MAHATMA GANDHI UNIVERSITY

Kottayam, Kerala

B.Tech. –Degree Courses 2010-2011

Revised Scheme and Syllabus
And
Syllabus for Combined I & II Sem

SCHEME

Semester 1&2

Common for All Branches

Code	Subject	Hours/week			Marks		End-sem duration-hours	Credits
		L	T	P/D	Inte-rnal	End-sem		
EN010 101	Engineering Mathematics I	2	1	-	50	100	3	5
EN010 102	Engineering Physics	1	1	-	50	100	3	4
EN010 103	Engineering. Chemistry & Environmental Studies	1	1	-	50	100	3	4
EN010 104	Engineering Mechanics	3	1	-	50	100	3	6
EN010 105	Engineering Graphics	1	3	-	50	100	3	6
EN010 106	Basic Civil Engineering	1	1	-	50	100	3	4
EN010 107	Basic Mechanical Engineering	1	1	-	50	100	3	4
EN010 108	Basic Electrical Engineering	1	1	-	50	100	3	4
EN010 109	Basic Electronics Engineering. & Information Technology	2	1	-	50	100	3	5
EN010 110	*Mechanical Workshop*	0	-	3	50	-	3	1
EN110 111	*Electrical and Civil Workshops*	-	-	3	100	-	3	1
	Total	**13**	**11**	**6**			**30**	**44**

Syllabus for combined Ist & IInd Sem
2010 Admission
(Common for all branches)

EN010 101 ENGINEERING MATHEMATICS – I

Teaching Scheme **Credits: 5**

2 hour lecture and 1 hour tutorial per week

Objectives

- *To impart mathematical background for studying engineering subjects.*

MODULE I (18 hours) - MATRIX

Elementary transformation – echelon form – rank using elementary transformation by reducing in to echelon form – solution of linear homogeneous and non – homogeneous equations using elementary transformation. Linear dependence and independence of vectors – eigen values and eigen vectors – properties of eigen values and eigen vectors(proof not expected) – Linear transformation – Orthogonal transformation – Diagonalisation – Reduction of quadratic form into sum of squares using orthogonal transformation – Rank, index, signature of quadratic form – nature of quadratic form

MODULE 2 (18 hours) - PARTIAL DIFFERENTIATION

Partial differentiation : chain rules – statement of Eulers theorem for homogeneous functions – Jacobian –Application of Taylors series for function of two variables – maxima and minima of function of two variables (proof of results not expected)

MODULE 3 (18 hours) - MULTIPLE INTEGRALS

Double integrals in cartesian and polar co-ordinates – change of order of integration- area using double integrals – change of variables using Jacobian – triple integrals in cartesian, cylindrical and spherical co-ordinates – volume using triple integrals – change of variables using Jacobian – simple problems.

MODULE 4 (18 hours) - ORDINARY DIFFERENTIAL EQUATIONS

Linear differential equation with constant coefficients- complimentary function and particular integral – Finding particular integral using method of variation of parameters – Euler Cauchy equations- Legenders equations

MODULE 5 (18 hours) - LAPLACE TRANSFORMS

Laplace Transforms – shifting theorem –differentiation and integration of transform – Laplace transforms of derivatives and integrals – inverse transform – application of convolution property – Laplace transform of unit step function – second shifting theorem(proof not expected) – Laplace transform of unit impulse function and periodic function – solution of linear differential equation with constant coefficients using Laplace Transform.

REFERENCES

1. Erwin Kreyszig ;Advanced Engineering Mathematics Wiley Eastern Ltd
2. Grewal B.S ;Higher Engineering Mathematics ,Khanna Publishers
3. N. P. Bali ;Engineering Mathematics ,Laxmi Publications Ltd
4. Goyal & Gupta ; Laplace and Fourier Transforms
5. Dr. M.K.Venkataraman ;Engineering Mathematics Vol. I,National Publishing Co.
6. Dr. M.K.Venkataraman Engineering Mathematics Vol. 2, National Publishing Co
7. T.Veerarajan ,Engineering Mathematics for first year, Mc Graw Hill
8. S.S.Sastry Engineering Mathematics Vol. I,Prentice Hall India
9. S.S.Sastry Engineering Mathematics Vol. 2, Prentice Hall India
10. B.V. Ramana Higher Engineering Mathematics, Mc Graw Hill

EN010 102 ENGINEERING PHYSICS

Teaching Scheme **Credits: 4**

I hour lecture and 1 hour tutorial per week

Objectives

- *To provide students knowledge of physics of a problem and an overview of physical phenomena.*

