# University of Pune

## Faculty of Engineering

### F.E. (Common to All Branches) 2008 Structure (w.e.f. June-2008)

#### PART – I

<table>
<thead>
<tr>
<th>CODE</th>
<th>SUBJECT</th>
<th>TEACHING SCHEME</th>
<th>EXAMINATION SCHEME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lect.</td>
<td>Tut.</td>
</tr>
<tr>
<td>107001</td>
<td>Engineering Mathematics-I</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>107002</td>
<td>Applied Science – I</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>110003</td>
<td>Fundamentals of Programming languages.</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>103004</td>
<td>Basic Electrical Engineering</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>101005</td>
<td>Basic Civil and Environmental Engineering</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>102006</td>
<td>Engineering Graphics – I</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>111007</td>
<td>Manufacturing Practices</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total of Part – I</strong></td>
<td></td>
<td>18</td>
<td>-</td>
</tr>
</tbody>
</table>

#### PART – II

<table>
<thead>
<tr>
<th>CODE</th>
<th>SUBJECT</th>
<th>TEACHING SCHEME</th>
<th>EXAMINATION SCHEME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lect.</td>
<td>Tut.</td>
</tr>
<tr>
<td>107008</td>
<td>Engineering Mathematics-II</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>107009</td>
<td>Applied Science – II</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>101010</td>
<td>Engineering Mechanics</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>104011</td>
<td>Basic Electronics Engineering</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>102012</td>
<td>Engineering Graphics – II</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>102013</td>
<td>Basic Mechanical Engineering</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Communication Skill</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total of Part – II</strong></td>
<td></td>
<td>18</td>
<td>-</td>
</tr>
</tbody>
</table>

* Communication Skill : Practical will be conducted by respective departments,. hence no subject code is allotted..

** This change has been done in the Meeting of Dean & Chairman of Faculty of Engineering held on dt. 23-5-2008.
UNIVERSITY OF PUNE
Syllabus for Engineering Degree Course – Revision 2008

Teaching Scheme:
Lectures – 4 Hrs./Week

Examination Scheme:
Paper – 100 Marks (3 Hrs. Duration)

Unit 1

Unit 2
Complex Numbers & Applications: Argand’s Diagram, De’Moivre's theorem and its application to find roots of algebraic equations. Hyperbolic Functions, Inverse Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.

Unit 3
Differential Calculus: Successive Differentiation, Leibnitz Theorem.

Unit 4
Expansion of Functions: Taylor’s Series and Maclaurin's Series.
Differential Calculus: Indeterminate Forms, L’ Hospital's Rule, Evaluation of Limits.

Unit 5

Unit 6
Jacobian: Jacobians and their applications. Errors and Approximations.
Maxima and Minima: Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.

Text Books:
Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).

Reference Books:
Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning).
Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).
Teaching scheme:
Lectures – 4 Hrs./Week
Practicals- 2Hrs./Week

Examination scheme:
Paper – 100 Marks(3Hrs)
T.W. 25 Marks

Both schemes are exactly half for Chemistry and Physics each

Chemistry

Unit 1: Solid state and materials chemistry (08 Hrs.)
Crystallography: - Unit cell, Bravais lattices, Cubic crystals - CN, APF, radius ratio. Three laws of crystallography, Weiss indices and Miller indices with numericals, X-ray diffraction – Bragg’s Law and numericals. Crystal defects (point and line defects) and their effects on properties of crystals.
Zinc sulphide – structure and applications as luminescent.

Molecular electronics:-Basic concepts. Study of following molecules for their structures and properties on the basis of orbitals, chemical bonding, band theory, electrical conductivity, applications in electronics such as in diodes, transistors, ICs, photovoltaic devices, sensors etc.
1. Conductive polymers-polypyrrole, polystyrene
2. Pure carbon compounds- graphite, single wall and chiral carbon nano-tubes, fullerenes
3. Liquid crystals
4. Charge transfer compounds-tetrathiofulvalene.

