains and Smog formation. Pollution control Methods.
Corrosion & Lubrication: Introduction, causes of corrosion, Theories of corrosion- Direct Chemical attack, electrochemical theory of corrosion , factors influencing Corrosion, Corrosion inhibitors, passivity, Types of corrosion, Protection from corrosion and Protective Coatings. Theory, Classification and mechanism of Lubrication.
5. Applied Chemistry:
Water and Waste Chemistry: Introduction, Hardness of Water, Characteristics imparted by Impurities, Analysis of contaminants, Treatment. Of Water by Zeolite, L-S Process, Boiler Feed water. Waste water treatment.
6. **Chemistry of Engineering Materials:**
Fuels & Combustion: Classification of fuels, 'Non conventional Energy. Biogas , Biomass And solar energy. Calorific value- Gross and Net. Characteristics of good fuel. Determination of calorific value, Solid fuels. Analysis of coal, Liquid fuel. Instrumentation: IR, UN.' NMR.
7. **Industrial Chemistry:**

Polymer Chemistry: Classification of Polymers. Including Biopolymers condensation and Addition Polymers and their applications . Industrial application and mechanism of Chemical Reaction, Beckman. ,Hoffman, Reimer Tiemann, Cunnizzaro. Enels- Alder and Skraup Synthesis.

References:

1.Puri and Sharma: Principles of Physical Ctilemistry.
2.Manas Charadra: Atomic Structure and Chemical Bend Engineer Fig Chemistry.
3.Bahal and Tulj: Engineering chemistry**.**

COMPUTER AND LANGUAGES

Course Code: CSIT-401 **Credits 4(2-1-1)**

Computer hardware components and their functions Basic operating system concepts MSDOS and getting to know DOS commands Familiarizing with WINDOWS environment Getting started with UNIX Files & Directories and their use in different Operating System Environments Getting to know different editors edit & vi Introduction to Internet Getting familiar with Browser programme Netscape & Explorer Sending & receiving mail over Internet Introduction of PINE and /of ELM What is a programming language? How Programs are developed and executed? Introduction to "C" Programming language. Basic "c" features: Arithmetic & logical expressions Advanced "C" features: conditional & loops Function & Arrays Introduction to Pointers & Structures

References:

1. DOS the complete reference by Kris Jamsa, Tata- Mc Graw Hill Publication.
2. UNIX POWER TOOLS by J. Peek Tim O' reilly & M. Locekides, BPB Publication.
3. The "C" Programming Language by B.W Kernighan & D.M Ritchie, Prentice Hall of India.
4. Using LINUX- Latest Edition By Jade Tackett & David Ganter, Prentice Hall of India.

BASIC ELECTRONICS

Course Code: ECE- 301 **Credits 4(2-1-1)**

1. Energy Bands in Solids:
Energy band theory of solids, Concept of forbidden gap, Insulators, Metals and Semiconductors.

2. Transport Phenomenon in Semiconductors:
Mobility and conductivity, electrons, and holes in an intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, carrier densities in semiconductor, electrical properties of semiconductors, Hall effect, Diffusion.

3. Junction Diode:
P-N Junction, depletion layer, v-I characteristic, diode resistance, capacitance, switching time, diode application as rectifier (half wave and full wave), diode circuits (clipper, clamper, voltage multipliers) Breakdown mechanism, Zener & avalanche, breakdown characteristics, Zener diode and its applications.

4. Bi junction transistor:
Bipolar junction transistor , CE, CC& CB configuration., characteristic curves (cut off , active and saturation region, requirement of biasing and biasing types and biasing analysis, Stability.

5. Transistor as Amplifiers:
Graphical analysis of CE amplifier, Concept of voltage gain, current gain and power gain hparameter (low frequency), computation of Av Ri, & and approximate formulae.
6. Operational Amplifiers:
Concepts of ideal op- amp, inverting, non inverting and unity gain amplifiers, adders, Difference amplifier, integrator.
7. Switching Theory & Logic Gates:
Millimeter, CRO and its applications

Refrences:
1.Boylstad & Neshlshky, "Electronic Devices & Circuits," PHI.
2.Moris Mano, "Digital Computer Design" PHI

WORKSHOP PRACTICE

Course Code: ME –304 **Credits 4(2-0-2)**

1. Introduction:
Classification of manufacturing processes, primary shaping processes. Machining processes, Joining processes, Surface finishing processes, Plant & shop layout , Industrial safety.
2. Properties of Metals:
Strength, Elasticity, Stiffness, Plasticity , Malleability , Ductility , Brittleness, Toughness, Hardness, Impact strength , Fatigue , Creep.
3. Classification of Metals:
Wrought iron, Cast iron, Gray cast iron, White cast iron , Nodular cast iron , Alloy cast iron, Steel Mild steel, Medium carbon steel . High carbon steel and its applications . Effect of Alloying elements on steel, Special alloy steels, e.g. stainless steel , high speed steel, Cutting alloys.
4. Non- Ferrous Metals:
Aluminum, copper, Zinc, Lead, Tin, Nickel, non- ferrous alloys, Brass, Bronze.
5. Carpentry Shop:
Introduction, Selection of timber. Seasoning of Timber, Common defects in Timber, Preservation of timber , Auxiliary materials used in carpentry, Veemers and veneering, Plywood, wood' Marking hand tools, Marking and measuring tools, Holding & Supporting tools, Cutting tools-Saw, Chisel, Planers, Boring tools, Wood' marking Processes, Joinery work classification of joints.
6. Bench Working & Fitting Shop:
Introduction, Vices, vice blocks, Surface plates, Trisquare, Bevel square, Combination setfiles, Chisels, Hacksaw , Surface gauge, Universal surface gauge, punches, Calipers, Dividers, pliers, Spanners, Drills taps. Die and die stock. Screw pitch gauge, Wire gauge, Dial indicator , Bench' Marking Processes.
7. Welding Shop:
Concept of welding, Resistance welding, Spot welding resistance butts and flashes welding, Resistance projection welding and seam welding , Electric arc welding , Gas Welding (Oxy-Acetylene welding),Equipment's and process, welding joints and positions of welding.
8. Sheet Metal:
Introduction, Metals used in sheet metal shop hand tools, sheet metal operations.

ENGINEERING PHYSICS-II

Course code: PHY- 312 **Credit 4(3-0-1)**

Unit-1:

Wave Mechanics and X-ray Diffraction:

Wave- particle duality, de- Brogie matter waves, Phase and group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrodinger's wave equation- particle in one dimensional box. Diffraction of X-rays by crystal planes, Bragg's spectrometer, Compton's effect**.**

Unit-11:

Dielectric and magnetic properties of Materials:

Dielectric constant and polarization of dielectric materials, Types of polarization (Polarizability). Equation of internal fields in liquid and solid (one- Dimensional), Claussius mussoti- Equation, Ferro and Piezo electricity (Qualitative), Frequency dependence of dielectric constant, Dielectric losses, Important applicationsof dielectric material. Langevin's theory for dia and paramagnetic material, phenomenon of hysteresis and its applications. Ultrasonic: Generation, detection, and application of ultrasonics.

Unit-III :

Electromagnetics:

Displacement Current, Maxwell's Equations (Integral and Differential Forms). Equation of continuity, E-M wave equation and its propagation characteristics in free space and in conducting media, pointing theorem and pointing vectors.

Unit-IV:

Superconductivity and Science and technology of non materials:

Temperature dependence of resistivity in superconductivity material, Effects of magnetic field *(Meissner effect), Type-I and Type-II superconductors, Temperature dependence of critical filed, BCS theory (Qualitative) ,High temperature superconductors in superconducting state, Applications of Super-conductors.

Introduction to Nanomaterials- Basic principle of nanoscience and technology, creation and use of buck balls, structure, properties and use of carbon nanotubes, Application of nanotechnology.

Reference books:

1. Engineering Physics: Srivastava / Yadav
2. Physics for Engineers – II : Narinder Kumar
3. Introduction to Engineering Physics – II : A. S. Vasudeva
4. Engineering Physics: Satya Prakash
5. Text book of Engineering Physics – II: Gupta/Kumar
6. Engineering Physics: Uma Mukherji

NETWORKS & SYSTEMS

Course Code: EE-401 **Credits 5(3-1-1)**

1. Introduction to Graph Theory:
Definitions, graph, tree, spanning, walk, trail, path, loop, co- tree, basic cut set And loop & cut set matrices for planar networks, loop and nodal method of analysis.