MODULE I (12 hours) LASERS AND HOLOGRAPHY

Lasers- Principle of laser- Absorption- Spontaneous emission- Stimulated emission- Characteristics of laser - Population inversion- Metastable states- Pumping- Pumping Methods- Pumping Schemes- 3 level and 4 level pumping- Optical resonator- Components of laser- Typical laser systems like Ruby laser- He-Ne laser- Semiconductor laser- Applications of laser-

Holography- Basic principle -Recording and reconstruction- comparison with ordinary photography-Applications of Hologram

MODULE II (12 hours) NANOTECHNOLOGY AND SUPERCONDUCTIVITY

Introduction to nanoscale science and technology- nanostructures-nanoring, nanorod, nanoparticle, nanoshells- Properties of nanoparticles- optical, electrical, magnetic, mechanical properties and quantum confinement- Classification of nanomaterials- C_{60}, metallic nanocomposites and polymer nanocomposites- Applications of nanotechnology

B. Superconductivity- Introduction- Properties of super conductors- Zero electrical resistance- Critical temperature- Critical current- Critical magnetic field- Meissner effect- Isotope effect- Persistence of current- Flux quantization - Type I and Type II superconductors- BCS Theory (Qualitative study) – Josephson effect- D.C Josephson effect- A.C Joseph son effect- Applications of superconductors.

MODULE III (12 hours) CRYSTALLOGRAPHY AND MODERN ENGINEERING MATERIALS

A. Crystallography – Space lattice- Basis- Unit cell- Unit cell parameters- Crystal systems- Bravais lattices- Three cubic lattices-sc, bcc, and fcc- Number of atoms per unit cell- Co-ordination number- Atomic radius- Packing factor- Relation between density and crystal lattice constants- Lattice planes and Miller indices-Separation between lattice planes in sc- Bragg's law- Bragg's x-ray spectrometer- Crystal structure analysis.

Liquid crystals- Liquid crystals, display systems-merits and demerits- Metallic glasses- Types of metallic glasses (Metal-metalloid glasses, Metal-metal glasses) – Properties of metallic glasses (Structural, electrical, magnetic and chemical properties)

Shape memory alloys- Shape memory effect, pseudo elasticity

.

MODULE IV (12 hours) ULTRASONICS

A. Ultrasonics- Production of ultrasonics- Magnetostriction method – Piezoelectric method- Properties of ultrasonics- Non destructive testing- Applications

B. Spectroscopy- Rayleigh scattering (Qualitative) - Raman effect – Quantum theory of Raman effect- Experimental study of Raman effect and Raman spectrum- Applications of Raman effect

C. Acoustics- Reverberation- Reverbaration time- Absorption of sound- Sabine's formula(no derivation)- Factors affecting acoustics properties

MODULE V (12 hours) FIBRE OPTICS

Principle and propagation of light in optical fibre- Step index (Single Mode and Multi Mode fibre) and graded index fibre- N.A. and acceptance angle—Characteristics of optical fibres (Pulse dispersion, attenuation, V-number, Bandwidth-distance product) –

Applications of optical fibres- Fibre optic communication system (Block diagram)- Optical fibre sensors (any five) – Optical fibre bundle.

REFERENCES

1) A Text book of Engineering Physics – M.N.Avadhanulu and P.G.Kshirsagar S.Chand& Company Ltd.
2) Nanomaterials- A.K.Bandhopadyaya – New Age International Publishers
3) Engineering Physics – A. Marikani
4) Engineering materials –V Rajendran and Marikani-Tata McGraw-Hill Publishing Company Limited
5) Engineering physics- Dr. M Arumugam - Anuradha Agencies
6) Nano ; The Essentials- T. Pradeep
7) Material Science-M Arumugham- Anuradha Agencies
8) Lasers and Non-Linear optics By B.B Laud- New Age International (P) Limited

EN010 103 Engineering Chemistry & Environmental Studies

(Common to all branches)

Teaching scheme **Credits:4**

1hr lecture and 1hr tutorial per week (total 60 hrs)

Objectives

- *To impart a scientific approach and to familiarize the applications of chemistry in the field of technology*
- *To create an awareness about the major environmental issues for a sustainable development.*

Module 1 Electrochemical Energy Systems (13 hrs)

Electrochemical cells - Galvanic cell - Daniel cell – EMF - determination by potentiometric method - Nernst equation – derivation- Single electrode potential-Types of electrodes- Metal/metal ion electrode, Metal/metal sparingly soluble salt electrode, Gas electrode and Oxidation/reduction electrode - Reference electrodes - Standard hydrogen electrode and Calomel electrode - Glass electrode – Determination of pH using these electrodes - Concentration cell – Electrolytic concentration cell without transfer - Derivation of EMF using Nernst equation for concentration cell - Cells and Batteries - Primary and secondary cells - Lead acid accumulator, Ni-Cd cell, Lithium–MnO_2 cell and Rechargeable Lithium ion cell – Polarization – Overvoltage - Decomposition potential - Numerical problems based on Nernst equations and pH determination.