Unit 2: Volumetric analysis (08 Hrs.)
Standard solutions and their preparations, various ways of expressing concentrations of solutions, equivalent weights in different types of reactions. Volumetric analysis – acid-base, complexometric, oxidation-reduction, precipitation – with specific examples, theories of indicators used in above titrations, titration curve (acid-base only) numericals on all above.

Unit 3: Polymers (08 Hrs.)
Definition and important terms: Monomer, Polymer, Polymerization, Degree of polymerization (Dp), Glass transition temperature (Tg), Molecular weight, Polymer dissolution.
Classification on the basis of - a) Polymerization mechanism – (step and chain polymers, brief mechanism should be explained), b) Polymerization reactions – (addition and condensation), c) Thermal behaviour– (thermoplastics and thermosetting), d) Types of monomers– (homopolymer and copolymer).
Commercial Polymers–Synthesis, properties and applications- Polyethylene (PE), Polypropylene (PP), Polyvinyl chloride (PVC), Polystyrene (PS), Phenol formaldehyde (PF), Acrylonitrile butadiene styrene (ABS), Epoxy resin.
Compounding of Plastics.
Rubbers-Synthesis, structure, properties and applications of a) Natural rubber–isolation, Polyisoprene. b) Vulcanized rubber-Valcanisation of rubber by sulfur. c) Synthetic rubber-Styrene – Butadiene rubber, Silicon rubber and Neoprene rubber.

Speciality polymers –Basic concepts and applications of conductive, liquid crystalline, thermally stable and biodegradable polymers. Polymer composites, Recycling of polymers.

Term work: Any four experiments
1. To standardize KMnO₄ solution by preparing standard oxalic acid and to estimate ferrous ions.
2. To standardize Na₂S₂O₃ solution by preparing standard potassium dichromate and to estimate percentage of copper from brass.
3. To determine phenol by iodometric method.
4. To determine molecular weight of a polymer using Ostwald viscometer.
5. Preparation of (any one) polystyrene, urea formaldehyde, phenol formaldehyde and its characterization.
6. To determine chloride ions from solution by Volh ard method.
7. To determine calcium from the given sample of cement by volumetric method.

Term work is based on performance and regular checking of the experiments.

Reference Books:
2. Principles of the solid state, H.V. Keer (New age international publishers).
3. Polymer Science, V.R. Gowarikar (Wiley Eastern Ltd.).

Laboratory Manual:
Physics

Unit 4: Interference and electron Optics

**Interference:** Interference of waves, Interference due to thin films of uniform (with derivation) and non-uniform thickness (without derivation), Fringe width, Newton’s Rings, Applications of Newton’s Rings for determination of (i) wavelength of incident light / radius of curvature of Plano convex lens (ii) refractive index of a given liquid; Michelson’s interferometer, applications for determination of (i) wavelength of a monochromatic source (ii) refractive index /thickness of a transparent material; Engineering applications of interference (i) Testing of optical flatness of surfaces (ii) Nonreflecting / Antireflection coatings.

**Electron Optics:** Motion of an electron in electric (parallel, perpendicular) and magnetic (extensive, limited) fields, crossed fields. Electrostatic and magneto static focusing, Scanning electron microscope (SEM), Bainbridge mass spectrograph.

Unit 5: Diffraction and ultrasonic

**Diffraction:** - Diffraction of waves, classes of diffraction, Fraunhoffer diffraction at a single slit (geometrical method), conditions for maxima and minima, Intensity pattern due to a single slit, Plane diffraction grating, conditions for principal maxima and minima, intensity pattern; Resolving power, Resolving power of a grating.