2. Introduction to continuous time signals and systems:
Basic continuous time Signals, unit step, ramp and impulse, differential equation Formulation for linear-Time invariant (LTI)

3. Review of Laplace transform (LT):
Initial value and final value theorem, properties and solution of differential equations using LT, waveform synthesis and LT of complex waveforms: concept of transform impedance.

4. Net work Theorems:
Principle of superposition, Tellegen's theorem, Thevenin, Norton, Millman, Maximum power transformer, Block diagram representation of L T I continuous Time networks and systems, Timedomain analysis of L T I network using Laplace Transform (transient and steady state), relation between impulse response and system function.

5. Concept of poles and zeros:
Relation between location of poles, time- response and Stability, frequency response and bode plots, interrelation between frequency Response and time response, convolution integral.

6. Two port networks:
Two-port parameters, inter-conversion of 2- port parameters, Network functions: driving point and transfer, interconnection of 2- port networks, Reciprocity, ladder networks, image impedance, characteristics impedance, T- π Transformation.

7. Position real function:
Definition and properties, Synthesis of LC,RL, and RC Using Cauer's and Foster's first and second form.

References:

1. M.E. Van Valkenburg' Network Analysis, 'Prentice Hall
2. J.D. Ryder,' Networks Fields and Transmission Lines,' Prentice Hall.
3. W.H. Hayt & E. Kemmerly,' Engineering circuit Analysis,'TMH.
4. V.K. Aatre,' Network theory & Filter Design,' New Age International Pub.
5. Nara singh Deo,'Graph Theory.'
6. J.A. Edminister,' Electric Circuits,' Schaum series, McGraw Hill.

List of experiments:
1. Cascaded two port networks.
2. Twin T network characteristics.
3. Transient response of RLC series Circuit.
4. Hybrid parameters of a transistor.
5. Study of resonance in RLC series and parallel circuit and damping effects.
6. Z and H Parameters.

7. Maximum Power transfer theorem.

ENGINEERING MATHEMATICS III

Course Code: MAS –590 **Credits 4(3-1-0)**

1. Ordinary Y. Differential Difference Equations:
ODE of 2nd order with constant coefficients both homogeneous and non- homogeneous Types with applications to electrical and mechanical systems. Difference equations and their Solutions by z transform. Series solutions of ODE of 2nd orders with variable Coefficients with special emphasis to the differential equations of Legendre, Bessel and Chebyshev. Legendre's polynomials, Chabyshev polynomials and Bessel's functions and their properties.

2. Integral Transforms:
Fourier transform and integral Hanker transforms and Hilbert transforms and their Properties, some simple applications. Partial Differential Equations: Linear PDE with constant coefficients of 2nd order and their assifications, PDE of Parabolic, elliptic and hyperbolic type with illustrative examples. Separation of variables Method for solving PDE. Such as two dimensional heat equations, wave equations and Laplace equations.

3. Functions of a Complex variable:
Analytic (functions, Gauchy- Riemam equations, harmonic functions line integral in the Complex plane, caucry's Integral theorem cauchy's integral formula derivatives of analytic Functions, Liouvilles Theorem, fundamental theorem of Algebra representation of a Function py power series, Taylor's series and Laurent's Series, poles, Singularities and Zeros. Residue theorem, evaluation of integrals using. Residue theorem. Conformal" Mapping, linear fractional transformations, special linear fractional transformations.

References:

1. Kreyszig, E. (1993): Advanced Engg. Mathematics 7th Edition, John Willey & sons inc.
2. Paopoulis: Signal Analysis 3rd Edition (1988) Me Graw Hill

ELECTRICAL MEASUREMENTS AND MEASURING INSTRUMENTS

Course code: EE-405 **Credits 5(3-1-1)**

1. Philosophy of Measurement:
Accuracy & Precision, errors in measurement, "types of measuring Instruments with brief detail.

2. Analog measurement of Electrical Quantities:
Review of various instruments for measurement of voltage and current Electro dynamo Meter and induction wattmeter's Measurement of power 'in single phase and –three phase Systems, errors and , remedies in wattmeter and , energy meter, instrument transformers And their application in theextension of instrument range, introduction to measurement of Speed and frequency.

3. Measurement of Parameters:
Different methods of measuring low, medium and high resistances, measurement of Inductance and capacitance with the help of a.c bridges, Q meter.

4. D.C and A.C Potentiometer:
D.C and AC potentiometers and their applications.

5. Magnetic Measurement:

Ballistic galvanometer and flux meter, determination of hysteresis loop & measurement of Iron losses

6. Digital Measurement of Electrical Quantities:

Concept of digital measurement, digital measurement of voltage, current, power, power factor and frequency: power analyzer, harmonics analyzer.

References:

1. E.W. Golding, & F.C. Widdis, Electrical measurement & Measuring Instruments, A.H. Whealer & Co. Pvt.
Ltd., India.
2. Forest K.: Harris, Electrical Measurement' Willey Eastern Pvt. Ltd, India.

3. M.B. Stout, Basic Electrical Measurements' Prentice hall of India , India.
4. A.K. Sawhney, Electrical & Electronic Measurement & Instrumentation, Ohanpat Rai& Sons, I' 1dia.
5 .W.D. Cooper, Electronic Instrumentation and Measurement technique, prentice hall

SOLID STATE DEVICES & CIRCUITS

Course Code: ECE-401 **Credits 5(3-1-1)**

1. Study of unregulated power supplies:

Review of half and –full wave bridge rectifiers; Capacitor, L-C, filters, bleeder resistance, ripple factor, diode ratings.

2. Ebers-moll model:

cut off, active and saturation region of transistor. Review of transistor biasing: stability analysis of biasing, thermal runaway.

3. **Field effect transistor:**

Construction of JFET & MOSFET (Enhancement & depletion), characteristics, circuit symbols Biasing ,FET as resistance, small signal model, FET amplifiers.

4**. Multistage amplifier:**

Effect of coupling and by-pass capacitors, emitter follower at low frequency: Darlington Connection, source follower, cascade amplifier, bootstrapping, power amplifier: Single ended And push pull amplifiers, class B, class AB and class C power amplifiers, transformer Coupling and capacitor coupling, conversion efficiency, power and heat sinks.

5. **Small signal model:** Hybrid-TT model, Frequency response of a transistor amplifier gain bandwidth product, Concept of fa'fT and fp, Wideband amplifier: compensation techniques, Cascade amplifiers, Introduction to tuned amplifiers.

6. Feed Back Amplifiers and Oscillators:

Principles of feed back in amplifiers advantages of negative feedback, classification of Feedback :voltage-series, voltage- shunt, current- series, current –shunt effect of feed back on Input and output impedance, gain, stability, noice, distortion and bandwidth. Berkhausen Criterion for sinusoidal oscillators, oscillators, phase shift oscillator, Wein bridge oscillator, Hartley & Colpitts oscillators, crystal oscillators, frequency stability.

References:

1. J. Millman & A. Grabel, "Microelectronics,'TMH.
2. R. L Boylestad 7 L Nashelsky, 'Electronics Devices & Circuit Theory' Prentice Hall.

SWITCHING THEORY & LOGIC DESIGN

Course Code: ECE –402 **Credits 3(2-1-0)**

1. Number System:
Representation of negative numbers, 9's and I 's complement, 1o's 2's complement Arithmetic using 2,s complement, floating point representation : range, resolutions, Normalization, representation of zero, unused codes, parity bit & error –detection.
2. Minimisation of Boolean functions having don't care entries:
minimization Using tabular method.
3. **Combination Circuits Design**:
Adders: serial and parallel, magnitude comparator, decoder, multiplexes and applications, hazards and its avoidance.
4. **Introduction to sequential logic**:
Concept of history sensitive circuits and feed back flip-flops: RS, D, T, JK, and race around Condition, master slave flip-flops. Analysis of clocked sequential between asynchronous and synchronous circuits. Design of synchronous circuits: state Transition diagram, forming of universal map, excitation tables for flip flops, design using Minimization techniques, handling entry intoon desired state, power on reset.
5. Design of asynchronous sequential circuits: Fundamental mode. Circuits synthesis using flow tables,
excitation tables and output Tables, races (critical and non –critical) and cycles and its avoidance.