Module 2 Corrosion and Corrosion Control (10 hrs)

Introduction - Types of corrosion – Chemical and Electrochemical corrosion – Chemical corrosion – Oxidation corrosion, By other gases and Liquid metal corrosion – Pilling-Bedworth rule - Electrochemical corrosion – Mechanism - absorption of O_2 and evolution of H_2 - Types of electrochemical corrosion- Galvanic corrosion, Concentration cell corrosion, Differential aeration corrosion, Pitting corrosion, Waterline corrosion and Stress corrosion - Factors influencing the rate of corrosion - Nature of the metal and Nature of the environment - Corrosion control methods – Selection of metal and proper design, Cathodic protection (Sacrificial anodic protection and Impressed current cathodic protection), Modifying the environment, corrosion inhibitors and Protective coating - Metallic coating – Anodic coating and cathodic coating - Hot dipping (Galvanizing and Tinning), Electroplating, Electroless plating, Metal spraying, Metal cladding Cementation- sheradizing - chromizing- calorizing and Vacuum metallization - Non-metallic coating - Anodization

Module 3 Engineering Materials (13 hrs)

High polymers – Introduction - Degree of polymerization – Functionality – Tacticity - Types of polymerization (mechanisms not required) – Addition, Condensation and Copolymerization - Glass transition temperature-(Tg) Definition only, Compounding and moulding of plastics - Compression, Injection, Extrusion, Transfer and Blow moulding.

Fiber Reinforced Plastics - Glass reinforced plastics (GRP) - Manufacturing methods - Hand lay up, Spray up and Filament winding - properties and uses.

Conducting Polymers – Polyacetylene and Polyaniline - Applications (mechanism not required)

Rubber - Natural rubber – Properties – Vulcanization - Synthetic rubber - Preparation, properties and uses of Polyurethane rubber, NBR and Silicone rubber.

Carbon Nanotubes - Single walled (SWCNT) and Multi walled (MWCNT) - Properties and uses.

Module 4 Environmental Pollution (12 hrs)

Pollution - Types of pollution – a brief study of the various types of pollution - Air pollution - Sources and effects of major air pollutants – Gases - Oxides of carbon, nitrogen and sulphur – Hydrocarbons – Particulates -Control of air pollution - Different methods - Water pollution - Sources and effects of major pollutants - Inorganic pollutants- heavy metals cadmium , lead, mercury - Ammonia, Fertilizers and Sediments (silt) - Organic pollutants – Detergents, pesticides, food waste, - Radioactive materials - Thermal pollutants - Control of water pollution - General methods

Eutrophication - Definition and harmful effects

Desalination of water - Reverse osmosis and Electrodialysis

Module 5 Environmental Issues (12 hrs)

An overview of the major environmental issues - Acid rain – Smog - Photochemical smog - Green house effect - Global warming and climate change - Ozone layer depletion – Deforestation - Causes and effects - Wet land depletion – Consequences, Biodiversity – importance and threats, Soil erosion - Causes and effects, Solid waste disposal -Methods of disposal - Composting, Landfill, and Incineration, E-Waste disposal - Methods of disposal – recycle(recovery) and reuse

Renewable energy sources - Solar cells – Importance - Photo voltaic cell - a brief introduction

Bio fuels - Bio diesel and Power alcohol.

Note: This course should be handled and examination scripts should be evaluated by the faculty members of Chemistry

Text Books

1. A text book of Engineering Chemistry - Shashi Chawla, Dhanpat Rai and Co.
2. A text book of Engineering Chemistry - Jain & Jain 15th edition .
3. A text book of Engineering Chemistry – S. S. Dhara.
4. Modern Engineering Chemistry – Dr. Kochu Baby Manjooran. S.

References

1. Chemistry - John E. McMurry and Robert C. Fay, Pearson Education.
2. Polymer science –V. R. Gowariker, New Age International Ltd.
3. A text book of polymer - M. S. Bhatnagar Vol I, II,& III, S. Chand publications.
4. Nano materials – B. Viswanathan, Narosa publications.
5. Nano science & Technology – V. S. Muralidharan and A. Subramania, Ane Books Pvt. Ltd.
6. Nanotechnology - Er. Rakesh Rathi, S. Chand & Company Ltd.
7. Environmental Studies - Benny Joseph (2nd edition), Tata Mc Graw Hill companies.
8. Environmental Chemistry - Dr. B. K. Sharma, Goel publishers.
9. Environmental Chemistry – A. K. De, New age International Ltd.
10. Industrial Chemistry – B. K. Sharma, Goel publishers.
11. Engineering Chemistry – O. G. Palanna, Tata Mc Graw Hill Education Pvt. Ltd.

EN010 104 ENGINEERING MECHANICS

(Common to all branches)

Teaching Scheme **Credits: 6**

3 hour lecture and 1 hour tutorial per week

Objective:

To develop analytical skills to formulate and solve engineering problems.

Module I (23 hrs)

Introduction to Mechanics – Basic Dimensions and Units – Idealization of Mechanics – Rigid Body – Continuum – Point force – Particle – Vector and Scalar quantities.

Principles of Statics – Force Systems – Coplanar, Collinear, Concurrent and Parallel – Free body diagrams – Resolution of forces – Moment of a Force – Varignon's Theorem – Couple – Resolution of a force into force couple system – Conditions of static equilibrium of Rigid bodies – Solutions of problems using scalar approach

Force Systems in Space – Introduction to Vector approach – Elements of Vector algebra – Position vector – Moment of a Force about a Point and Axis – Resultant of Forces – Equilibrium of forces in space using vector approach

Module II (23 hrs)

Principle of Virtual work – Elementary treatment only – application of virtual work in beams, ladders

Centroid of Lines, Areas and Volumes – Pappus Guldinus Theorems

Moment of Inertia of laminas – Transfer theorems – radius of Gyration – problems

Centre of Gravity – Mass moment of Inertia of circular and rectangular plates – solid rectangular prisms – Cylinders – Cones

Module III (23 hrs)

Friction – Laws of friction – Contact friction problems – ladder friction – Wedge friction – Screw friction.

Introduction to Structural Mechanics – Types of Supports, loads, frames – Static Indeterminacy – Support reactions of beams – Analysis of perfect trusses by method of joints, method of sections.

Module IV (28hrs)

Kinematics – Rectilinear motion of a particle under Variable Acceleration

Relative Velocity - problems

Circular motion with Uniform and Variable Acceleration – Relations between Angular and Rectilinear motion – Normal and Tangential accelerations

Combined motion of Rotation and Translation – Instantaneous centre of zero velocity – Wheels rolling without slipping

Introduction to Mechanical Vibrations – Free vibrations – Simple Harmonic motion

Module IV (23 hrs)

Kinetics of particles – Newton's laws of Motion of Translation – D'Alembert's Principle – Motion of connected bodies – Work Energy Principle – Principle of Momentum and Impulse – Collision of Elastic bodies

Newton's laws of Rotational motion – Angular Impulse and Torque – Conservation of Angular Momentum – Centrifugal and Centripetal forces – Applications – Work done and Power by Torque and Couple.

References:

1. Engineering Mechanics – S. Timoshenko, D.H. Young & J. V. Rao – Tata Mc Graw Hill
2. Engineering Mechanics – Statics and Dynamics – Irving H Shames, G Krishna Mohana Rao – Pearson Edutcation
3. S. Rajasekararn & G.Sankarasubramanian, Engineering Mechanics, Vikas Publishing Co.
4. Engineering Mechanics – Prof.J.Benjamin, Pentex Publishers
5. Engineering Mechanics – G. S. Sawhney PHI Learning Private Ltd. New Delhi
6. Engineering Mechanics – K. L. Kumar, Tata Mc Graw Hill, New Delhi

EN010 105: ENGINEERING GRAPHICS

Teaching Scheme **Credits: 6**

I hour lecture and 3 hour drawing per week

Objectives

- *To provide students of all branches of engineering with fundamental knoeledge of engineering drawing*
- *To impart drawing skills to students*

MODULE 1 (24 hours)

Introduction to Engineering Graphics: Drawing instruments and their uses-familiarization with current BIS code of practice for general engineering drawing.

Scales-Plain scales-Diagonal Scales-Forward and Backward Vernier Scales.

Conic Sections:-Construction of conics when eccentricity and distance from directrix are given .Construction of ellipse (1) given major axis and foci (2) given major axis and minor axis (3)given a pair of conjugate diameters (4) by the four centre method. Construction of parabola given the axis and base. Construction of hyperbola-(1) given the asymptotes and a point on the curve. (2) Given ordinate, abscissa and transverse axis. Construction of rectangular hyperbola. Construction of tangents and normals at points on these curves.

