

**SYLLABUS PRESCRIBED FOR
FOUR YEAR DEGREE COURSE IN
B.E./ B.TEXT. E./B.TECH. (CHEM.ENGG.)/B.TECH. (CHEM. TECH.)
POLYMER (PLASTIC) TECH.
SEMESTER-I / II “GROUP A”**

I A 1

ENGINEERING MATHEMATICS-I

Aim :

The course is aimed at developing the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.

Objectives :

On completion of the course the students are expected:

- to identify algebraic problems from practical areas and obtain the solutions in certain cases
- to understand maxima and minima concept.
- to solve differential equations of certain types, including systems of differential equations that they might encounter in the same or higher semesters.
- to understand double and triple integration and enable them to handle integrals of higher orders.

SECTION-A

Unit I : Successive differentiation, Leibnitz's theorem on the n^{th} derivative of a product, Expansion of a function by using Taylor's theorem and Maclaurin's theorem, Indeterminate forms. (10)

Unit II: Partial differentiation, total differential coefficients, exact differential, Euler's theorem on homogeneous function, Transformation of independent variables. (10)

Unit III : Jacobians of explicit functions and implicit function with properties, functional dependence, Maxima and Minima of a function of two independent variables, Maxima and Minima of a function of several independent connected variables by Lagrange's method of undetermined multipliers. (10)

SECTION-B

Unit IV : Complex Numbers : Demoiver's theorem and its applications, Hyperbolic and inverse hyperbolic functions, separation of real and imaginary parts, Logarithm of complex numbers. (10)

Unit V : Ordinary differential equations of first order and first degree in various forms; (Variable separable, linear differential equation, homogeneous differential equation, exact differential equation) and reducible to above forms, methods of substitution. (10)

Unit VI : Solution of differential equation of first order and higher degree by various methods. application of differential equations of first order and first degree to the problems on orthogonal trajectories and electrical engineering. (10)

TEXT BOOK :-

- (1) Wartikar P.N. & Wartikar J.N.- A Text Book of Applied Mathematics, Vol.-I, & II, Pune V.G. Prakashan, Pune.

REFERENCE BOOKS :-

- 1) Grewal B.S. - Higher Engineering Mathematics, 40/e, Khanna Publishers.
- 2) Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
- 3) Ramana B.V. - Higher Engineering Mathematics, (TMH)
- 4) Singh R.R. & Bhatt M. - Engineering Mathematics, (TMH)

Aim :

To enable the students to correlate the theoretical principles of fundamentals of modern aspects in Physics with application oriented studies of engineering.

Objectives :

At the end of the course the students would be exposed to fundamental knowledge in:

- Electromagnetic phenomena and wave propagation,
- Interferometric techniques in metrology, communication
- Application of quantum physics to optical & electrical phenomena
- Application of lasers and Fiber Optics in Engineering and Technology
- Conducting, superconducting and dielectric materials
- Semi conducting and new engineering materials
- Physics of Modern engineering materials
- Application of ultrasonics, acoustics

SECTION-A

Unit I : Solid State Physics : Energy band diagrams, covalent bonds, bound & free electrons, holes, electron and hole mobilities intrinsic and extrinsic semiconductors, fermi and impurity levels, charge neutrality equation and semiconductor conductivity, Einstein relation, p-n junction diode, Zener diode, Light Emitting Diode. (9)

Unit II: Modern Physics : Elements of wave properties of particle and particle properties of wave, LASER, spontaneous and stimulated emission of radiation, Einstein coefficient, Ruby Laser, characteristics & application of Laser. (7)

Unit III : Electric and Magnetic Fields : Motion of electron in uniform transverse electric field and transverse magnetic fields, velocity selector (energy filter), positive rays, Bainbridge mass spectrograph, Hall effect, cathode ray oscilloscope : working and its block diagram. (7)

SECTION-B

Unit IV : Interference and Diffraction : Fundamental condition of interference, thin film interference due to reflected light, Newton's ring, Fresnel and Fraunhofer diffraction, single and double slit diffraction, plane transmission grating. (7)

Unit V : Fibre Optics : Principle and construction of optical fibre, acceptance angle and acceptance cone numerical aperture, types of optical fibres and refractive index profile, attenuation in optical fibres, different mechanisms of attenuation, application of optical fibres. (8)

Unit VI : Fluid Dynamics and Acoustics : Continuity equation, Bernoulli's theorem and its applications, Viscosity, flow of liquids through a capillary tube, Stoke's formula. Production and application of Ultrasonics. Acoustics of buildings. (7)

TEXT BOOK :

1) M.N.Avadhanulu & P.G.Kshirsagar : Engineering Physics, S.Chand Pub., 2008

REFERENCE BOOKS :

- 1) R.K.Gaur & S.L.Gupta : Engineering Physics, Dhanpat Rai & Sons.
- 2) Hitendra K. Malik & A.K.Singh : Engineering Physics, Tata McGraw Hill
- 3) Beiser : Modern Physics, Tata McGraw Hill
- 4) Mani & Mehta : Modern Physics, Affiliated East-West Press
- 5) N.Subrahmanyam, Brijlal, M.N.Avadhanulu : A Text Book of Optics, S.Chand & Company Ltd.