References:
1. M. Morris Mano, 'Digital Prentice Hall.
2. Zvi Kohavi, 'Switching & Finite automate Theory], Prentice Hall.
3. A.S. Tennenbaun, 'Structured computer organization], Prentice Hall(For negative number

INTRODUCTION OF INFORMATION TECHNOLOGY

Course Code: CSIT-302 **Credit 4(2-1-1)**

Fundamental Concept Of Information:
Information Concept And Processing Definition of Information, Need of Information ,Quality of Information , Value of Information, Concept of Information , Entropy Category and j" , Level of Information in Business Organization, Data Concepts and Data Processing , Data Representation.
Information Representation:
Information Contents, Introduction To Information Representation in digital Media, Text, Images, Graphics, Animation, Audio, Video elementary Concepts in information Preservence, Data Compression, Huffman Coding, Shannon Principles, Adaptive Compression, LZW Coding, Text, Images Compression, Introduction to Jpeg, Mpeg, Mheg. Computer and Programming Computer appreciationDefinition of electronic computers history of computers, generation, characteristics and Application of computers, classifications of computers RAM, Rom, computers hardware's CPU various I/O devices peripherals and storage media, software definition Programming Language Classification and Programmed Methodology Computer languages generation of languages introduction to 4 GLS, software development Methodology life cycles, software coding, testing, maintenance industry standards Introduction to ISO, SEI- CMM standards for it industries. Digital devices and basic network concepts

Digital Fundamentals:
Various codes, decimals, binary, hexadecimal conversion floating numbers, gates , flip flops, minimization, adder, multiplexers.

Computers network and communication:
Need for data transmission over distance, types of data transmission, media for dataTransmission, networking of computers- introduction of LAN and WAN, network topologiesBasic concept in computers and network client server architecture, introduction to Advanced communication techniques ISDN ATM, token based protocol CSMA/CD, mobile Communication.

Internet And Web technologies:
Internet & World' Wide Web' Hypertext markup Language DHJML, WWW, gopher, FTP Telnet, Web browsers, Net Surfing search Engine, Basic concept in 'E- commerce, EDI, Electronic payments, Digital Signatures, Network securities firewall.

Web Technologies:
Elementary concepts in object oriented programming, corba, COM/DCOM Wireless Application protocol, ASP, scripting HTML, Java APPLETS, WAP, WML, JSPIT Industry Jrends, Careers and ' Applications In India Scientific, Business, Educational and Entertainment applications , Industry Automation, Weather, forecasting awareness of Ongoing IT projects in India, NICNET ernet, Application of IT to E Commerce, Electronic Governance, Multimedia, Entertainment.

References:
1. Curtin, "Information Technology: Breaking News,"TM+12. Raja Raman, V.
2. Introduction to Computers" 3. Bajpai, Kushwaha & Yadav,"
3. Introduction to Computer & C Programming", New Age international.

ENVIRONMETAL STUDIES-I

Course Code: ENV- 415 **Credits 2(2-0-0)**

1. **The Multidisciplinary Nature of Environmental Studies:**
Definition, Scope and Importance

(i) Ecosystems:
- Concept of an ecosystem
- Structure and function of an ecosystem
- Producers, consumers and decomposes
- Energy flow in the ecosystem
- Food chains, food webs and ecological pyramids
- Introduction, types, Chacretistics features, structures and function of the following ecosystem:

(a) Forest Ecosystem
(b)Grassland Ecosystem
(c) Desert Ecosystem
(d) Aquatic ecosystem (Ponds, streams, lakes, rivers, oceans, estuaries.)

(ii) Social Issues and the Environment:
- From Unsustainable of sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, water shed 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
• Visit to local polluted site- Urban/Rural/Industrial/ Agricultural
• Study of Common plants, insects, birds
• Study of simple ecosystems – ponds, river. Hill slopes etc (Field work equal to 5 lecture hour)

ELECTRONIC WORKSHOP & PCB LAB

Course Code: ECE –403 **Credits 2(0-0-2)**

1. Winding Shop:
Step down transformer winding of less than 5VA
Soldering Shop:
Fabrication of DC unregulated power supply
2. PCB Lab:
(a) Artwork and printing of simple PCB.
(b) Etching and drilling of simple PCB.
3. Wiring and Fitting Shop:
Fitting of power supply along with meter in a cabinet.
4. Testing of power supply fabricated

Note: *No design work is involved*

SIGNALS & SYSTEMS

Course Code: ECE –406 **Credits 4(3-1-0)**

1. Continuous and Discrete time signals:
Transformation of the independent variable, continuous discrete time systems, basic system properties.
2. Fourier Transform:
Basic theorem, application to L T I networks frequency response, Fourier Series Representation of periodic non sinusoidal signals application to analysis of L T I networks.
3. Discrete time Fourier Transform:
Representation of periodic signals, Fourier transform of periodic signals, Properties of Discrete Fourier transforms , convolution property , multiplication properties, duality.
4.Time and frequency characterization:
Magnitude- phase representation of Fourier transform, frequency response of L T I systems, Time domain properties of ideal frequency selective, filters, time domain and frequency Domain aspects of non- ideal filters, first order and second order, continuous and Discrete time systems**.**
5. Random Variables & Process:

Random variable, random process, correlation function (auto & cross), cumulative Distribution function, probability density function, joint cumulative & distribution and probability density.

6. Sampling:

Sampling theorem, reconstruction of signals from samples, effect of under sampling discrete time processing of continuous time signals**.**

7. **Introduction to Z- Transforms:**

Convergence, inverse, properties of z – transform (linearity, time shifting, scaling reversal, Expansion, conjugation, convolution, differentiation in z- domain, initial value theorem), Analysis and characterization of L T I systems**.**

References:

1. A.V. Oppenheim, A.S. Willsky and S.H. nawab, 'Signals and Systems,' prentice Hail.
2. B.P. Lathi, 'Modern Analog and Digital Communication systems,' Oxford University press, New
Delhi.
3. S. Haykins,' Communication Systems' john Wiley.
4. Taub & Schilling, 'Principles of Communication systems,'TMH.

COMPUTER ORGANISATION

Course Code: CSIT-412 **Credits 4(3-1-0)**

Representation of Information:

Number system, Integer and Floating Point Representation, Character Codes Ascii, Ebcdic Error Detection and Correction Codes.

Basic Building Blocks:

Boolean Algebra, Combination Logic Design, flip –flops, Registers, Counters, ALU.Arithmetic and Logic Operations, Faster Algorithm and their Implementation, Organization Of Central Processing unit (Hardwired and Micro programmed), Microprogramming.

Organization:

Memory Types and Organization, Address Decoding and Selecting , Peripheral Device-s I/O Devices (Disks and Tapes). Programmed and Interrupt Control Mechanisms, I/O Controllers, DMA, Bus Architecture, Bandwidths, Assembly language programming, Programmers Models of A Machine.

Theory of Parallelism:

Parallel Computer Models, Principles of Performance & _ ca1ability, Processor & Memory Hierarchy, Cache and Shared Memory, multiprocessors, Flynn Classifications, parallel Computing , Introductory Concept of Pipeline, Vector Processing. Example of Typical 16 or 32 Bit Processor. Registers and Addressing Modes, Instruction Set; Use of and Assembly Language for Specific Programs for Typical Programs Like: Table Search, Subroutines, Symbolic and Numeric Manipulations and I/O.

References:

Hamacher," Computer Organization", Mc Graw Hill.
Tannenbaum, "Structured Computer Organization" Prentice hall of India

ELECTRICAL MACHINES I

Course Code: EE- 403 **Credits 5(3-1-1)**

Principle of E.M.E.C:

'Introduction, Energy in Electro-magnetic System "Flow of Energy in Electro Mechanical Devices, Energy in Magnetic field and co-energy, dynamics of Electromechanical Systems, Singly excited system, torque EMF equations, idealized machine, Need for d-q-o Transformation basic machine relations in. d-q-o variables.

D.C Machines:

EMF and torque equations, Armature windings, Armature Reactions Demagnetizing _& Cross – magnetizing armature MMF. Interpol and Compensating windings, commutation, Characteristics of D.C. generators**.**

D.C motors and their characteristic:

Starting of D.C motors. Starter step calculation of D.C. shunt motor & speed control of D.C Shunt motor, Ward Leonard control. Breaking of D.C. moors. Efficiency and testing of D.C Machines, Hopkinson test.

Transformers:

Transformer constructional & practical considerations Three –phase transformer, vector Group equivalent circuit, Exact and approximate, per unit values phasor diagram Transformer testing: open circuit test;
Short circuit test Sumpner's test, Efficiency and Voltage regulation, all day efficiency Auto transformer.3 to 2 and 6, phase conversion

Harmonics:

Three-phase bank of single transformers, parallel operations of 1 & 3 phase Transformers, load division between transformers in parallel. Three winding transformers Tertiary winding , Tap Changing, Transformers special. purposes, Welding, Traction. Instruments and pulse transformers

References:

1. Electrical Machine: I.J. Nagrath and D.P. Kothari (Tata Mc Graw Mill)
2. Electrical Machinery: Fitzerald, Kingsley (Mc Graw Hill).
3. Electrical Machines and Their Application: J. Hundmarsh.
4. Fundamental of Electrical Machines: B.R. Gupta & V. Singhal (New Age International Pub.).