Miscellaneous curves:-Cycloids, Inferior and superior Trochoids-Epicycloid-Hypocycloid-Involute of circle and plain figures-Archimedian Spiral and Logarithmic Spiral- Tangents and normals at points on these curves.

MODULE 2 (24 hours)

Orthographic projections of points and lines:-Projections of points in different quadrants-Projections of straight lines parallel to one plane and inclined to the other plane-straight lines inclined to both the planes-true length and inclination of lines with reference planes using line rotation and plane rotation methods – Traces of lines.

Orthographic projections of planes-Polygonal surfaces and circular lamina.

MODULE 3 (24 hours)

Orthographic projections of solids:-Projections of prisms , cones ,cylinders ,pyramids ,tetrahedron, octahedron and spheres with axis parallel to one plane and parallel or perpendicular to the other plane-the above solids with their axes parallel to one plane and inclined to the other plane –axis inclined to both the reference planes-use change of position method OR auxiliary method.

Sections of solids:-Sections of prisms ,cones , cylinders ,pyramids ,tetrahedron and octahedron with axis parallel to one plane and parallel or perpendicular or inclined to the other plane with section planes perpendicular to one plane and parallel , perpendicular or inclined to the other plane –True shapes of sections.

MODULE 4 (24 hours)

Developments of surfaces of (1)simple solids like prisms ,pyramids , cylinder and cone (2) sectioned regular solids (3)above solids with circular or square holes with their axes intersecting at right angles.-Developments of funnels and pipe elbows.

Isometric Projections:-Isometric Scales-Isometric views and projections of plane figures, simple & truncated solids such as prisms, pyramids, cylinder, cone, sphere, hemisphere and their combinations with axis parallel to one the planes and parallel or perpendicular to the other plane.

MODULE 5 (24 hours)

Perspective projections:-Perspective projections of prisms, pyramids, cylinder and cone with axis parallel to one plane and parallel or perpendicular or inclined to the other plane by visual ray method OR vanishing point method

Intersection of surfaces:-Intersection of prism in prism &cylinder in cylinder-Axis at right angles only.

REFERENCES

1. Engineering Graphics-Unique Methods easy solutions-K.N Anilkumar
2. Engineering Graphics-P I Varghese.
3. Engineering Drawing-N D Bhatt
4. Engineering Graphics-P S Gill
5. Engineering Graphics-T S Jeyapoovan.

EN010 106: BASIC CIVIL ENGINEERING

(Common to all branches)

Teaching scheme: **Credits: 4**

1 hour lecture and 1 hour tutorial per week

Objective:

To familiarize all engineering students with the basic concepts of civil engineering so that they can perform better in this great profession "Engineering".

Module 1 (12 hours)

Introduction to civil engineering : various fields of civil engineering- Engineering materials: Cement – Bogues compounds, manufacture of Portland cement-wet and dry process, grades of cement, types of cement and its uses – steel– types of steel for reinforcement bars ,structural steel sections,built-up sections,light gauge sections. Aggregates: Fine aggregate:- pitsand, riversand, M- sand--Coarse aggregate: natural and artificial , requirements of good aggregates. Timber: varieties found in Kerala – seasoning and preservation. Bricks**:** classification, requirements, tests on bricks.

Module 2 (12 hours)

Cement mortar- preparation and its uses– concrete –ingredients, grades of concrete – water cement ratio, workability, curing, ready mix concrete. Roofs - roofing materials -A. C, aluminium, GI, fibre, tile, reinforced concrete (brief description only)- reinforcement details of a one way slab, two way slab and simply supported beams.

Module 3 (12 hours)

Building Components: Foundation: Bearing capacity and settlement - definitions only-footings- isolated footing , combined footing - rafts, piles and well foundation , machine foundation (Brief description only).

Superstructure: Walls - brick masonry – types of bonds , English bond for one brick -stone masonry-Random Rubble masonry.

Module 4 (12 hours)

Surveying**:** Classification –principles of surveying- chain triangulation- instruments used, field work – bearing of survey lines –WCB and reduced bearing -Leveling: field work - reduction of levels - height of instrument method.

Introduction to total station- basic principles of remote sensing, GPS and GIS.

Module 5 (12 hours)

Site plan preparation for buildings (Sketch only) – Kerala Municipal Building Rules (1999)- general provisions regarding site and building requirements – coverage and floor area ratio – basic concepts of "intelligent buildings" and "green buildings"- disposal of domestic waste water through septic tank and soak pit. Classification of roads- basics of traffic engineering – road markings , signs, signals and islands, road safety-accidents, causes and remedies– (brief description only)

References

1. Jha and Sinha, Construction and foundation Engineering, Khanna Publishers
2. Punmia B. C., Surveying Vol –I, Laxmi Publications
3. Rangwala, Building Materials, Charotar Book stall
4. K. Khanna ,C. E. G. Justo., Highway Engineering, Khanna Publishers
5. Nevile., Properties of Concrete, Mc Graw Hill
6. B C Punmia.,Basic Civil Engineering, Khanna Publishers
7. Kerala Municipal Building Rules – 1999

EN010 107 BASIC MECHANICAL ENGINEERING

(Common to all branches)

Teaching scheme **Credits- 4**

1hour lecture and1hour tutorial per week

Objective

To impart basic knowledge in mechanical engineering

Module 1(12 hours)

Thermodynamics: Basic concepts and definitions, Gas laws, specific heat –Universal gas constant- Isothermal, adiabatic and polytrophic processes, work done, heat transferred, internal energy and entropy - Cycles: Carnot, Otto and Diesel- Air standard efficiency.

Basic laws of heat transfer (Fourier's law of heat conduction, Newton's law of cooling Steffen Boltzmann's law)

Module 2 (12 hours)

I.C. Engines: Classification of I.C Engines, Different parts of I.C engines, Working of two stroke and four stroke engines-petrol and diesel engines-air intake system, exhaust system, fuel supply system, ignition system, lubrication system, cooling system and engine starting system-Performance of I.C. engines, advantage of MPFI and CRDI over conventional system.

Refrigeration: Unit of refrigeration, COP, Block diagram and general descriptions of air refrigeration system, vapour compression and vapour absorption systems- Required properties of a refrigerant, important refrigerants– Domestic refrigerator- Ice plant.

Air conditioning system: Concept of Air conditioning, psychometry, psychometric properties, psychometric chart, psychometric processes, human comfort– winter and summer air conditioning systems (general description), air conditioning application.

Module 3 (12 hours)

Power transmission elements: Belt Drive - velocity ratio of belt drive, length of belt, slip in belt- simple problems– Power transmitted– Ratio of tensions– Centrifugal tension Initial tension– Rope drive, chain drive and gear drive-Types of gear trains (simple description only).

Module 4 (12 hours)

Power plants: General layout of hydraulic, diesel, thermal and nuclear power plants-nonconventional energy sources (general description only).

Hydraulic turbines and pumps : Classifications of hydraulic turbines –types of hydraulic turbines – runaway speed, specific speed, draft tube, cavitations, selection of hydraulic turbines .Classification of pumps– positive displacement and rotodynamic pumps (description only)- applications

Steam turbines: Classification of steam turbines, description of common types of steam turbines: Impulse and reaction, compounding methods.

Module 5 (12 hours)

Simple description of general purpose machines like lathe, shaping machines, drilling machines, grinding machines and milling machines, Basic concepts of CNC, DNC, CIM and CAD/CAM

Manufacturing Processes: Moulding and casting, forging, rolling, welding- arc welding-gas welding (fundamentals and simple descriptions only)

Text book

1 P.L. Bellany, *Thermal Engineering,* Khanna Publishes

2 Benjamin J., *Basic Mechanical Engineering,* Pentex

Reference Books

1 R.C.Patel, *Elements of heat engines,* Acharya Publishers -

2 G.R Nagapal, *Power plant engineering,* Khnna publishes

3 P.K.Nag, *Engineering Thermodynamics*, McGraw Hill

4 Dr.P.R Modi &Dr.M.S. Seth, *Hydraulics & Fluid Mechanics including Hydraulic Machines,* Standard Book House

EN010 108: Basic Electrical Engineering

(Common to all branches)

Teaching Scheme
Credits: 4
I hour lecture and 1 hour tutorial per week

Objectives

- *To provide students of all branches of engineering with an overview of all the fields of electrical engineering*
- *To prepare students for learning advanced topics in electrical engineering*

Module I (10 hours)
Kirchhoff's Laws – Formation of network equations by mesh current method – Matrix representation – Solution of network equations by matrix method – Star delta conversion.
Magnetic circuits – mmf, field strength, flux density, reluctance, permeability – comparison of electric and magnetic circuits – force on current carrying conductor in magnetic filed.

Module II (12 hours)
Electromagnetic Induction – Faraday's laws – lenz's law – statically and dynamically induced emf – self and mutual inductance – coupling coefficient.
Alternating current fundamentals – generation of AC –frequency, period, average and r m s value, form factor, peak factor, phasor representation – j operator – power and power factor – solution of RLC series and parallel circuits.

Module III (13 hours)
DC machine – principle of operation of DC generator – constructional details – e m f equation – types of generators.
DC motor – principle of operation of DC motor – back emf – need for starter – losses and efficiency – types of motors – applications – simple problems.
Transformer – principle of operation – e m f equation Constructional details of single phase and three phase transformer – losses and efficiency – application of power transformer, distribution transformer, current transformer and potential transformer.

Module IV (13 hours)
Three phase system – generation of three phase voltage – star and delta system – relation between line and phase voltages and currents – phasor representation of three phase system - balanced delta connected system – three wire and four wire system – simple problems. Three phase power measurement – Single wattmeter, two wattmeter and three wattmeter methods.
Induction motors – principle of operation of three phase induction motors – applications of cage and slip ring induction motor – single phase induction motors – capacitor start / run, shaded pole – universal motors - Applications.
Synchronous generator (Alternator) – principles of operation and types.

Module V (12 hours)
Generation of electric power – types of generation – hydroelectric, thermal and nuclear (Block schematic and layout only) - Non conventional energy sources – solar, wind, tidal, wave and geothermal.

Transmission – need for high voltage transmission – Transmission voltage – Distribution – Underground versus overhead – Feeder – Distributor – Service mains – conductor materials – one line diagram of typical power system.
Requirements of good lighting system – working principle of incandescent lamp, Fluorescent lamp and mercury vapour lamp-energy efficient lamps (CFL,LED lights) – need for energy management and power quality – home energy management.

Text Books

1. D.P. Kothari & I.J. Nagrath – Basic Electrical Engineering – Tata McGraw Hill
2. D.C. Kulshreshta – Basic Electrical Engineering - Tata McGraw Hill
3. Hughes – Electrical and Electronic Technology – Pearson Education

Reference Books

1. R.V. Srinivasa Murthy – Basic Electrical Engineering – Sunguine Technical
2. J.B.Gupta – Fundamentals of Electrical Engineering & Electronics – S.K.Kataria
3. V.K. Mehta, Rohit Mehta – Basic Electrical Engineering – S.Chand.
4. Bureau of Engineering Efficiency – Guide book for national certification examination for energy managers and auditors.
5. Rajendra Prasad – Fundamentals of Electrical Engineering, Prentice Hall India.
6. Soni, Gupta, Bhatnagar & Chackrabarty – A text book on power system engineering – Dhanapt Rai
7. Electrical Engineering Fundamentals – Vincent Del Toro, Pearson Education.

EN010 109: Basic Electronics Engineering and Information Technology

(Common to all branches)

Teaching Scheme **Credits: 5**

2 hour lecture and 1 hour tutorial per week

Objectives

- *To provide students of all branches of engineering with an overview of all the fields of electronics engineering and information technology*

MODULE 1 (18 hours): Basic Circuit Components: *Diode:* Germanium, Silicon, Zener, LEDs (working principle only). Forward and reverse characteristics. [2hr.] *Rectifiers*: Half wave, fullwave , Bridge circuits, DC Power supply: Capacitor filter, Zener regulator. [3hrs.] *Transistors* :Different configurations - CE characteristics-β and ∝, concept of Amplifiers: Common emitter RC coupled amplifier, Frequency response, Bandwidth.(No analysis required) Comparison of BJT,FET,MOSFET, IGBT. [2hr.]. *Integrated circuits*: Advantages, classification of Linear and Digital ICs. Basics of Op-amps, inverting and non-inverting amplifiers.Family of IC's(Function diagram of 7400 & CD4011) [4hrs.] .Specifications of TTL and CMOS.[] –Comparison.

MODULE 2 (18 hours): Basic communication Engineering:*Communication:* Frequency bands: RF, VHF, UHF, x, ku, ka, c. Modulation – need for modulation, basic principles of amplitude, frequency and pulse modulation. [6hrs.]. Block schematic of AM transmitter , Super-hetrodyne receiver, FM receiver.-function of each block.[3hrs.] .*Wireless communication*: *Satellite Communication*-Earth station, transponder and receiver.*Mobile Communication*: GSM-BSC, Cell structure, frequency re-use, hands-of, establishing a call.

MODULE 3 (18 hours):Basic instrumentation and Consumer electronics: *Electronic instrumentation*: Transducers: Basic principles of Strain guage, LVDT, Thermistor, Photodiode, Typical moving coil microphones and Loud speaker.Block diagram of Digital Multimeter .[8hrs*].CONSUMER ELECTRONICS*: Basic principles of TV –Interlaced Scanning-Block Diagram of PAL TV receiver(color).Basic principles of DTH, brief descriptions of MP3,multichannel audio 5.1,7.1.

MODULE 4 (18 hours):**Introduction**: Definition and Scope of IT-Digital Computer, Von Neumann Architecture-Basic Operational Concepts-CPU-single Bus and Multi Bus Organization, A typical Instruction set, Execution of Instructions. **Memory and I/O**-Main Memory, Virtual Memory-Cache memory-Secondary Memories-Printers, Plotters, Displays ,Key board, Mouse, OMR and OCR-Device Interface-I/O Processor-I/O Channel

MODULE 5 (18 hours) :Computer software-System Software and Application Software-Machine Language-Assembly Language-High Level Language-Language Translators-Operating System, Procedural Programming and Object Oriented Programming.**Computer Networks**-Concepts of Networking-Network Topologies-WAN-LAN-MAN, Protocol-Internet-working concept, Internet Architecture, IP addresses, Routing, Domain Name System(Basic concepts only)

References

1.Basic Electronics – Devices, Circuits and IT fundamentals.Santiram Kal,PHI(Module 1to 5)
2. Basic Electronics: Bernad Grob, Mc Graw Hill Publication(Module 1)
3. Electronic Devices: Floyd, Pearson Education (Module 1)
4. Electronic Devices and Circuits: J.B. Gupta,S.K.Kataria & Sons (Module 1 , 2,3)
5. Digital Principles: Malvino & Leach, Mc Graw Hill Publication(Module 1)
6. Electronic Instrumentation: H.S Kalsi, Mc Graw Hill Publication(Module 2)
7. Communication Systems: Sanjay Sharma, S.K.Kataria & Sons (Module 2)
8. Satellite Comunication : Robert M.Gagliardi,CBS Publishers & Distributors.(Module 2)
9.Basic Radio and TV; S.P. Sharma,Tata McGrawhill(Module 2 &3)
10.Wireless Communication; T.S. Rappaport, Pearson(Module 3)
11.Computer Organization, Hamacher, Vranesic and Zaky, Mc Graw Hill (Module 4)
12.Systems Programming, JJ Donovan ,Mc Graw Hill (Module 5)
13.Computer Networks,Andrew.S Tanenbaum,Pearson Education(Module 5)

EN010 110: Mechanical Workshop

(Common to all branches)

Teaching scheme **Credits: 1**

3 hours practical per week

Objectives

- *To provide students of all branches of engineering in house experience of basic mechanical instruments and activities*

Carpentry Planing – cutting – chiselling, marking – sawing – cross and tee joints – dovetail joints – engineering application, Seasoning, Preservation – Plywood and ply boards.

Fitting Practice in chipping – filing – cutting – male and female joints.

Smithy Forging of square and hexagonal prism. Study of forging principles, materials and operations.

Foundry Preparation of simple sand moulds – moulding sand characteristics, materials, gate, runner, riser, core, chaplets and casting defects.

Demonstration and study of machine tools – lathe, drilling, boring, slotting, shaping, milling and grinding machines, CNC machines and machining centers.

Demonstration and study of arc and gas welding techniques.

EN010 111: Electrical and Civil Workshops

(Common to all branches)

Teaching scheme **Credits: 1**

3 hours practical per 2 weeks for each

Objectives

- *To provide students of all branches of engineering in house experience of basic electrical and civil instruments and activities*

Electrical Workshop

1. Wiring and estimation of one lamp and one plug, Control of two lamps in series and in parallel.
2. Staircase wiring.
3. Godown wiring.
4. Insulation megger - earth megger , measurement of insulation resistance and earth resistance .Study of volt meter, ammeter , watt meter and energy meter.
5. Working principle and wiring of Fluorescent , CFL and Mercury vapour lamp .
6. Study and wiring of distribution board including power plug using isolator, MCB and ELCB – Estimation of a typical 1BHK house wiring system.
7. Familiarization , soldering, testing and observing the wave forms on a CRO of a HW and FW Uncontrolled Rectifier (using diodes) with capacitor filter.
8. Observing the wave forms on a CRO of Experiment 7 without capacitor filter and find the average and RMS value of the voltage waveform.
9. Visit your college substation and familiarize the supply system, Transformer, HT Panel and Distribution etc.

Civil Workshop

Masonry : English bond – Flemish bond – wall junction – one brick – one and a half brick – two brick and two and a half brick – Arch setting.

Plumbing: Study of water supply and sanitary fittings – water supply pipe fitting – tap connections – sanitary fittings – urinal, wash basin – closet (European and Indian), Manholes.

Surveying: Study of surveying instruments – chain – compass – plane table – levelling – minor instruments. Demonstration of Theodolite and Total Station.

Familiarization of latest building materials : Flooring materials – Roofing materials – Paneling boards.