**Ultrasonics:** - Ultrasonic waves, Piezo-electric effect, Production of ultrasonic waves by Piezoelectric oscillator, Magnetostrictive effect, Production of ultrasonic waves by magnetostrictive oscillator, properties of ultrasonic waves, Applications of ultrasonic waves (i) Scientific- Echo sounding, Sound signaling, depth sounding, SONAR, cleaning of dirt etc (ii) Engineering –thickness measurement, cavitation, Ultrasonic cleaning, Nondestructive testing, Flaw detection, Soldering, Drilling and welding (iii) Medical- for diagnostics and treatment

Note: **Discuss any one application for 4 marks**

Unit 6: Polarisation and nuclear physics

**Polarisation:** - Introduction, production of plane polarised light by refraction (pile of plates), Law of Malus, Double refraction, Huygen’s theory of double refraction, Cases of double refraction of crystal cut with the optic axis lying in the plane of incidence and (i) parallel to the surface (ii) perpendicular to the surface (iii) inclined to the surface, Retardation plates-quarter wave plate (QWP), Half wave plate (HWP); Analytical treatment of light for the production of circularly and elliptically polarised light, Detection of various types of light (PPL, CPL, EPL, Upl, Par PL), Optical activity, Specific rotation, Polaroids

**Nuclear Physics:** - Nuclear fission in natural Uranium-Chain reaction, Critical size. Nuclear fuels, Nuclear fusion, and thermonuclear reactions-P-P and CN cycles, Particle accelerators-cyclotron, betatron.

Reference Books:
1.Optics, Jenkins and White (Tata Mcgraw Hill)
2.Text Book of Optics, Brijlal and Subramanyam (S. Chand and Company)
3.University Physics, Young and Freedman (Pearson Education).
4.Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons).
5. Concepts of Modern Physics-Beiser (Tata Mcgraw Hill)

Term Work: Any Four experiments
1.Determination of wavelength by using diffraction grating.
3.Experiment on ultrasonic waves.
5.Determination of specific rotation by Laurent’s half shade polarimeter.
6.Demonstration of Lissajous figures (principles of interference and polarisation) using a CRO, phase measurement.
7.Michelson’s interferometer
8. Determination of e/m by Thomson’s method.
10.Determination of wavelength of the given source by Fraunhoffer diffraction at a single slit.

**Term work is based on performance and regular checking of the experiments.**
Objective
- To learn and acquire art of computer programming
- To know about some popular programming languages and how to choose a programming language for solving a problem using a computer
- To learn to program in C

1. Program Planning Concepts
   Algorithm; Advantages of Generalized Algorithms; How to Make Algorithms Generalized; Avoiding Infinite Loops in Algorithms – By Counting, By using a Sentinel Value; Different ways of Representing an Algorithm – As a Program, As a Flowchart, As a Pseudo code; Need for Planning a Program before Coding; Program Planning Tools – Flowcharts, Structure charts, Pseudo codes; Importance of use of Indentation in Programming; Structured Programming Concepts – Need for Careful Use of “Go to” statements, How all programs can be written using Sequence Logic, Selection Logic and Iteration (or looping) Logic, functions.

2. Programming Languages
   What is a Programming Language; Types of Programming Languages – Machine-level, Assembly-level and High-level Languages, Scripting Languages, Natural Languages; Their relative Advantages and Limitations; High-level Programming Language Tools – Compiler, Linker, Interpreter, Intermediate Language Compiler and Interpreter, Editor, Matlab, GUI; Overview of some popular High-level Languages – FORTRAN, COBOL, BASIC, Pascal, C, C++, JAVA, LISP; Characteristics of a Good Programming Language; Selecting a Language out of many Available Languages for Coding an Application; Subprograms.

3. Program Testing and Debugging
   Definition of Testing & Debugging; Difference between Testing and Debugging; Types of Program Errors; Testing a Program; Debugging a Program for Syntax Errors; Debugging a Program for Logic Errors, Concept of APIs/Libraries.

4. Program Documentation
   What is Documentation; Need for Documenting Programs and Software; Forms of Documentation – Comments, System Manual, User Manual; Documentation Standards and Notations.