Aim :

Basic concepts of Mechanics for Static and Dynamics have to be implanted into the student.

Objectives :

At the end of this course the student should be able to understand:

- the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions.
- the principle of work and energy.
- the effect of friction on equilibrium
- the laws of motion, the kinematics of motion and the interrelationship
- the dynamic equilibrium equation
- All these should be achieved both conceptually and through solved examples.

SECTION-A**UNIT I:**

Concept of a force, moment of a force about a point and about an axis, couple, resolution and compositions of coplanar force system, reduction of system of forces into a force and a couple equivalent force system.

Free-body diagrams, equations of equilibrium, problems of equilibrium involving co-planar force system acting on a particle, rigid body and system of rigid bodies, problems of equilibrium of non-coplanar concurrent force system. (8)

UNIT II:

Analysis of simple plane trusses, method of joints, method of sections, analysis of frames involving ideally connected members.

Coulomb's law of friction, static belt friction, wedge friction. (8)

UNIT III:

First moment of an area and centroid, second moment and product of area, transfer theorems, polar moment of inertia, radius of gyration, definition of principle axes and principle moment of inertia.

Work of a force, Principle of virtual work and its application. (7)

SECTION B**Unit IV:**

Kinematics: Definitions of displacement, velocity and acceleration and their relations, rectilinear motion under variable & constant accelerations, motion curves, simple relative motion between two particles, curvilinear motion using rectangular coordinates, normal and tangential components.

Kinematics of rigid body motion in rectilinear translation: rotation about a fixed axis and plane motion. (8)

Unit V:

Kinetics of rectilinear and circular motion of a particle acted upon by constant and variable force system, D'Alembert's principle, concept of dynamic equilibrium, rectilinear motion of several interconnected particles

Kinetics of rigid body rectilinear translation, rotation about a fixed axis of rigid body. (7)

Unit VI:

Work, power and energy: work-energy equation for motion of a particle, system of particles, work energy equation for rigid bodies rectilinear translation.

Linear impulse, linear momentum, momentum equation for a particle and a system of particles, direct central impact, collision of two particles, coefficient of restitution. (7)

TEXT BOOK :

- 1) Bhattacharyya Basudeb, Engineering Mechanics, Oxford University Press.

REFERENCE BOOKS :

1. Singer, F. L., Engineering Mechanics, Harper Collins Pub., Singapore.
2. Timoshenko, S. P. and Young, D. H., Engineering Mechanics, McGraw-Hill International C., Auckland.
3. Beer, F. P. and Johnston, E. R., Vector Mechanics for Engineers, McGraw-Hill International C., Auckland.
4. Shames, I. H., Engineering Mechanics, P.H.I. Pvt. Ltd., New Delhi.

Aim :

To provide mechanical engineering (orthographic) drawing skills in the context of engineering design.

Objectives :

To develop in students graphic skills for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.

SECTION-A**UNIT I: Engineering Curves**

- a) Conic Section
Construction of ellipse, parabola & hyperbola by various methods
- b) Cycloidal curves.
Construction of cycloid, epicycloids & hypocycloid.
Tangent & normal to the curve.
- c) Involute
Involute of circle, square, pentagon, hexagon.
- d) Loci of points :
Locus problems on
 - i. four bar chain mechanism
 - ii. Simple slider crank mechanism
 - iii. Offset slider crank mechanism. (8)

UNIT II: Introduction to Projections.

- 1st angle, 3rd angle method of projection
- a) Projection of points
- b) Projection of lines
(Inclined to one plane at a time.)
- c) Projection of planes.
(Inclined to both the planes) (8)

UNIT III: Orthographic projection

- Conversion of simple pictorial views into orthographic views. (7)

SECTION-B**UNIT IV: Projection of regular solids.**

- Projection of prism, pyramid, cone, cylinder
- Projection on auxiliary planes. (7)

UNIT V: Section of solids.

- Section of solids keeping solids in different position. (7)

UNIT VI: Isometric views & projection.