List of practical for EMEC –I Lab:

1) Part of DC Machine
2) Load test on DC shunt Generator.
3) Load test on DC Series Generator.
4) Load test on DC Compound Generator.
5) Magnetization Characteristic of externally excited DC Shunt Generator.
6) Load test on DC Shunt Motor.
7) No load (Swinburne's test) test on DC Shunt Motor.
8) Scott Connection on two identical transformers.
9) Three phase AC to 2 two phase AC balanced load transformation.

ELECTRICAL ENGINEERING MATERIALS

Course code: EE-404 **Credits 3(2-1-0)**

1. Crystal Structure of Materials:

Atomic bonding, Crystallinity, Miller Indices X-ray crystallography, structural imperfections, crystal growth.

2. Conductivity of Metals:

Free electron theory of metals, factors affecting electric conductivity of metals, thermal Conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, Super conductivity.

3. Dielectric Properties of Materials:

Polarization mechanism and dielectric constant, behavior of polarization under impulse And Frequency switching, dielectric loss, spontaneous polarization, piezoelectric effect.

4. Magnetic Properties of Materials:

Origin of permanent magnetic dipoles in materials, classification, diamagnetism, Para magnetism, ferromagnetism, Ant ferromagnetism and ferromagnetism, magnetostriction.

5. Mechanism of Conduction in Semiconductor:

Energy band theory, classification of materials using energy band theory, Hall effect drift And diffusion currents, continuity equation, .P-N diode, volt –amp equation and its Temperature dependence.

6. Electrical Engineering materials:

Properties and application of electrical conducting and semi conducting, insulating and Magnetic materials.

References:

1.A..J. Dekker, Electrical engineering materials PHI.
2.C.S. Indulkar & S. thuruvengadam_ introduction to Electrical Engineering materialsS. Chand & Co.
3. R.K. Rajput, Electrical Engineering materials luxmi publications'.

ELECTROMAGNETIC FIELD THEORY

Course code: EE-406 **Credits 4(3-1-0)**

1. Electromagnetic Theory:

Review of scalar and vector field, Dot and Cross products, Other coordinates- cylindrical, Spherical etc. Vector representation of surfaces, physical interpretation of gradient Divergence and curl, Gauss's law, Stokes Theorem, different coordinate systems.

2. Electrostatic Fields:

Electric field due to a point. Charges, electrostatic potential, Solution – of Laplace and Poisson's equation in 'one dimension, M method of images applied to plain boundaries, Electric flux density, Boundary conditions, Capacitance, Electrostatic energy.

3. Magnetostatic fields:

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

4. Time Varying Fields:

Continuity equation, displacement current, Maxwell's equation, boundary conditions. Plane wave equation and its solution in conducting, and non- conducting media, phasor Notation, phase velocity. Group velocity. Depth of penetration . conductors and dielectrics, Impedance of conducing medium. Polarization, Reflection and refraction of plane waves At plane boundaries, pointing vectors, and pointing theorems.

5. Transmission Lines:

Transmission line equations. Characteristic impedance, distortion Less lines. Impedance of A loss less lines, Open and short circuited lines, Standing wave and reflection losses, Impedance matching, application of smith chart.

References:

1. Electromagnetic field theory" J.F.D. Kraus.
2. Electromagnetic- field theory Hayt.
3. Electromagnetic- field theory J.D. Kraus., R.C Keith.
4. Electromagnetic field theory- K.D. Prasad.

COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

Course code: MAS- 491 **Credits 4(3-1-0)**

Introduction:
Errors in Numerical Computations, Mathematical Preliminaries, Errors and their Analysis, Machine Computations, Computer Software.

Algebraic & transcendental equation:
Bisection Method, Iteration Method, Method of false Position, Rate of convergence, Method for Complex Root, Mullers method, Quotient difference Method, Newton-Raphson Method.

Interpolation:
Introduction, error in Polynomial interpolation, Finite differences, decision of errors, Newton's formulae for Interpolation, Gauss, Stiriling, bessel's, Everett's Formulae, Interpolation by unevenly Spaced points, Lagrange Interpolation Formulae, Divided Diffrence Newton's General interpolation Formula.

Curve Fitting, Cubic Spline & Approximation:
Introduction, method of Least Square Curve Fitting Procedures, Fitting a straight line, Curve fitting by Sum of Exponential , Data fitting with Cubic Splines, Approximation of functions.

Numerical Integration and Differentiation:
Introduction, Numerical Differentiation, Numerical Integration, trapezoidal rule Simpson 1/3 rule , Simpson 3/8 Rule , Booles waddles rule. Eular- Maclauriaun formulae, Gaussian, Formulae, Numerical Evaluation of singular Integral.

Statistical Computation:
Frequency chart, Regression Analysis, least Square Fit, Polynomial fit, linear & Non Linear Regression, Multiple Regression, statistical quality Control method.

References:
1. Sastry, "introductory method of numerical analysis," PHI.
2. Jain & lyengar, "numerical method for scientific & numerical computation", New Age Intemational.
3. Balaguruswamy, Numerical method ", TMH.
4. Gerald & Whitelyc Applied numerical analysis, Addison Wesley,"
5. Probability & Statistic, Schaum Series .
6. Hultquit, "Numerical Method for Engineers & Computer.

ENVIRONMENTAL STUDIES-II

Course Code: SES-416 **Credits 2(2–0-0)**

1) Natural Resources:
(a) Forest resources.
(b) Water resources.
(c) Mineral resources.
(d) Food resources.
(e) Energy resources.

(f) Land resources.
Role of an individual in conservation of natural resources. Equitable use of resources for sustainable life style.

2) Biodiversity and its conservation:

(a) Introduction -Definition: genetic, species and ecosystem diversity.
(b) Bio geographical classification of India.
(c) Value of diversity: consumptive use, productive use, social, ethical aesthetic and option values.
(d) Biodiversity at global, National and local levels.
(e) India as mega-diversity nation.
(f) Hot-Spots of biodiversity.
(g) Threats to biodiversity: habitat loss, poaching of wild life, man-wild life conflicts.
(h) Endangered and endemic species of India.
(i) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

3) Environment Pollution:

Definition
Causes effect and control measures of
(a) Air Pollution.
(b) Water Pollution.
(c) Soil Pollution.
(d) Marine Pollution.
(e) Noise Pollution.
(f) Thermal Pollution.
(g) Nuclear Hazard.
Solid waste Management: Causes, effect 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.

List of Experiments:

(1) Identification and study of different Natural Resources.
(2) Determination of Chloride of water sample.
(3) Determination of pH of water sample.
(4) Determination of Acidity of water sample.
(5) Determination of Hardness of water sample.
(6) Determination of Alkalinity of water sample.
(7) Determination of Turbidity of water sample.
(8) Identification of different tools for measurement of Environmental pollution. To show frequency chart, regression analysis, Linear Square fit and polynomial fit.

ELECTRICAL ENGINEERING DRAWING

Course Code: EE -505 **Credits 2(0- 0-2)**

Module1:

Armature:

1. Simplex lap/ wave dc armature windings.
2. Simplex lap/ wave, integral/ fractional slot, double layer three phase ac armature windings.
3. Single layer three phase ac armature windings.

Module2:

Transformers:

1. Sectional plan and elevation of a transformer limb with windings.
2. Sectional plan and elevation of the core assembly of a power transformer.
3. Sectional plan and elevation of a distribution transformer tank with its accessories.
4. Sketches of capacitor and oil filled type transformer bushings.

Module-3: Rotating Machines:

DC Machines:

1. Sectional front and side elevation of armature with commutator.
2. Sectional front and side elevation of yoke and pole assembly with field winding.
3. Sectional front and side elevation of assembled Machine.

Alternators:

1. Sectional front and side elevation of water wheel rotor assembly with winding.
2. Sectional front and side elevation of salient pole alternator.
3. Sectional front and side elevation of turbo alternator.
4. Sketches of the methods of pole fixing and slot details of turbo and water wheel alternators.

Induction Motors:

1. Sectional front and side elevation of slip ring induction motor.
2. Sectional front and side elevation of squirrel cage induction motor.

MODULE 4:

Substations:

1. Layouts and single line diagrams of outdoor and indoor substations.
2. Layout of a 220KV substation.
3. Layout of a captive power substation.
4. Single line diagram of a distribution center.
5. Experiments using Electrical CAD.

References:

1: Bhattacharya S.K, Electrical Engineering Drawing, Wiley Eastern, Edition 2.
2: Clayton & Hancock, Performance and Design of DC Machines, ELBS, 1992.
3: Narang K.L., A Text Book of Electrical Engineering Drawing, Tech India Publications.
4: A.K. Sawhney, Electrical Machine Design, Dhanpath Rai, New Delhi, 1991.
5: Say M.G, Performance and Design of AC machines, Pitman, ELBS, 1991.

ELEMENTS OF ECONOMICS & PRINCIPLE OF MANAGEMENT SCIENCE

Course code: BAM-315 **Credits 4(3-1-0)**

Unit-1:
Introduction: Nature and significance of Economics, Meaning of Science, Engineering and Technology and their relationship with economic development.

Unit2:
Basic Concept: The concept of demand and supply, Elasticity of Demand and Supply, Indifference Curve analysis, Price Effect, income Effect and Substitution Effect

Unit3:
Money and Banking: Functions of money, Value of Money, Inflation and measures to Control it, Brief idea of functions of banking system, viz, Commercial and central banking, business fluctuations.

Unit4:
Introductions Definition, Nature and Significance of Management, Evaluation of management through, Contributions of Max Weber, Taylar and fayal

Unit-5:
Human Behavior: Factors of individual Behavior, Perception, learning and Personality Development, Inter Personal Relationship and Group Behavior

References:
1. Dewtt, K.K/Modern Economic Theory/S. Chand & Co.
2. Luthers Fred/ Organizational Behavior.
3. Prasad L.M/ Principals of Management.
4. A.W. Stonier & D.C Horgne/ A. Text Book of Economic Theory/Oxford Publishing House Pvt. Ltd.

ELECTRICAL MACHINES-II

Course code: EE -501 **Credits 5(3-1-1)**

Unit1:
Synchronous Machines1:
Constructional features, armature windings, E.M.F. Equation, winding coefficients, harmonics in the induced E.M.F. armature reaction, O.C and S.C tests, Voltage regulation. Synchronous impedance method, MMF method, potier's triangle method and ASA method, parallel operation, operation of infinite bus, cooling.

Unit2:
Synchronous Machine II:
Two reaction theory, power expression for cylindrical and salient pole machines, performance characteristics.Synchronous Motor Principle of operation, starting methods, phasor diagram. Torque angle characteristics, V-curves, hunting and damping, synchronous condenser reluctance motor.

Unit3:
Poly Phase induction Machine1:

Constructional features, Production of rotating magnetic field, phasor diagram, equivalent circuit, torque and power equations, torque- slip characteristics, no load and blocked rotor.Tests, efficiency, performance by circle diagram, induction generator.

Unit4:

Poly phase Induction Machines-II:

Starting and speed control (with and without e.m.f injection in the motor circuit),Deep bar and double cage induction motors, cogging and crowing operation under unbalanced supply.

Unit5:

Single Phase Induction motor:

Double revolving field theory, equivalent circuit, no load and blocked rotor tests, starting methods, repulsion motor.

A.C. Commutator Motors:

EMF induced in commutator windings, single phase a.c series motor, and Universal motor.

References:

1. M.G. Say," Alternating current machines", Priman & Sons.
2. P.S. Bimbra," Electric Machinery", Khanna Publications.
3. P.S. Bimbira," Generalized Theory of Electrical Machines", Khanna Publishers.
4. I.J. Nagrath and D.P. Kothari, "Electrical Machines ," Tata Mc Graw Hill.
5. B.R. Gupta and V. Singhal, "fundamental of Electrical Machines," New Age International.

List of practical for EMEC –II Lab:

1. Study the parts of motor and generator.
2. No load test and block rotor test ON 1φ AC motor.
3. No load test and block rotor test on 3φ AC motor.
4. Load test on 1φ AC motor.
5. Magnetizing characters of a 3φ Alternator.
6. Open circuit and short circuit test on a 3φ Alternator.
7. Load test on 3φ AC motor.

CONTROL SYSTEM

Course code: EE -502 **Credits 5(3-1-1)**

Unit1:

Input/ Output Relationship:

Introduction to open loop and closed loop control system, mathematical modeling and representation of physical systems (Electrical, Mechanical and Thermal), derivation of transfer function for different types of systems,Block diagram & signal flow graph, reduction algebra, Masor's Gain Formula.

Unit2

Time –Domain Analysis:

Time domain performance criteria, transient response of first, second & higher order system, steady state error and static error constants in unity feedback control systems, error criteria, generalized error constants, performance indirect response with P,P I & PID Controllers.

Unit3:

Frequency Domain Analysis:

Polar and inverse polar plots, frequency domain specification, Logarithmic Plots (Bode Plots) gain and phase margins, relative stability, correlation with time domain, constant M &N criteria, closed loop frequency response from open loop response.

Unit4:

Concept of Stability:

Asymptotic stability and conditional stability, Routh- Hurvitz criterion, Nyquist stability criterion, Root locus Plots and their applications.

Unit5:

Compensation Techniques:

Concept of compensation, Lag, Lead and Lag- Lead networks, design of closed loop systems using compensation techniques, feedback compensation using P,PI , PID controllers.

Non- linear Systems:

Linearization techniques of non- linear systems phase- plane and describing function techniques, introduction to optimization techniques.

References:

1. S.P. Eugene Xavier, "Principles of control system, "S. Chand
2. K.Ogata, ,"Modern control Engineering" Prentice Hall of India.
3. B.C. Kao, "Automatic control system," Prentice Hall of India.
4. I.J. Nagrath & M. Gopal," Control system Engineering," New Age.

List of experiments for Control System:

1) Study of a close Loop Process (the position Control) servo stabilizer.
2) Study of the performance of analog P.I.D controller with Simulated Process.
3) To Study the performance characteristic of a D.C motor speed control.
4) To Study the Speed- Torque characteristics of A.C Servo- motor.
5) To Study the characteristic of Resistance Temperature Detector (R.T.D)
6) Study of Synchror- Transmitter and Receiver.
7) Study of the performance of a D.C Motor Angular position Control System.
8) To Study the performance of Analog P.I.D Oven Controller.
9) To Study the Time Response of variety of Simulated Linear system

ELEMENTS OF POWER SYSTEM

Course code: EE- 503 **Credits 4(3-1-0)**

Unit-1:

1.Power System Components:

Single line diagram of power system, brief description of power system elements, such as, synchronous machine, transformer, transmission line, bas bar and circuit breaker etc.

2. Supply System:

Different kinds of supply system and their comparison, choice of transmission voltage, Kelvin's law.

3. Transmission line:

Configurations, types of conductors, resistance of line, skin & proximity effects.

Unit-II:

4. Over head transmission lines:

Calculation of inductance and capacitance of single phase, three phase, single circuit and double circuit transmission lines representation and performance of short medium and long transmission lines Ferranti effect.

Unit –III

5.Coronas and Interference:

Phenomenon of corona, corona loss factors affecting corona, etrostatic and Electromagnetic interference with communication lines, methods of reducing Corona and interference.

6. Overhead Line Insulator:

Types of insulators and their applications, Potential distribution over a string of insulators, methods of insulators, method of equalizing the potential.

Unit-IV:

7. Mechanical Design of transmission Line:

Catenary's curve calculation of sag and tension, effect of wind and ice loading sag template, vibration dampers.

8. Insulated Cables

Type of cables, dielectric stress, grading of cables, Insulation resistance, capacitance of single phase and three phase cables, Dielectric loss, heating of cables.

Unit-V:

9. Neutral Grounding:

Necessity of neutral grounding, various method of neutral grounding, earthing Transformer, grounding practices

10. High voltage Transmission:

Introduction to extra and ultra H.V a.c Transmission , High Voltage d.c transmission –kinds of dc link, merits and demerits of HVDC Transmission Introduction to Flexible AC Transmission system.

References:

1. C.L. Wadhwa," Electrical Power System," Wiley Eastern Ltd.
2. W.D. Stevension," Elements of power System Analysis "Mc Graw Hill.
3. M.L. Soni, P.V. Gupta and U.S. Bhatnagar,"A Course in Electrical power ," Dhanpat Rai Sons.
4. S.L. Uppal," Electrical power ," Khanna Publishers.
5. Asfaq Husain, " Electrical Power System", CBS Publishers and Distributors.

ELECTRONIC CIRCUITS AND DESIGN

Course code: ECE-504 **Credits 5(3-1-1)**

1. Linear wave Shaping:

RC high pass and low pass circuits, response to sine, square inputs, RC circuit as a Differentiator, Integrator & compensated attenuator.

2. Logic Families:

Diode switching ,Transistor as a switching element, MOS as a digital circuit element, concept of transfer characteristics, input characteristics and opt characteristics of logic gates, fan in, fan out, noise margin Circuit concept and comparison of various logic families-TTI, III, ECL, & CMOS. Tri-state logic, open collector outputs, interfacing between logic families, comparison among families, packing density, power consumption, gate delay.

3. Shift Registers:

Basic principle, Serial & parallel data transfer. Shift left/ Right Register, Universal Shift Register, Shift Register applications , review of counters, PRBS Generators.

4. Multiplexers and De- Multiplexers:

Analog & Digital and their applications.

5. Memories:

Sequential & Random Access, one and Multidimensional selection arrangements, Read only memories Formation of Memory Banks.

6. Wave form Generators:

Clock Generator, Monostable Multivibrator as a delay circuit, Schmitt trigger, Integrated circuit timer 555.

References:

1. Taub & schilling / Digital Integrate Electronics/ Graw Hill International Edition.
2. Malvino & Leach/ Digital Electronics and circuit design/TMH.
3. G. Gopalan / Introduction to Digital Microelectronics circuits/ TMH.
4. S. Salivahann & S. Arivazhagan/ Digital Circuits & Design/ V Ikeas publishing House Pvt. Ltd.
5. John M. Yarbrough/ Digital Logic: Applications and Design/ Vikas publishing House Pvt. Ltd.
6. Rabaey/ Digital Integrated Circuits: A Design Perspective/ PHI

UTILIZATION OF ELECTRICAL ENERGY

Course Code: EE – 508 **Credit 4(3-1-0)**

Unit-I:

Electric Heating:

Advantages and methods of electric heating, Resistance heating, Electric arc heating, Induction heating, Dielectric heating

Unit-II:

Electric Welding: Electric Arc Welding, Electric Resistance welding, Electronic welding control, Electrolyte Process:

Principles of electro deposition, Laws of electrolysis, applications of electrolysis

Unit-III

Illumination:

Various definitions, Laws of illumination, requirements of good lighting

Design of in door lighting and outdoor lighting systems

Refrigeration and Air Conditioning:

Refrigeration systems, domestic refrigerator, water cooler

Types of air conditioning, Window air conditioner

Unit-IV:

Electric Traction - I, Types of electric traction, systems of track electrification, Traction mechanics- types of services, speed time curve and its simplification, average and schedule speeds, Tractive effort, specific energy consumption, mechanics of train movement, coefficient of adhesion and its influence

Unit-V:

Electric Traction – II Salient features of traction drives, Series – parallel control of dc traction drives (bridge transition) and energy saving, Power Electronic control of dc and ac traction drives, Diesel electric traction.

References:

1. H.Partab,"Art and Science of Electrical Energy" Dhanpat Rai & Sons.
2. G.K.Dubey,"Fundamentals of Electric Drives" Narosa Publishing House Reference Books:
3. H. Partab, " Modern Electric Traction" Dhanpat Rai & Sons.
4. C.L. Wadhwa, " Generation, Distribution and Utilization of Electrical Energy" New Age International Publications.

POWER ELECTRONICS

Course code: EE-504 **Credits 5(3-1-1)**

1. Power converter components:
Power transistor and traic, commutation, thyristor, GTO, power MOSFET, thyristor characteristics, rating protection and cooling of thyristor, Gate circuit requirement, single pulse and carrier frequency gating, firing circuit based on RC, UJT, 555 and comparator circuit, Darlington and series parallel combination of thyristor, GTO, MOSFET basics.

2. Controlled rectifier:
Cycloconverters and ac controllers, half wave rectifier, analysis of single phase Controlled rectifier with different types of loads, effect of transformers leakage inductance. Three phase converters with inter phase reactors and tiacs.

3. Inverters:
Principles of inverters, half wave full wave bridge single phase inverter, analysis with resistance and inductive loads, feed backs diodes, three phase inverters. MC- MURRAY – Bedford half bridge inverters.

4. Choppers:
Principles of inverters, analysis of chopper ckts. Multiquadrant Choppers, parallel voltage and current commutated choppers.

5. Solids state speed control of motors:
Converter and chopper control of dc motors control of universal motors, with half wave converter and ac controller, AC. Motor speed control.

References:
1. Ckt devices and application by Rashid, PHI
2. Power Electronics principles and application by Joseph.
3. Power Electronics by Cyril Wlander, MGH.

List of Experiment:
1. To study the different parameter and characteristics of 741op- amp.
2. To study the characteristics curve of LDR.
3. To study the series commutated SCR inverter.
4. To study the analog to digital converter.
5. To study the SCR volt- amp characteristics and pot the firing characteristics of given SCR.
6. To study the series capacitor commutation SCR circuit.
7. To study the SCR Jones chopper operation system.
8. To study the SCR phase controlled using R & RL.
9. To study the UJT as triggering generator used for SCR phase controlled I/0 Circuit.
10. To study the SCR commentator circuit.
11. To study the DC motor speed control.
12. To study the SCR phase controlled circuit response and to compare the o/p required with the theoretical rectified operation.
13. To Study the Parallel inverter operation.
14. To Study the AC induction motor speed control as state voltage controlled by phase controlled.
15. To Study the operating principle of pressure translator and application.
16. To Study the operating complementary commutation circuit.

17. To Study the operating principle of strain gauge & characteristics of load & its application.
18. To Study the characteristics of a thermo couple & its application.
19. Verify the parameter of wheat stone bridge.
20. To Study the characteristics of LVDT & its application.

POWER SYSTEM ANALYSIS

Course Code: EE-506 **Credits 4(3-1-0)**

UnitI:

1. Modelling of Power System Elements:

Per unit representation of power system, modeling of synchronous machine, transformer, transmission and line reactors.

2. Symmetrical Fault Analysis:

Sudden short circuit of 3- phase alternator at terminals, subtransient, transient and steady state reactances, current limiting reactors, Volt- ampere calculation for 3- phase symmetrical faults, selection of circuit breaker.

Unit-II:

3.Symmetrical Components:

Symmetrical components of unbalanced phasors, phase shift in Y- transformer, power in terms of symmetrical components, sequence impedances, sequence networks –positive, negative and zero sequence networks of synchronous machine and transformer.

4. Unsymmetrical Faults:

Single line to ground fault, line to line fault, double line to ground fault, interconnection of sequence networks to simulate faults, fault through impedance**.**

Unit-III:

5. Power System Stability:

Concept of stability, steady state, transient and dynamic stabilities, swing equation, stability study using equal area criterion and step by step method, factors affecting stability and methods of improvement**.**

Unit IV:

6. Load Flow Study:

Formation of Y- Bus matrix, classification of buses, development of load flow equations , load flow solution using Gauss- Seidal and Newton Raphson methods**.**

Unit-V:

7. Travelling Waves:

Standard lightning impulse wave, wave equation, surge impedance, reflection and transmission of traveling waves, repeated reflections and Bewley's lattice diagram, protection against over voltage. Introduction to power system transients.

References:

1. W.D. Stevension, "Elements of Power System Analysis", Mc. Graw Hill.
2. L.P. Singh," Advanced Power system Analysis and dynamics", Wiley Eastern Lid.
3. C.L. Wadhwa," Electrical power system ," Wiley eastern Lid.
4. Ashfaq Husain, " Electrical power System," CBS Publishers and Distributors.
5. S.L. Uppal ," Electrical power ," Khanna publishers.
6. M.L. Soni, P.V. Gupta and U.S. Bhatnagar," A course in Electrical Power" Dhanpat Rai & Sons

POWER STATION PRACTICE

Course Code: EE-507 **Credit 3(2-1-0)**

Unit-I:

1. Introduction:

Importance of electrical energy, comparison with other forms of energy, global energy scenario.

2. Non- Conventional Energy Sources:

Introduction to solar energy , geo- thermal energy, tidal energy, wind energy, biogas energy and M.H.D. Power generation.

Unit-II:

3.Thermal Power Plant:

Location and site selection, general layout and working of plant, brief description of boilers, economizers, super heaters, draft equipments, fuel and handling plat.

4. Gas Turbine power plant:

Lay out, working and components of gas turbine power Plant, combined gas and steam turbine plant**.**

Unit-III:

5.Hydro Electric plant:

Location and site selection , general layout and operation of plant, impulse, Reaction, Francis and Kaplan turbines, governing of turbines.

6. Diesel power Plant:

Layout and components of plant auxiliary equipments**.**

Unit-IV:

7.Nuclear power plant:

Location and site selection, general layout and operation of plant, brief description of reactors, moderators and reflectors.

8. Substation Layout :

Types of substations, bus –bar arrangements, typical layout of substations, substation equipments.

Unit-V

9.Power plant Economics and Tarrifs:

Load curve, load duration curve, factors affecting cost of generation, tarrifs, depreciation, effect of low power factor and its improvement.

References:

1. M.V. Deshpande, “Elements of Electric power station Design”, Wheeler publishing co.
2. B.R. Gupta , “generation of Electrical Energy”, Eurasa publishing House.
3. B,G.A.. Skrotzki & W.A. Vopat, “ Power Station Engineering and Economy,” Tata Mc. Graw Hill.
4. S.L. Uppal, “ Electrical Power “, Khanna publishers.
5. M.L. Soni, P.V. Gupta and U.S Bhatnagar,” A Course in Electrical Power”, Dhanpat Rai & sons

ELECTRICAL MACHINE DESIGN I

Course Code: EE-511 **Credit 5(3-1-1)**

Design Considerations:
Factors influencing design of electrical machines, magnetic loading, output equations, choice of specific magnetic loading , specific electric loading, flux density and current density, selection of C and L for deferent machines, properties of electrical magnetic materials used in electrical machines, classification and properties of insulating materials, temperature rise and methods of cooling.

Design of Transformer:
Output equation, voltage per turn, optimum designs, choice of flux density and current density, design of core, window dimension, design of yoke, design of low voltage and high voltage windings, number and arrangement of coils, calculation of resistances, leakage reactance, regulation, losses, efficiency, no load current, mechanical stresses, tank design and temperature rise calculations.

Design of Induction Motors:
Output equation, choice of flux density, electric loading, main dimensions, stator design, core, rotor design, airgap, rotor slots, rotor bars, end rings, rotor core, magnetic circuit resistances leakage reactance's, circle diagram and performance evaluation, temperature rise calculations.

References:
1. K. Sawhney, "A Course in Electrical Machine Design" Dhanpat Rai & Sons.
2. K.G. Upadhyay," Conventional and Computer Aided Design of Electrical Machines" Galgotia Publications.
3. M.G. Say, "The Performance and Design of AC Machines" Pitman & Sons.
4. A.E. Clayton and N.N. Hancock, "The Performance and Design of D.C.Machines" Pitman & Sons.

ADVANCE ELECTRICAL MACHINES

Course Code: EE-605 **Credit 4(3-1-0)**

UNIT-I:
Poly-phase AC Machines:
Construction and performance of double cage and deep bar three phase induction motors; e.m.f. injection in rotor circuit of slip ring induction motor, concept of constant torque and constant power controls, static slip power recovery control schemes (constant torque and constant power)

UNIT-II:
Single phase Induction Motors:
Construction, starting characteristics and applications of split phase, capacitor start, capacitor run, capacitor start capacitor-run and shaded pole motors.

Two Phase AC Servomotors:
Construction, torque-speed characteristics, performance and applications.

UNIT-III:
Stepper Motors:
Principle of operation, variable reluctance, permanent magnet and hybrid stepper motors, characteristics, drive circuits and applications.

Switched Reluctance Motors:
Construction; principle of operation; torque production, modes of operation, drive circuits.

UNIT-IV:
Permanent Magnet Machines:

Types of permanent magnets and their magnetization characteristics, demagnetizing effect, permanent magnet dc motors, sinusoidal PM ac motors, brushless dc motors and their important features and applications, PCB motors. Single phase synchronous motor; construction, operating principle and characteristics of reluctance and hysteresis motors; introduction to permanent magnet generators.

UNIT-V:

Single Phase Commutator Motors:

Construction, principle of operation, characteristics of universal and repulsion motors ; Linear Induction Motors. Construction, principle of operation, Linear force, and applications.

References:

1. P.S. Bimbhra "Generalized Theory of Electrical Machines" Khanna Publishers.
2. P.C. Sen " Principles of Electrical Machines and Power Electronics" John willey & Sons, 2001
3. G.K.Dubey "Fundamentals of Electric Drives" Narosa Publishing House, 2001

MICROPROCESSORS AND APPLICATION

Course Code: ECE-405 **Credits 5(3-1-1)**

Unit-1:

1. Introduction to Microprocessors:

Evolution of microprocessors, register structure, ALU, BUS Organization, timing and Control**.**

2. Architecture of a 16-bit Microprocessors:

Internal Organization of 8086, Bus Interface unit, Execution Unit, register organization, Sequential Memory Organization , Bus Cycle.

Unit-2:

Assembly Language Programming :

Addressing Modes, Data Transfer Instructions, Arithmetic and logic instructions, Program Control Instructions (Jumps, Conditional Jumps, Subroutine Call)Loop and String Instructions, Assembler Directives, Parameter Passing and Recursive Procedures**.**

Unit-3:

CPU Module Design:

Signal Description of pins of 8086 and 8088, Clock Generation Address and Data bus Demultiplexing, Buffering , Memory Organization, Read and write Cycle Timings, interrupt Structures, Minimum Mode CPU Module, maximum mode Operation (Coprocessor Configuration) Features of Numeric Processor 8087.

Unit-4:

Basic I/O Interfacing:

Programmed I/O, Interrupt Driven I/O, DMA, Parallel I/O(8255PPI,Centronics Parallel Port), Serial I/O (8251/ 8250, . Rs-232 Standard,) 8259-programmable Interrupt Controller,8237- DMA Controller, 8253/8254- Programmable Timer/ Counter, A/D and D/A Conversion.

Unit-5:

Memory Interfacing:

Types of Memory , RAM and Rom Interfacing with Timing Considerations, DRAM Interfacing, Trouble Shooting of Memory Module. Advanced Microprocessors and Micro controllers**.**

References:

1. Kenneth J.AYALA / The 8051 Micro controller / Penram International Publishing,1996.
2. Hall D.V /Microprocessors Interfacing /TMH (2nd Edition).
3. Liu, G.A., Gibson / Microcomputer Systems: The 8086/8088 Family /PHI 2nd Ed.
4. B.P Singh /Advanced Microprocessor and Microcontrolles / New Age International.
5. B.P. Singh / Microprocessor Interfacing and Application / New Age International.

NON- CONVENTIONAL ENERGY SOURCES

Course code: EE-606 **Credits 4(3-1-0)**

Introduction:
Various non- conventional energy resources, Introduction, availability, classification, relative merits and demerits.

Solar Cell:
Theory of solar cells solar cell materials, solar cell power plant, limitations. Solar Theory Thermal Energy; Solar radiation flat plate collections and their materials, applications and performance, focusing of collectors and their materials ,application and performance, solar thermal power plants, thermal energy storage for solar heating and cooling, limitations

Geothermal Energy:
Resources of geothermal energy, thermodynamics of geo-thermal energy conversion electrical conversion, non-electrical conversion, environmental considerations.

Magneto- hydrodynamics (MHD):
Principle of working of MHD power plant, performance and limitations

Fuel Cells:
Principle of working of various types of fuel cells and their working, performance and limitations.

Thermo- electrical and thermionic Conversions:
Principle of working , performance and limitations.

Wind energy:
Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments wind characteristics. Performance and limitations of energy conversions systems.

Bio- Mass:
Availability of bio- mass and its conversion theory Ocean thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations Wave and Tidal Wave: Principle of working , performance and limitations, Wave Recycling plants.

References:

1. Andra Gabdel, “A Handbook for Engineers and Economists.”
2. A Main,” Handbook of solar radiation Data for India”
3. Peter Auer,” Advances in Energy System and technology” vol. I & II Edited by Academic press.

SWITCH GEAR AND PROTECTION

Course code: EE-601 **Credits 5(3-1-1)**

Unit-1:

1. Protection System:

Basic philosophy of protection, essential qualities of protection, primary and back up protections, protection zones; relay as comparator, single input, dual input and multi-input comparators, phase and – amplitude comparators; relay threshold characteristics in complex-Z and Y- planes.

Unit II:

2. Theory of Circuit Breaking:

Theory of are phenomenon, methods of are quenching, restriking and recovery voltages; inductive current chopping capacitive current breaking short line faults; testing and ratings of circuit breaker.

Unit III:

3. Protective Relays:

Types, electromagnetic relay, electronic relay, static relay, buch holtz relay: operational characteristics of various over current and distance relays and their realization using static components.

Unit-IV:

4. Protection of Transmission Line:

Phase and earth fault relay, distance protecion, power swing, carrier relaying scheme, poly phase relay, traveling wave based relaying scheme protection of feeder and bus bar, pilot relaying scheme.

Unit V:

Protections of alternator and transformer, percentage differential relay, introduction to digital protection of transmission line, alternator and transformer

Circuit Breakers:

Types, constructional features and operation of Bulk oil, minimum oil, air-blast, SF6' vacuum and static circuit breakers.

References;

1. B. Ram and D.N. Vishwakarma," Power System Protection and Switchgear," Tata Mc. Graw Hill.
2. B. Ravindranath and M. Chander, "power System protection and Switchgear," Wiley Eastern, Ltd.
3. S.S. Rao, " Switchgear and Protection, " Khanna Publishers.
4. T.S.M. Rao, " Power System Protection: Static relays with microprocessor application," Tata Mc. Graw Hill.
5. L.P. Singh, " Digital protection "New Age International

List of Experiments:

1. To Study of Vacuum circuit breaker.
2. To Study of Air Circuit Breaker.
3. To Study of oil circuit Breaker.
4. To Study of SF-6 Circuit Breaker.

5. To find the operating and de-operating Current of Instantaneous over Current relay.
6. TO find the Current Vs time Characteristics of Instantaneous over Current relay.
7. To find the operating and de-operating Voltage of over Voltage relay.
8. To plot the Voltage Vs time Characteristics of over Voltage relay.

ELECTRICAL MACHINE DESIGN II

Course Code: EE-602 **Credits 5(3-1-1)**

Design of D.C Machine :
Constructional Details, Stator, Armature, Armature Winding , Commentator, Design output Equation, Choice of Average Gap Density, Choice of Ampere Conductors per Meter, Selection of Number of Poles, Guiding Factors for choice of Number of poles, Core Length, Armature Diameter, Length of Air Gap, Estimation of Air Gap Length, Brush shift and Its Effect, Choice of Armature Winding, Number of Armature Coils, Number of Armature Slots, Guiding Factors for Choice of Number of Armature Slots, Slot Dimensions, Pole Design, Area of Poles, Height of Pole, Yoke, Magnetization Curve (O.O.C), Design of shunt Field Winding, Design of Series Field , Temperature Rise**.**

References:
1. K. Sawhney, "A Course in Electrical Machine Design" Dhanpat Rai & Sons.
2. K.G. Upadhyay," Conventional and Computer Aided Design of Electrical Machines" Galgotia Publications.
3. M.G. Say, "The Performance and Design of AC Machines" Pitman & Sons.
4. A.E. Clayton and N.N. Hancock, "The Performance and Design of D.C.Machines" Pitman & Sons.

MODERN CONTROL SYSTEM

Course Code: EE- 603 **Credit 4(3-1-0)**

Unit-I:
1. State Space Analysis of Control System :
Introduction, state space representation of continuous linear time invariant system, transfer function and state variables, solution of state equations.
Unit-II:
2. Analysis of Discrete Systems:
Introduction of discrete time systems: sample and hold circuits, representation by difference equations and its solution using Z- Transform, pulse transfer function, representation of discrete system in state variable form and its solution.
Unit- III:
3. Controllability and Observability:
State and output controllability and observability:
Design of state observers and controllers**.**
4. Stability:
Liapunov's method, methods for generating Liapunov's function, Lure's transformation; popov's criterion.
Unit-IV:
5. Optimal control:

Introduction, formation of optimal control problem, calculus of variations, minimization of functions, constrained optimization. Dynamic programming, performance index, optimality principle, Hamilton- Jacobi equation, linear quadratic problems, Ricatti equation and its solution, solution of two point boundary value problems.

Unit-V:

6. Adaptive Control:

Introduction, modal reference adaptive control systems, controller structure, self tuning regulators, various adaptive control systems, fuzzy logic and its applications.
Introduction to digital control.

References;

1. B. Ogata, " state- Space Analysis,"
2. M. Gopal ," modern Control System Theory," Wiley eastern Ltd.
3. Brian D.O Adnerson and john B. Moore, "optimal Control Linear Quadratic Method,"
4. Shastri and Bodson, " Adaptive Control," Prentice Hall of India.
5. S. Das Gupta, " Control system Theory," khanna Publishers.

INSTRUMENTATION AND PROCESS CONTROL

Course Code: EE– 604 **Credits 4(3-1-0)**

Unit-I:

Transducer I:

Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain guages, Resistance thermometer, Thermistors, Thermocouples, LVDT,RVDT

Unit-II:

Transducer II:

Capacitive, Piezoelectric Hall effect and opto electronic transducers. Measurement of Motion, Force pressure, temperature, flow and liquid level.

Unit-III:

Telemetry:

General telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter.

Acquisition System:

Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.

Unit-IV:

Display Devices and Recorders:

Display devices, storage oscilloscope, spectrum analyzer, strip chart & x-y recorders, magnetic tape & digital tape recorders.

Recent Developments:

Computer aided measurements, fibre optic transducers, microsessors, smart sensors, smart transmitters.

Unit-V:

Process Control:

Principle, elements of process control system, process characteristics, proportional (P), integral (I), Derivative (D), PI, PD and PID control modes. Electronic, Pneumatic & digital controllers.

References:

1. A.K.Sawhney, "Advanced Measurements & Instrumentation", Dhanpat Rai & Sons
2. B.C. Nakra & K.Chaudhry, "Instrumentation, Measurement and Analysis", Tata Mc Graw Hill 2nd Edition.
3. Curtis Johns, "Process Control Instrumentation Technology", Prentice Hall

Elective I :EEE-(621-630)

HIGH VOLTAGE ENGINEERING

Course Code: EE-635 **Credits 4(3-1-0)**

UNIT-I:

Break Down In Gases:

Ionization processes, Townsend's criterion, breakdown in electronegative gases, time lags for breakdown, streamer theory, Paschen's law, break down in non-uniform field, breakdown in vacuum.

Break Down In Liquid Dielectrics:

Classification of liquid dielectric, characteristic of liquid dielectric, breakdown in pure liquid and commercial liquid.

Break Down In Solid Dielectrics:

Intrinsic breakdown, electromechanical breakdown, breakdown of solid, dielectric in practice, breakdown in composite dielectrics.

UNIT-II:

Generation of High Voltages and Currents:

Generation of high direct current voltages, generation of high alternating voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-III:

Measurement of High Voltages and Currents:

Measurement of high direct current voltages, measurement of high alternating and impulse voltages, measurement of high direct, alternating and impulse currents, Cathode Ray Oscillographs for impulse voltage and current measurements.

UNIT-IV:

Non-Destructive Testing:

Measurement of direct current resistively, measurement of dielectric constant and loss factor, partial discharge measurements

High Voltage Testing:

Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, testing of transformers, testing of surge arresters, radio interference measurements.

References:

1. M. S. Naidu and V. Kamaraju, "High Voltage Engineering, Tata Mc-Graw Hill.
2. E. Kuffel and W. S. Zacngal, High Voltage Engineering", Pergamon Press.
3. M. P. Chaurasia , "High Voltage Engineering", Khanna Publishers
4. R. S. Jha, "High Voltage Engineering", Dhanpat Rai & sons
5. C. L. Wadhwa, "High Voltage Engineering", Wiley Eastern Ltd.

6. M. Khalifa,' High Voltage Engineering Theory and Practice,' Marcel Dekker

ELECTIVE –III: EEE-(641-650)

ADVANCE POWER ELERCTRONICS

Course Code: EE- 623 **Credits 4(3-1-0)**

AC –DC converters, performance Parameter- (Source Side & Motor Side), Comparison of performance of full and semi converters. Power factor improvement methods- Line commutation Technique & forced commutation Technique, Advantages & Disadvantages. Modulation Index, Switch mode dc-dc converters, Back converter , Boost converter, Buck-boost converter, cuk converter, Full bridge converter. Resonant converters (Zero voltage or Zero current converters), classification, different method of mode of operations, switch mode inductive current switching modified resonant buck converter. Flexible ac transmission system (FACTS), different devices – static var compensator, Thyristor controlled series capacitor, static phase, braking resister system, unified power flow control.

References:

1. Power Electronics M. Mohan, 2nd edition Willey Eastern.
2. Thyristor d.c, derives" P.C. Sen.
3. Power Electronic " S. N. Singh , Dhanpat Rai, 2002.
4. Power Electronics" M.H. Rashid 3rd edition PHI.