5. Programming in C Language
   Character set, Constants, Variables, Keywords and Comments; Operators and Operator Precedence; Statements; I/O Operations; Preprocessor Directives; Pointers, Arrays and Strings; User Defined Data Types – Structure and Union; Control Structures – Conditional and Unconditional Branching Using “if”, “switch”, “break”, “continue”, “go to” and “return” Statements; Loop Structures – Creating Pretest Loops using “for” and “while” Statements; Creating Posttest Loops using “do…while” statement; Functions – Creating Subprograms using Functions; Parameter Passing by Value; Parameter Passing by Reference; Main Function.
Term Work

Term work shall consist of a record in the form of a journal consisting of at least twelve exercises/assignments on programming in C that includes flowcharts, pseudo codes and printouts of the programs and necessary documentation for the following exercises:

1. Write a C program to accept five numbers from console and then to display them back on console in ascending order.
2. Write a C program to calculate the sum of all numbers from 0 to 100 (both inclusive) that are divisible by 4.
3. Write a C program to accept the length of three sides of a triangle from console and to test and print the type of triangle – equilateral, isosceles, right angled, none of these.
4. Write a C program to accept a string from console and to display the following on console:
   (a) Total number of characters in the string
   (b) Total number of vowels in the string
   (c) Total number of occurrence of character ‘a’ in the string.
   (d) Total number of occurrence of string ‘the’ in the string.
5. Write a program in C to reverse the digits of a given integer.
6. Write a program in C to read an integer and display each of the digit of the integer in English.
7. Write a program in C to generate first 20 Fibonacci numbers
8. Write a program in C to generate prime numbers between 1 and n.
9. Write a program in C to compute the GCD of the given two integers
10. Write a program in C to compute the factorial of the given positive integer using recursive function.
11. Write a program in C to compute the roots of a quadratic equation.
12. Write a program in C to sort n integers using bubble sort.
13. Write a program in C to compute addition/subtraction/multiplication of two matrices. Use functions to read, display and add/subtract/multiply the matrices.
14. Write a program in C to carry out following operations on strings using library functions
   a. To concatenate a string $S_2$ to string $S_1$.
   b. To find the length of a given string
   c. To compare two strings $S_1$ and $S_2$.
   d. To copy a string $S_2$ to another string $S_1$.
15. A data file contains a set of examination scores followed by a trailer record with a value of -1. Write a C program to calculate and print the average of the scores.

The instructor may choose from the assignments given above and may modify them, if necessary.

Text Book


Reference Books

BASIC ELECTRICAL ENGINEERING (103004)

Teaching scheme
Lectures - 3Hrs/Week
Practical -2Hrs/Week

Examination scheme
Paper-100 Marks (3Hrs.Duration)
Term work- 25 Marks

SECTION – I

Unit 1. General:
Concepts of emf., p.d. and current, resistance, effect of temperature on resistance, resistance temperature coefficient, insulation resistance. S.I. units of work, power and energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems. batteries and cells, their types, primary cells and secondary cells, Lead Acid, Ni-Cd and Ni-MH batteries, current capacity and cell ratings. charging, importance of initial charging and discharging of batteries. series and parallel battery connections, maintenance procedure. (6 Hrs)

Unit 2. D.C. Circuits:
Classification of electrical networks, Ohm's law, Kirchhoff’s law and their applications for network solutions. Simplifications of networks using series and parallel combinations and star-delta conversions, Superposition theorem, Thevenin’s theorem and maximum power transfer theorem. (8 Hrs)

Unit 3. Electromagnetism:
Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule and cork screw rule, nature of magnetic field of long straight conductor, solenoid and toroid. concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships. simple series and parallel magnetic circuits, comparison of electrical and magnetic circuit, force on current carrying conductors placed in magnetic field, Fleming’s left hand rule. Faradays laws of electromagnetic induction, statically and dynamically induced e.m.f., self and mutual inductance, coefficient of couplings. energy stored in magnetic field. (7 Hrs)
SECTION – II

Unit 4. Electrostatics and AC fundamentals:

A) Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant. (3 Hrs)

B) Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak(maximum), average and r.m.s. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. rectangular and polar representation of phasors. (4 Hrs)

Unit 5. Single phase A.C. Circuits:

Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Development of concept of reactance, study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and R-L-C circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, concept of active, reactive and apparent power and power factor. (7 Hrs)

Unit 6. Polyphase A.C. Circuits and Single phase Transformers:

A) Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams. (3 Hrs)

B) Single phase transformers: Construction, principle of working, e.m.f. equation, voltage and current ratios. losses, definition of regulation and efficiency, determination of these by direct loading method. descriptive treatment of autotransformers and dimmerstats. (4 Hrs)

Term work:
The term work shall consist of record of minimum eight exercises and experiments, out of which Group A is compulsory and any five experiments from Group B should be conducted.

Group A
1. Wiring Exercises:
   a) Study of various wiring components (wires, switches, fuse, sockets, plugs, lamp holders, lamps etc. their uses and ratings).
   b) Control of two lamps from two switches (looping system).
   c) Staircase wiring.
   d) Use of Megger for insulation test and continuity test of wiring installations and machines.
2. a) Study of fluorescent tube circuit.
   b) Study of compact fluorescent lamp(CFL).
   c) Study of HID lamps such as mercury vapour lamp/sodium vapour lamp.
3. a) Study of safety precautions while working on electric installations and necessity of earthing.
   b) Introduction to energy conservation and simple techniques to achieve it.
Group B

4. Determination of temperature rise of medium resistance such as shunt field winding.
5. Verification of Kirchhoff’s laws and Superposition theorem.
6. Verification of Thevenin’s theorem.
8. Verification of current relations in three phase balanced star and delta connected loads.
9. Single phase transformer
   a) Voltage and current ratios.
   b) Efficiency and regulations by direct loading.

Note: College should provide printed text and figures for Group A experiments and only printed text for Group B experiments.

Text Books:

3. Electrical Engineering- G.K. Mittal

Reference Books:

4. Principles of Electrical Engineering by Del. Toro, PH
101005 Basic Civil and Environmental Engineering

Teaching Scheme
Theory: 3 Hours/Week
Practicals 2 Hours/Week

Examination Scheme
Paper 100 Marks
Term Work: 25 Marks

Section I

Unit 1: Introduction to Civil Engineering (6 hours)

a) Role of Civil Engineer in the construction of buildings, dams, expressways and infrastructure projects for 21st century. Importance of an interdisciplinary approach in engineering.


Unit 2: Materials and Construction (6 hours)

a) Use of basic materials cement, bricks, stone, natural and artificial sand, Reinforcing Steel-Mild, Tor and High Tensile Steel. Concrete types - PCC, RCC Prestressed and Precast. Introduction to smart materials. Recycling of materials.

b) Substructure - Function of Foundations, (Only concepts of settlement and Bearing capacity of soils.) Types of shallow foundations, (only concept of friction and end bearing pile).


d) Introduction to automation in construction:- Concept, need, examples related to different civil engineering projects.

Unit 3: Uses of maps and field surveys (6 hours)

a) Various types of maps and their uses. Principles of survey.
Modern survey methods using levels, Theodolite, EDM, lasers, total station and GPS. Introduction to digital mapping. Measuring areas from maps using digital planimeter.

b) Conducting simple and differential levelling for setting out various benchmarks, determining the elevations of different points and preparation of contour maps. Introduction to GIS Software and other surveying softwares with respect to their capabilities and application areas.
Section II

Unit 4: Ecology and Eco System (6 hours)
b) Introduction to solid waste management, Disposal of electronic wastes.

Unit 5: Planning for the Built Environment (6 hours)

Unit 6: Energy and Environmental Pollution (6 hours)
a) Types of energy:- conventional and non-conventional. Need for harnessing alternative energies to meet the increased demand. Methods of harnessing energies.
b) Sources, causes, effects and remedial measures associated with
   1. Air Pollution
   3. Noise Pollution
   4. Land Pollution

Term Work:
Any 8 Practical Exercises from those given below should be carried out, record to be submitted in the field book and file which will form a part of termwork.