- Construction of isometric scale.
- Isometric views & projection of objects having rectangular, cylindrical surfaces & representation of sloping faces and slots.
- Dimensioning of isometric views/projection. (8)

TEXT BOOK :-

1. Bhatt N.D. & Panchal V.M. – Engineering Drawing, 49th edition, Charotar Pub. House, Anand, Gujrat, 2007.

REFERENCE BOOKS :

1. Shah P.J. - Engineering Drawing, S.Chand Publication, 2008.
2. Narayana K.L., Kannaiah P. - Engineering Drawing, Scitech Publication, 2009.
3. Dhwan R.K. - Engineering Drawing, S.Chand Publication, (5th edition, 2008)
4. Jolhe D.A. - Engineering Drawing, Tata McGraw Hill Publication, 2008.

COURSE OBJECTIVES:

- To give students 'hands on experience' of craftsmanship.
- To make students familiar with different work trades.
- To develop quality & safety consciousness amongst the students.
- To develop awareness of fire safety amongst the students.
- To develop respect towards labour work amongst the students.
- To develop skill sets for creating entities from primitive engineering materials.
- To develop skill sets for establish in connections through wires and cables.
- This exercise also aims at inculcating respect for physical work and hard labour in addition to some value addition by getting exposed to interdisciplinary engineering domains.

A) PERFORMANCE:

I) SMITHY: Introduction to smithy operations like upsetting, drawing, bending, Forming; Tools-hammer, hot and cold chisels, swages, drifts, flatters, tongs, anvils and various smithy tools & equipments, their use. Forging Principle, forge welding, use of forged parts.

One job on smithy: Job involving upsetting, drawing down, flatter, Change of cross sectional area like round into rectangular or making a ring from a round bar, S – Hook, forming such as a square / hexagonal headed bolt, hook etc.

II) FITTING: Introduction to different fitting tools. Use and setting of fitting tools for marking, center punching, chipping, cutting, filing, drilling, their use, different measuring tools, Files – Material and Classification.

One job on fitting: Job involving Fitting involving marking, filing, hacksaw cutting, drilling and tapping such as a male-female type pare.above mentioned operations.

III) TAPS & DIES: introduction to Taps & Dies, Different sizes of Taps & Dies their uses, Holding instruments of taps & dies.

One job on taps & dies: Job involving, External and internal threads on plate or pipe , marking, center punching, cutting, filing, drilling.

B) DEMONSTRATION:

Minimum two physical demonstrations provided from following. In addition to physical demonstrations **Video / LCD** presentations for rest of demonstrations may be provided.

- 1) SAFETY :** Common hazards while working with engineering equipment and related safety measures. Colour Codes floor marking in industries, various hazard indication signs. Posters for safety. Fire Safety, fire prevention precautions, necessity of fire fighting, fire extinguishers, rules of fire fighting, risk elements in fire fighting and demonstration of use of fire extinguishers.
- 2) MATERIALS :** Brief introduction of materials used in Industries, steels and alloys, cast iron, non-ferrous metals, timber, plastics and polymers, glass etc. and; their applications.
- 3) MEASURING INSTRUMENTS:** Brief introduction to instruments other than used in above performing trades. like –Vernier Caliper, Micrometer, Dial indicator, thickness gauge, height gauge, Their least counts, common errors and care while using them, Use of marking gauge, 'V' block and surface plate.

- 4) **MACHINE TOOLS AND PROCESSES:** Brief introduction to metal removing, Showing basic operations like plain turning facing, step turning etc. metal shaping,
- 5) **FOUNDRY:** Moulding sand, constituents and characteristics. Pattern, definition, materials, types, core printing. Role of gate, runner, riser, core and chaplets. Causes and remedies of some common casting defects like blow holes, cavities, inclusions. Demonstration to Preparation of sand mould like pipe flange, anvil, etc.
- 6) **PLASTIC INJECTION MOULDING:** Introduction, principle, equipment & its operation, mould introduction & setting, Safety precautions and demonstration of plastic injection molding process.
- 7) **IT & COMPUTERS:** Introduction and identification of hardware components of a typical computer system. Handling and operating peripheral devices like printer, scanner, pen drives, CD-ROM, Multimedia Devices, UPS etc. Identification and study of communication elements like Single pair wires (phone lines), multi-pair wires (UTP), fibre-optic cables, printer data cables, connectors- RJ-45, RJ-9, RJ-11, USB, 9-Pin and 25-Pin serial and parallel connectors; converters- serial to USB, 9-Pin to 25- Pin, Vice-Versa and others. POST (power on self test), Power related problems. Use of CD Read / Write operations etc. Installation of Operating system windows and Linux , simple diagnostic exercises.
- 8) **CONSTRUCTION OF ELECTRICAL BOARD WIRING:** House wiring, staircase wiring for fluorescent tube light, store wiring, three-phase wiring for electrical motors & Machines. Working of Electrical Batteries, demonstration of electrical cable wires, starters and MCB's.

REFERENCES :

1. B. S. Raghuvanshi, A Course in Workshop Technology, Vol – I, Dhanapat Rai and Sons.
2. Hajara Choudhari, Elements of Workshop Technology, Vol – I, Media Promoters.
3. Gupta and Kaushik, Workshop Technology, Vol – I, New Heights.
4. Chapman, Workshop Technology, Vol – I, The English Language Book Society.
5. H.S.Bawa, Workshop Technology, Vol.-I, TMH Publications, New Delhi.
6. S.K.Hajra Choudhary,Elements Of Workshop Technology,Media Promoters &Publishers Pvt.Ltd,
7. Workshop Technology, Vol I, II and III, Chandola S.P., Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. K.T.Kulkarni,Introduction to Industrial Safety,K.T.Kulkarni,Pune Reference Books
9. Hwaiyu Geng, Manufacturing Engineering Handbook,McGraw Hill Publishing Co.Ltd.
10. Lawrence E.Doyle, Manufacturing Processes and Materials for Engineers,Prentice Hall Inc.

NOTE: Journal should be prepared and submitted based on information of tools and equipments used, jobs prepared by using various tools, equipments, machines in the above three trades of performance sections. It also consist of details of demonstration (minimum two) demonstrated to students with brief description.

The term work shall be assessed based on a) the record of attendance, b) Term work done, c) the written/ practical / oral tests on the term work to decide the depth of understanding. The term work is to be assessed weekly.

PRACTICAL EXAMINATION:

Practical examination will consists of actual preparation of one job from any of the above performance sections. Duration of examination will be 3 hrs. Total marks are 25, out of which 15 marks are for job preparation and 10 marks for viva voce which should be conducted when the students are on job.

I A 6**ENGINEERING PHYSICS****PRACTICALS :**

- 1) Determination of Band gap energy of semiconductor.
- 2) To study the forward and reverse characteristics of P-N junction diode.
- 3) To study the reverse characteristics of Zener diode.
- 4) To study the forward characteristics of Light Emitting Diode.
- 5) To determine the wavelength of monochromatic light by Newton's rings method.
- 6) Determination of wavelength of spectral lines using diffraction grating.
- 7) Determination of grating element of a diffraction grating using LASER beam.
- 8) Study of Hall effect
- 9) Amplitude and frequency measurement of ac signal using CRO
- 10) Study of CRO
- 11) Determination of unknown frequency of ac signal using Lissajou's pattern
- 12) To determine resolving power of telescope
- 13) Determination of Planck's constant using photocell
- 14) To determine the coefficient of viscosity of water by capillary flow
(Note : Minimum 08 experiments shall be conducted)

I A 7**ENGINEERING MECHANICS****PRACTICALS:**

(Four compulsory graphical solutions to the problems of statics.)

1. Law of Polygon of forces
2. Reactions at the supports of simple beam.
3. Jib crane/shear leg.
4. Determination of coefficient of friction on inclined plane.
5. Determination of Coefficient of coil friction.
6. Determination of mass moment of inertia of fly wheel
7. Determination of gravitational acceleration by compound pendulum.
8. Determination of velocity ratio, law of machine, simple screw jack, differential wheel axle, worm and worm wheel, single and double purchase crab.

A journal on experiments conducted shall be submitted by each student. Practical examination shall be viva-voce based on the practicals and syllabus of the course.

I A 8**ENGINEERING DRAWING**

PRACTICAL - Each student will submit a set of at least 8 drawing sheets based on the syllabus evenly distributed as per list attached. Practical examination will consist of orals on the topic based on the syllabus.

1. Construction of Engineering curves.
2. Loci of points on link mechanism
3. projection of straight lines
4. Projection of planes
5. Projection of regular solids
6. Section of solids
7. Orthographic projection (1st & 3rd angle)
8. Isometric projection/view
9. Free hand sketches of simple machine elements
 - a) Screw threads ISI profile
 - b) Types of nuts, bolts, studs, set screws, washer, locking arrangement of nuts & bolts.
 - c) Foundation bolts (Rag, Eye, Lewis foundation bolts)

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SEMESTER-I / II “GROUP B”**

I B 1 ENGINEERING MATHEMATICS-II

Aim :

The course is aimed at developing the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects. The topics introduced will serve as basic tools for specialized studies in many fields of engineering and technology.

Objectives :

On completion of the course the students are expected:

- Solution of simultaneous equations by matrix method
- Fourier series
- to know the basics of vector calculus comprising of gradient, divergence & curl and line, surface
- to grasp the basics of complex integration and the concept of contour integration which is important for evaluation of certain integrals encountered in practice

SECTION-A

Unit I: Matrices : Inverse of matrix by adjoint method, Inverse of matrix by partitioning, Rank of a matrix, solution of simultaneous equations by matrix method, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof)

(10)

Unit II: Fourier series: Periodic function, Fourier expansion of periodic function in $(C, C+2L)$, even and odd functions, half range Fourier series, Harmonic Analysis. (10)

Unit III: (a) Scalar Triple Product, vector triple product and their properties, multiple products.

(b) Rule of differentiation under integral sign.

(c) Tracing of curves in Cartesian, polar and parametric forms. (10)

SECTION-B

Unit IV: Reduction formulae, Beta and Gamma function, Rectification. (10)

Unit V: Double integration, change of order of integration, transformation to polar coordinates, Evaluation of area by double integration (10)

Unit VI: Triple integration, transformation to spherical polar coordinates, volume of solid by triple integration. Mean and RMS values. (10)

TEXT BOOK :-

- (1) Wartikar P.N. & Wartikar J.N.- A Text Book of Applied Mathematics, Vol.-I, & II, Pune V.G. Prakashan, Pune.

REFERENCE BOOKS :-

- 1) Grewal B.S. - Higher Engineering Mathematics, 40/e, Khanna Publishers.
- 2) Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
- 3) Ramana B.V. - Higher Engineering Mathematics, (TMH)
- 4) Singh R.R. & Bhatt M. - Engineering Mathematics, (TMH)

Aim :

To impart a sound knowledge on the principles of Chemistry involving the different application oriented topics required for all engineering branches.

Objectives :

The student should be conversant with:

- Chemistry involved in the different segments of environment and technological developments in water
- The principles involved in corrosion control, nuclear fuels, power generation and nanotechnology
- Utilization of Polymer and engineering materials towards different applications
- Importance of fuels and lubricants
- Concept of analytical techniques

SECTION-A**Unit I: Water Technology :**

Hardness of water :- Temporary and permanent hardness, units and their inter-conversions, Experimental determination by EDTA method, softening of water by Lime-Soda, Ion exchange and Zeolite process. Numerical problems based on Lime Soda & Zeolite process. (9)

Unit II: Corrosion, Corrosion Control and Nano-Chemistry :

Corrosion & its control - : Dry & Wet corrosion and their mechanism, Types of corrosion-Pitting corrosion, waterline corrosion, inter-granular corrosion, galvanic and stress corrosion.

Role of design and material selection in corrosion control, Anodic and Cathodic protection, hot dipping (Galvanizing and tinning)

Introduction of Nano-Chemistry, types of Nano materials, General methods of preparation of Nano materials, Applications of Nano materials. (7)

Unit III: Portland cement & Nuclear Fuels & Power generation :

A) Portland cement: Raw materials & manufacture of cement by wet process, setting and hardening, heat of hydration, soundness of cement.

B) Nuclear Fuels & Power generation: Nuclear binding energy, nuclear fission and fusion, critical mass, Components of nuclear power reactor and breeder reactors. (8)

SECTION-B**Unit IV: Fuels and Lubricants:**

A) Fuels :- Definition of chemical fuel, classification, calorific value-gross and net, analysis of coal, Proximate and ultimate analysis and their significance, cracking of petroleum fractions, Use of gasoline and diesel in internal combustion engines, Knocking, Chemical constitution and knocking properties, octane number, cetane number.

B) Lubricants: - Classification of lubricants, mechanism of lubrication, testing of lubricants for viscosity and viscosity index, flash and fire point. (7)

Unit V: Polymers, Resins/ Plastics, Rubbers:

Classification of polymers on the basis of their structure, methods of polymerization, Cationic & Anionic mechanism of polymerization, Thermosetting and Thermoplastic Resin, Preparation, properties and uses of PVC, Teflon, Bakelite, Natural rubber : vulcanization, properties and uses of Synthetic rubbers - styrene rubber, nitrile rubber & butyl rubber. (7)

Unit VI: Environmental Chemistry :

Segments of environment: lithosphere, hydrosphere, bio-sphere & atmosphere.

Green House Effect, Acid rain, Ozone depletion. Methods and equipments for controlling of Particulate emissions: wet scrubber, fabric filters, cyclone separators and electrostatic precipitators. (7)

TEXT BOOK :

- (1) "A Text Book of Engineering Chemistry"-S. S. Dara. (S.Chand).

REFERENCE BOOKS :

- 1) "Engineering Chemistry"-Jain & Jain. (Dhanpat Rai & Sons).
- 2) "A Text book on Experiments & Calculations in Engineering Chemistry- S. S. Dara. (S.Chand).
- 3) "Text book of Engineering & Technology" vol I & II-Rajaram & Kuriacose.
- 4) "A Text Book of Polymer Science & Tech"-V Gowariker.
- 5) Nanotechnology Fundamentals and Applications : Manasi Karkare, I K International Pub.

I B 3**COMPUTER PROGRAMMING****Aim:**

To impart knowledge to analyze, solve, design and code real-life problems using C language.

Objectives:

To learn the basic concepts of computing.

To know the methodology of problem solving.

To develop skills in programming using C language.

Guidelines for Tutorial Classes:

Course instructors have to plan for programming exercises to be solved independently by students during tutorial classes.

SECTION-A**UNIT I:** Problem Solving:

Organization of PC, Basic concepts of problem solving on computer, Input-Process-Output cycle. Algorithms, Flowcharts and algorithm development. Examples of algorithms for sorting a list with insertion sort and bubble sort. Examples of algorithms for searching: Linear search and binary search. (10)

UNIT II: C Fundamentals:

Introduction to C language, First C program, Program execution, Keywords, Character set, Built in Data Types, Variables, Expressions, Operators & their precedence. Assignment statement. I/O using scanf() and printf() functions, Format specifiers for scanf() and printf() functions. (10)

UNIT III: C Control constructs:

Decision-making using if, if-else and switch-case statements, Loops using for, while, do-while statements, break and continue statements. Functions: declaration, definition and parameter passing mechanism. (10)

SECTION-B**UNIT IV:** Scope Rules and Arrays

Storage classes: automatic, static, extern, register type. Introduction to arrays: single dimensional and multi-dimensional. Strings, Arrays of strings and string related functions. Programs for Searching and sorting the arrays of strings. (10)

UNIT V: Pointers:

Definition and uses of pointers. Address of operator, pointer arithmetic, Pointers and functions. Parameter passing mechanism using pointers. Pointers and Arrays, Arrays of pointers. Pointers and Strings. (10)

UNIT VI: Structures and Files:

Declaring and using the Structures. Operation on structures. Arrays of structures, Pointers to structures. Unions and their comparison with Structures. Introduction to Files. File types. File handling functions. Command line arguments. (10)

TEXT BOOK:

K R Venugopal & S R Prasad. "Mastering C" Tata-McGraw Hill-2207.

REFERENCE BOOKS:

1. Pradeep Dey & Manas Ghosh " Computer Fundamentals & Programming in C" Oxford University Press 2006.
2. Herbert Schildt - C Complete Reference (Tata-McGraw Hill)
3. Gottfried – Problem Solving in C (Schaum Outline Series- McGraw Hill)
4. Noel Kalicharan - C by Example (Cambridge University Press)

Aim :

To impart basic knowledge of electric circuits, magnetic circuits, D.C. machines and transformers, A.C. machines and control systems.

Objectives :

To expose the students to the analysis of electric and magnetic circuits, performance characteristics of D.C. machines, A.C. machines and transformers and to give awareness of the basics of Control System Engineering.

SECTION-A**Unit I: Fundamentals**

- a) Basic concept of Voltage , Current, Power, Energy and relationship between them
- b) Resistance Resistivity, Conductivity, Temperature effect on resistance and temperature coefficient of resistance.
- c) Series and parallel circuits , Star-Delta transformation,
- d) Kirchoff's laws, Superposition theorem, Thevinin's theorem, Maximum Power Transfer Theorem (8)

Unit II: Magnetic Circuit & Electromagnetism

- a) Basic concept of Magnetic flux, Flux density, MMF, Reluctance, Magnetic field intensity and their relationship
- b) Leakage and fringing of flux
- c) Series and Parallel Magnetic circuits
- d) Principles of Electromagnetic induction self and mutual induction coefficient of coupling and Energy stored in magnetic circuit
- e) Magnetization curves (8)

Unit III : A.C. Fundamentals

- a) RMS , Average values form factor ,peak factor for Sinusoidal Wave form only
- b) Single phase A.C. Series circuit with Resistance Inductance, Capacitance and phasor Diagrams Series resonance.
- c) Single phase A.C. Parallel circuit with Resistance Inductance, Capacitance and phasor Diagrams Parallel resonance.
- d) Impedance Triangle Active and Reactive power (7)

SECTION-B**Unit IV: Polyphase Circuits**

- a) Balanced Three phase circuits: Production of three phase supply, Star and Delta balanced load. Relationship of phase and line values of voltage and current for Star and Delta connections. (7)

Unit V : Electrical machines**A) Single Phase Transformer**

- a) Principle of operation Construction and Classification EMF Equation
- b) EMF Equation ,Losses ,Efficiency, Regulation

B) Electromechanical Energy Conversion

- a) Working principle , Construction and various parts of D.C. Machines
- b) Classification , characteristics and applications of D.C. Machines (8)

Unit VI Electrical Apparatus and safety

- a) Measurement of Current, Voltage, Power, Energy
- b) Range extension of Ammeter, Voltmeter, Wattmeter and Energy meter
- c) Necessity of earthing, limiting values for various installations
- d) Types of earthing (Pipe earthing and Plate earthing) (7)

TEXT BOOKS :-

1. Basic Electrical Engineering , First Ed., Kulshreshtha D.C., TMH - 2008
2. Principle of Electrical Engineering , 4th Edition, Del Toro V., PHI 2005

REGERENCE BOOKS :-

1. Basic Electrical Engineering, Fifth Edition, Fitzgerald A.E., TMH -2006.
2. Basic Electrical Engineering, First ed., R.Anand Natarajan, P.Ramesh Babu, SCITECH Publications, 2009
3. Basic Electrical Engineering –First ed., T.K.Nagsarkar , OXFORD University Press, 2005

COURSE OBJECTIVES:

- To give students ‘hands on experience’ of craftsmanship.
- To make students familiar with different work trades.
- To develop quality & safety consciousness amongst the students.
- To develop awareness of fire safety amongst the students.
- To develop respect towards labour work amongst the students.
- To develop skill sets for creating entities from primitive engineering materials.
- To develop skill sets for establish in connections through wires and cables.
- This exercise also aims at inculcating respect for physical work and hard labour in addition to some value addition by getting exposed to interdisciplinary engineering domains.

A) PERFORMANCE:

I) SHEET METAL: Introduction to sheet metal tools, their use, different sheet metal joints, soldering, surface development. Specifications of metal sheets, Surface coatings; Operations like cutting, bending, folding, punching, riveting ; Joining by brazing and soldering.

One job on sheet metal: Job involving soldering operation, making, cutting, bending, joining operations of small parts using sheet metal like Tray, Funnel, Dust Bin, etc.

II) WELDING : Classification & brief introduction to welding processes - Arc, Gas and Resistance. Definition of welding, brazing and soldering processes, and their applications. Oxy-Acetylene Gas welding process, Equipment and Techniques, Type of flames and their applications. Manual metal arc welding technique and equipment, AC and DC welding Electrodes, constituents and functions of Electrode coating. Welding positions. Type of welding joint. Common welding defects such as cracks, undercutting, slag inclusions, porosity.

One job on welding: Job involving, edge preparation for Arc welding for different jobs like Lap welding of two plates, butt welding of two plates and welding to join plates at right angles.

III) CARPENTRY : Brief study of various hand tools like chisel, saw, planer. Timber, definition, engineering applications, seasoning and preservation, plywood and plyboards. Introduction, use of marking tools & hand tools such as marking gauge, try squares, steel rules, saws, jackplane, etc. Use of power tools, safety precautions.

One job on carpentry: Job involving a joint, wood sizing exercise in planning, marking, sawing, chiseling and grooving to make. Use and setting of hand tools like hack saw, jack plane, chisels and gauges for construction of various joints like T – Lap joint, Bridle joint , Corner mortise joint, Dovetail / butt joint such as a tray, frame etc.

B) DEMONSTRATION:

Minimum two physical demonstrations provided from following. In addition to physical demonstrations **Video / LCD** presentations for rest of demonstrations may be provided.

- 1) **CARPENTRY:** Demonstration for wood turning with various forms on cylindrical wood piece.
- 2) **GAS CUTTING:** Demonstration on Gas cutting. Introduction, principle, equipment & its operation, safety precautions and demonstration of Oxy-Acetylene Gas cutting process.
- 3) **ELECTRONICS:** Introduction to Active & Passive Electronic components. Demonstration and use of electrical and electronics hand and power tools. Measurement of resistor and capacitor, measurement of voltage and frequency using oscilloscope. Demonstration and performance

measurement of any two electronic components / devices – Diodes, Transistor & Logic gates.
Working of Remote Controller.

- 4) **PRINTED CIRCUIT BOARDS** : Layout drawing, +ve and -ve film making, PCB etching and drilling, tinning and soldering techniques. Assembly of Electronic components on the printed circuit board (PCB).
- 5) **GLASS BLOWING**: Definition of glass, Basic concepts of glass structure, Batch materials and minor ingredients and their functions, Elementary concept of glass manufacturing process, Different types of glasses. Application of glasses. Types of Glasses, Manufacturing & properties of Glasses. Demonstration of glass blowing.
- 6) **PLUMBING** : Use of plumbing tools, spanners, wrenches, threading dies, demonstration of preparation of a domestic plumbing line involving fixing of a water tap and use of coupling, elbow, tee and union etc.
- 7) **MASONRY**: Use of mason's tools like trowel, hammers, spirit level, square, plumb, line and pins etc. Demonstration of mortar making, single and one and half brick masonry, English and Flemish bonds, block masonry, pointing and plastering

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11. B. S. Raghuvanshi, A Course in Workshop Technology, Vol – I, Dhanapat Rai and Sons.
12. Hajara Choudhari, Elements of Workshop Technology, Vol – I, Media Promoters.
13. Gupta and Kaushik, Workshop Technology, Vol – I, New Heights.
14. Chapman, Workshop Technology, Vol – I, The English Language Book Society.
15. H.S.Bawa, Workshop Technology, Vol.-I, TMH Publications, New Delhi.
16. S.K.Hajra Choudhary, Elements Of Workshop Technology, Media Promoters & Publishers Pvt.Ltd.
17. Workshop Technology, Vol I, II and III, Chandola S.P., Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
8. Hwaiyu Geng, Manufacturing Engineering Handbook, McGraw Hill Publishing Co.Ltd.
9. Lawrence E.Doyle, Manufacturing Processes and Materials for Engineers, Prentice Hall Inc.
10. Mark Minasi, The complete PC upgrade and maintenance guide -- BPB. Publications
11. Elements of Ceramics - F.H Norton
12. Fundamentals of Ceramics - Barsoum

NOTE: Journal should be prepared and submitted based on information of tools and equipments used, jobs prepared by using various tools, equipments, machines in the above three trades of performance sections. It also consist of details of demonstration (minimum two) demonstrated to students with brief description.

The term work shall be assessed based on a) the record of attendance, b) Term work done, c) the written/ practical / oral tests on the term work to decide the depth of understanding. The term work is to be assessed weekly.

PRACTICAL EXAMINATION:

Practical examination will consists of actual preparation of one job from any of the above performance sections. Duration of examination will be 3 hrs. Total marks are 25, out of which 15 marks are for job preparation and 10 marks for viva voce which should be conducted when the students are on job.

I B 6**ENGINEERING CHEMISTRY****LIST OF EXPERIMENTS**

1. Determination of alkalinity of water sample in given alkali mixture.
(i) NaOH and Na₂CO₃ (ii) Na₂CO₃ and NaHCO₃
2. Determination of hardness of water by EDTA method.
3. Determination of chloride ions in water sample.(Mohr's Method)
4. Determination of chlorine in water sample. (Iodometry)
5. Determination of % CaO in given cement sample.
6. Preparation of phenol formaldehyde & Urea formaldehyde resin.
7. Determination of viscosity of lubricating oil by Redwood viscometer No. 1
8. Determination of viscosity of lubricating oil by Redwood viscometer No. 2
9. Determination of flash point of lubricating oil by Pensky Marten's Apparatus.
10. Determination of flash point of lubricating oil by Abel's apparatus.
11. To carry out proximate analysis of coal.
12. Determination of acid value of lubricating oil.
13. Determination of Fe²⁺ and Fe³⁺ in given solution.
14. Determination of Dissolved Oxygen in Water Sample.
15. Determination of conductivity of unknown sample by conductivity meter.
16. Determination of P^H of unknown sample by P^H meter.

(Note : Minimum 08 experiments shall be conducted.)

I B 7**COMPUTER PROGRAMMING****COMPUTER PROGRAMMING LABORATORY :**

The objective of this lab is not only to provide a Hands-on Experience to C programming, but also to expose the students to the latest tools of the trade. This lab is based on modern operating systems like Linux/Windows. The students should be exposed to word processor, spreadsheet software, presentation software and web browser. Use of open source software like Star Office, Open Office with open source OS like Linux/ Ubuntu/BOSS should be encouraged.

It is expected that the candidate demonstrates adequate to high skills with these tools and programming with C.

The sample list of programs is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Basic interface of a GUI based OS.
2. File handling using Text Editor/Word Processor.
3. Presentation using Presentation software.
4. Spreadsheet software usage.
4. Introduction to Internet and Web Browsing.
5. Programming in C: Minimum ten programs based on the above syllabus. The programs should cover Functions, Control constructs, Decision constructs, Arrays, Pointers, Structures Files and Command-line arguments.

I B 8**ELECTRICAL ENGINEERING****PRACTICALS :**

- 1] To verify Kirchoff's laws.
- 2] To verify Thevenin's theorem
- 3] To verify Superposition theorem
- 4] To verify Maximum Power Transfer theorem
- 5] To plot B-H curve for given magnetic material
- 6] To verify vector relationship of Current & Voltage in RLC series circuit.
- 7] To verify vector relationship of Current & Voltage in RLC parallel circuit
- 8] To plot resonance curve in RLC series circuit.
- 9] To verify line & phase relationship of current & voltage in balanced three phase STAR Connection
- 10] To verify line & phase relationship of current & voltage in balanced three phase DELTA Connection
- 11] To determine Voltage ratio & current ratio for given single phase transformer.
- 12] To determine efficiency & regulation of given single phase transformer by direct loading.
- 13] Starting & reversing of DC shunt motor.
- 14] Measurement of power & energy in given single phase circuit using Wattmeter & Energy meter.

(Note : Minimum 08 experiments shall be conducted.)