1. Study of any 4 types of maps and writing their uses.
2. Exercise on use of dumpy level and laser level.
5. Determination of coordinates of a traverse using Global Positioning system (GPS)
6. Measurement of distance by EDM and comparing it with the distance measured using tape.
7. Visit to a construction site for studying the various construction materials used, type of structure, type of foundation and components of superstructure – submission of visit report.
8. Demonstration of use of any 4 Civil Engineering softwares.
9. Making a poster (Full imperial sheet size) in a group of 4 students, related to Energy/Environment.
10. Presentation in a group of 4 students, any case study related to Energy/Environment.

TEXT BOOKS:
1. Surveying and Levelling --- Kanetkar and Kulkarni, PVG Prakashana
2. Environmental Studies D.L.Manjunath – Pearson Education.
REFERENCE BOOKS:
Engineering Graphics – I (102006)

Teaching Scheme
Lectures 3 Hours/Week
Practical 2 Hours/Week

Examination Scheme
Theory – 100 Marks (4 Hours)

NOTE – Only FIRST ANGLE METHODS OF PROJECTIONS ARE TO BE USED IN ALL THE UNITS.

SECTION – I

UNIT – I Drafting Technology and Introduction to Any Drafting Software/Package
Layout of drawing sheets, sizes of drawing sheets, different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension. Tolerances – methods of representing tolerances, unilateral and bilateral tolerances, tolerance on linear and angular dimensions, geometrical tolerances. Symbols used on drawing, surface finish symbols, welding symbols.
Advantages of using Computer Aided Drafting (CAD) packages, applications of CAD, basic operation of drafting packages, use of various commands for drawing, dimensioning, editing, modifying, saving and printing/plotting the drawings. Introduction to 3D primitives.

UNIT – II Curves used in Engineering Practice [15 Marks]
Ellipse, Parabola, Hyperbola, normal and tangents to these curves, Involute, Cycloid, Epi-cycloid, Hypo-cycloid, Archimedean Spiral, Helix on cone and cylinder.

UNIT – III Orthographic Projections [20 Marks]
Reference planes, types of orthographic projections – First angle projections, Third angle projections, methods of obtaining orthographic views by First angle method, Sectional orthographic projections – full section, half section, offset section.

UNIT – IV Auxiliary Projections [15 Marks]
Auxiliary planes – Auxiliary Vertical Plane (AVP), Auxiliary Inclined Plane (AIP), symmetrical auxiliary view, unilateral auxiliary view, bilateral auxiliary view.

SECTION – II

UNIT – V Isometric Projections [20 Marks]
Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

UNIT – VI Interpretation of Given Views/Missing Views [20 Marks]
Identification of lines/edges and surfaces, visualization of given orthographic views, adding a missing/third view, adding a sectional view, to convert a given view in to a sectional view.

UNIT – VII Freehand Sketching [10 Marks]
Free hand sketching -- FV and TV of standard machine parts – Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints.
Term Work:

Five A2 (594X420mm) (Half imperial) size drawing sheet as detailed below:

Sheet No. 1: CURVES
To draw any four curves mentioned in the detailed syllabus.

Sheet No. 2: ORTHOGRAPHIC VIEWS
To draw two principal views, one sectional view for two objects.

Sheet No. 3: AUXILIARY VIEWS
To draw auxiliary views from the given views for any two objects.

Sheet No. 4: ISOMETRIC VIEWS
Two problems on Isometric views.
(minimum one problem by using CAD software/package)

Sheet No. 5: INTERPRETATION OF GIVEN VIEWS/MISSING VIEWS
Two problems on Interpretation of given views.
(minimum one problem by using CAD software/package)

Text Books:
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd..

Reference Books: