University of Pune

Faculty of Engineering

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

PART – I

CODE	SUBJECT	TEACHING SCHEME			EXAMINATION SCHEME				
		Lect.	Tut.	Pract./ Drg.	Paper	TW	Oral	Pr	Total
107001	Engineering Mathematics-I	4	-	-	100	-	-	-	100
107002	Applied Science – I	4	-	2	100	25	-	-	125
110003	Fundamentals of Programming languages.	1	-	2	-	-	-	50**	050
103004	Basic Electrical Engineering	3	-	2	100	25	-	-	125
101005	Basic Civil and Environmental Engineering	3	-	2	100	25	-	-	125
102006	Engineering Graphics – I	3	-	2	100	-	-	-	100
111007	Manufacturing Practices	-	-	2	-	25	-	-	025
Total of Part – I		18	-	12	500	150	-	-	650

PART – II

CODE	SUBJECT	TEACHING SCHEME			EXAMINATION SCHEME				
		Lect.	Tut.	Pract./ Drg.	Paper	TW	Oral	Pr	Total
107008	Engineering Mathematics-II	4	-	-	100	-	-	-	100
107009	Applied Science – II	4	-	2	100	25	-	-	125
101010	Engineering Mechanics	3	-	2	100	25	-	-	125
104011	Basic Electronics Engineering	3	-	2	100	25	-	-	125
102012	Engineering Graphics – II	1	-	2	-	50	-	-	050
102013	Basic Mechanical Engineering	3	-	2	100	25	-	-	125
	Communication Skill *	-	-	2	-	-	-	-	-
Total of Part – II		18	-	12	500	150	-	-	650

* 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

F.E. Semester – I: 107001 – Engineering Mathematics – I

Teaching Scheme:
Lectures – 4 Hrs./Week

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

Unit 1 (09 Hrs.)

Matrices: Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations. Eigen values, Eigen Vectors, Cayley – Hamilton Theorem. Application to problems in Engineering (Translation and Rotation of Matrix).

Unit 2 (09 Hrs.)

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 (09 Hrs.)

Infinite Series: Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Range of Convergence.

Differential Calculus: Successive Differentiation, Leibnitz Theorem.

Unit 4 (09 Hrs.)

Expansion of Functions: Taylor's Series and Maclaurin's Series.

Differential Calculus: Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits.

Unit 5 (09 Hrs.)

Partial Differentiation and Applications: Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables.

Unit 6 (09 Hrs.)

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:

Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).
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).

UNIVERSITY OF PUNE
Syllabus for Engineering Degree Course-Revision 2008
F.E. Semester – I : 107002 – Applied Science – I

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, polythiophene
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 and sulfur related compounds (S, S_2Cl_2, thioacids), Zinc oxide, Benzoyl peroxide. 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 five experiments

1. To standardize $KMnO_4$ solution by preparing standard oxalic acid and to estimate ferrous ions.
2. To standardize $Na_2S_2O_3$ 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 Volhard method.
7. To determine calcium from the given sample of cement by volumetric method.

Reference Books :

1.Chemistry, Raymond Chang. (Tata McGraw Hill).
2.Principles of the solid state, H.V. Keer (New age international publishers).
3.Polymer Science, V.R. Gowarikar (Wiley Eastern Ltd.).
4. Inorganic quantitative analysis, Vogel. (Prentice Hall).
5. Text book of engineering chemistry, R.N. Goyal and Harrmendra Goel, (Ane books India).

Laboratory Manual :

1. Laboratory Manual on Engineering Chemistry, Sudharani (Dhanpat Rai Publishing Company).

Physics

Unit 4 : Interference and electron Optics **(08 Hrs.)**

Interference:- Interference of waves, Interference due to thin films of uniform (with derivation) and non-uniform thickness (without derivation), Fringe width, qualitative discussion of colour formation in thin films; 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. Scientific applications- Natural phenomena e.g.; colours on reflection from peacock feather, etc.

Electron Optics :- Motion of an electron in electric (parallel, perpendicular and crossed) and magnetic (extensive, limited) fields; specific charge of an electron, e/m of an electron by Thomson's method, Electrostatic and magneto static focusing, Scanning electron microscope (SEM) and Scanning tunneling microscope (STM) – (diagram, construction, working and uses); Bainbridge mass spectrograph.

Unit 5 : Diffraction and ultrasonics **(08 Hrs.)**

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, Discuss dependence of spectrum on width, colour formation in CD's, wavelength etc, Diffraction at a circular aperture (results only); Diffraction due to two slits and hence N slits (discuss qualitatively) Plane diffraction grating, Resultant amplitude and intensity by geometrical method, 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, Detection of ultrasonic waves, 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, Determination of velocity by ultrasonic interferometer, soldering, drilling welding (iii) Medical- for diagnostics and treatment (iv) Chemical-Ultrasonic mixing, coagulation, crystallization, rate of a reaction (iv) Biological

Unit 6: Polarisation and nuclear physics **(08 Hrs.)**

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, Production of circularly and elliptically polarised light, Detection of various types of light (PPL, CPL, EPL, Upl, Par PL), Analysis of light ;Optical activity, Specific rotation, Fresnel's theory of optical rotation, Laurent's half shade polarimeter, determination of strength of sugar solution; Applications of polarised light-LCD, Natural phenomenon (red sunset, blue of the sky), Polaroids

Nuclear Physics :- Nuclear fission in natural Uranium-Chain reaction, Critical size. Nuclear fuels, Nuclear fusion, and thermonuclear reactions-P-P and CN cycles, Controlled fusion reaction (ignition temperature, Lawson criterion, Magnetic and inertial confinement- only qualitatively); 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 five experiments

1.Determination of wavelength by using diffraction grating.
2.Newton's Rings (Determination of wavelength/radius of curvature /refractive index of a liquid).
3.Experiment on ultrasonic waves.
4.Resolving Power of a telescope / grating.
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.
9.An experiment on polarization.
(Determination of polarising angle for glass and to determine refractive index of glass using Brewster's law **Or** Experimental verification of law of Malus).
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.

****

University of Pune
First Year Engineering Course

110003: Fundamentals of Programming Languages

Teaching Scheme	**Examination Scheme**
Theory : 1 Hr/Week	**Practical : 50 Marks**
Practical: 2 Hrs/Week	

Objectives

- 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

1. Pradeep K. Sinha and Priti Sinha, "Computer Fundamentals: Fourth Edition", BPB Publications, 2007.
2. **Behrouz A. Forouzan, Richard F. Gilberg, "COMPUTER SCIENCE – A Structred Programming approach using C", Indian Edition, Thomson, 3rd edition**

Reference Books

1. Kernighan, **Ritchie**, "The C Programming Language", Prentice Hall of India
2. **Carlo Ghezi, Mehdi Jazayeri, "Programming Language Concepts", John Wiley and Sons**
3. E. Balagurusamy, "Programming in ANSIC C", Tata McGraw Hill, 2002
4. Yashavant Kanetkar, "Let Us C" – Seventh Edition, BPB Publications, 2007

UNIVERSITY OF PUNE

THE SYLLABUS IS PREPARED BY :

BOS- Electrical Engineering,

SUBJECT : BASIC ELECTRICAL ENGINEERING (103004)

Note : This syllabus is subject to change without prior notice by the concerned BOS

BASIC ELECTRICAL ENGEERING (103004)

Teaching scheme	**Examination scheme**
Lectures - 3Hrs/Week	Paper-100 Marks (3Hrs.Duration)
Practical -2Hrs/Week	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. (4Hrs)

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, voltageand current ratios. losses, definition of regulation and efficiency, determination of these by direct loading method. descriptive treatment of autotransformers and dimmerstats. (4Hrs)

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.
7. Study of R. L. C. series circuits.
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 *:*

1. A Textbook of Electrical Technology Volume- I – B.L.Theraja, S.Chand and Company Ltd.,
2. New Delhi.
3. Basic Electrical Engineering, V.K.Mehta, S.Chand and Company Ltd., New Delhi.
4. Electrical Engineering- G.K.Mittal
5. Theory and problems of Basic Electrical Engineering- I.J.Nagrath and Kothari, Prentice-Hall of India Pvt. Ltd.

Reference Books :

1. Electrical Technolgy- Edward Hughes, Seventh Edition, Pearson Education
2. Elements of Electrical Technology- H.Cotton, C.B.S. Publications
3. Basic circuits analysis by John Omalley Shawn Mc Graw Hill.
4 Principles of Electrical Engineering by Del. Toro, PH

101005 Basic Civil and Environmental Engineering

Teaching Scheme	**Examination Scheme**
Theory: 3 Hours/Week	**Paper 100 Marks**
Practicals 2 Hours/Week	**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.

b) Basic Areas in Civil Engineering Surveying, Construction Engineering, Project Management, Transportation Engineering, Fluid Mechanics, Irrigation Engineering, Structural Engineering, Geotechnical and Foundation Engineering, Environmental Engineering, Quantity Surveying, Earthquake Engineering, Infrastructure Development, Town Planning, Remote Sensing.

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).

c) *Superstructure* - Types of loads :- DL and LL, wind loads, earthquake considerations. Types of Construction-Load Bearing, Framed, Composite. Fundamental requirements of masonary.

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)

a) Concept of Environment - biotic and abiotic factors. Concept of the ecological cycle. Impact of the human behaviour and the technological advancements on the environment. Need for conserving natural resources and preserving the environment. Engineer's role in achieving sustainable development. Environmental Impact Assessment (EIA).

b) Introduction to solid waste management, Disposal of electronic wastes.

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

a) Concept of an integrated built environment-natural and manmade. Principles of planning, viz. Aspect, Prospect, Roominess, Grouping, Privacy, Circulation, Sanitation, Orientation, Economy. Role of by-laws in regulating the environment.

b) Use of various eco-friendly materials in construction. Concept of green buildings.

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

2.Water treatment :- Objective, drinking water standards, pollution,introduction to waste water treatment.

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.
3. Measurement of area of irregular figures by digital planimeter.
4. Drawing of plan elevation & section for a residential building, single storeyed framed/load *bearing* structure. Preparing schedule of openings [On half imperial sheet.]
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.
3. Building Construction --- Bindra Arora; Dhanpat Rai publication.
4. Text book of Environmental Studies-Erach Bharucha-UGC, Universities Press.

REFERENCE BOOKS:

1. Building Design and Drawing-Shah, Kale and Patki. TATA McGraw Hill.
2. Introduction to Surveying-Anderson-McGraw-Hill International Student Edition.
3. A Basic Course in Environmental Studies - S. Deswal and A. Deswal, Dhanpat Rai Publications, Delhi.

Engineering Graphics – I (102006)

Teaching Scheme		Examination Scheme
Lectures	3 Hours/Week	**Theory** – 100 Marks (4 Hours)
Practical	2 Hours/Week	

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** :*

1. N.D. Bhatt, Elementary Engineering Drawing, Chartor Publishing house, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd..

***Reference Books** :*

1. P.S. Gill, Engineering Graphics.
2. N.D. Bhatt, Machine Drawing, Chartor Publishing house, Anand, India.
3. Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
4. Fredderock E. Giesecke, Alva Mitchell & others, Principles of Engineering Graphics, Maxwell McMillan Publishing

Manufacturing Practices (111007)

Teaching Scheme **Examination Scheme**
Practical- 2 Hrs/Week Term Work- 25 Marks

Topics to be studied and demonstrated during practical:

a. Introduction to hand tools, equipments & safety measures in various shops such as carpentry, smithy, welding & fitting.
b. Study of basic measuring instruments such as Micrometers, vernier, bevel protector, dial indicator & gauges.

Each candidate shall be required to complete and submit the term work as follows (Any Two)

1. Tin Smithy: One job including soldering, riveting operations.
2. Carpentry: One job with wood joints, use of filler material along with wood turning.
3. Welding: One job using arc welding operation containing simple joint.
4. Fitting: One job with one joint along with drilling, tapping, hacksaw operation.

Demonstration of following processes with the help of demonstration models and audio/video facilities (Any 6)

1. Smithy and forging operation.
2. CNC machine operations.
3. Mould preparation and casting operations.
4. Injection molding operation.
5. Chip manufacturing processes.
6. Advance manufacturing system such as FMS.
7. Modern material handling system like Robotics, AGV.
8. Automobile assembly processes.

Journal based on above topics should include description with sketches of all jobs performed and brief description of demonstrations observed.

UNIVERSITY OF PUNE
Syllabus for Engineering Degree Course – Revision 2008
F.E. Semester – II: 107008 – Engineering Mathematics – II

Teaching Scheme:
Lectures – 4 Hrs./Week

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

Unit 1 (09 Hrs.)
Differential Equations (DE): Definition, Order and Degree of DE, Formation of DE. Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types
Unit 2 (09 Hrs.)
Application of DE: Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical problems
Unit 3 (09 Hrs.)
Fourier Series: Definition, Dirichlet's conditions, Full Range Fourier Series, Half Range Fourier Series, Harmonic Analysis and Applications to Problems in Engineering.
Integral Calculus: Reduction formulae, Beta and Gamma functions.
Unit 4 (09 Hrs.)
Integral Calculus: Differentiation Under the Integral Sign, Error functions.
Curve Tracing: Tracing of Curves, Cartesian, Polar and Parametric Curves. Rectification of Curves
Unit 5 (09 Hrs.)
Solid Geometry: Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and Cylinder
Unit 6 (09 Hrs.)
Multiple Integrals and their Applications: Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values, Mass, Center of Gravity and Moment of Inertia.

Text Books:
Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning).
Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).

Reference Books:
Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).
Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).
Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).

****

UNIVERSITY OF PUNE
Syllabus for Engineering Degree Course-Revision 2008
F.E. Semester – II : 107009 – Applied Science – II

Teaching scheme:	**Examination scheme:**
Lectures – 4 Hrs./Week	Paper – 100 Marks (3Hrs)
Practicals- 2Hrs./Week	T.W. 25 Marks

Both schemes are exactly half for Chemistry and Physics each

Chemistry

Unit 1 : Fuels and combustion (08 Hrs.)

Fuels : Definition classification of fuels, calorific value and its units. Determination of calorific value – Bomb calorimeter, Boy's calorimeter – numericals. Solid fuels : Coal, classification of coal, proximate and ultimate analysis of coal, numericals based on analysis of coal - Dulong and Goutel formula. types of carbonisation of coal-low temperature and high temperature carbonization. Liquid fuels : Origin of petroleum, composition of petroleum, refining of petroleum , octane number of petrol, cetane number of diesel, power alcohol, biodiesel. Gaseous fuels : Composition, properties and applications of natural gas, treatment products such as CNG, LPG, LNG. Hydrogen gas as a fuel, production, properties, storage and transportation. Rocket propellants-characteristics, classification. **Combustion :** Chemical reactions, calculation on air requirement for combustion – numericals

Unit 2 : Corrosion and its prevention (08 Hrs.)

Corrosion:- Definition, atmospheric corrosion-mechanism, Wet corrosion-mechanism, Electrochemical and galvanic series, Factors affecting corrosion-nature of metal, nature of environment, Pourbaix diagram. Methods of prevention of corrosion-cathodic and anodic protection. metallic and non- metallic coatings, Surface conversion coating, organic coatings. Electroplating of Cu, Ag, Au and Ni. Hot dipping, blacodizing, powder coating

Unit 3 : Water and phase rule (08 Hrs.)

Water :- Chemical analysis of water-hardness, chloride content, alkalinity- numericals. Ill effect of hard water in steam generation, preventive measures. Softening of water by zeolite-with numericals and ion-exchange process. **Phase rule :-** Gibb's Phase rule and the terms involved in it with examples. Reduced phase rule. Two component system – iron carbon with microstructures and heat treatment. Applications and limitations of phase rule.

Term Work: Any five experiments

1. To determine total alkalinity of water sample.
2. To determine chloride content of water sample by Mohr's method.
3. To determine temporary and permanent hardness of water sample by EDTA method.
4. Spectrophotometric / colorimetric estimation of Fe^{++} from the given solution.
5. To construct a phase diagram for a binary system, naphthalene and benzoic acid and find eutectic point.
6. Study of corrosion of metals in medium of different pH.
7. Analysis of mixture of phosphoric acid and hydrochloric acid using indicators and pH meter.
8. To determine moisture, volatile matter & ash content of a given sample of coal.

Reference books :

1.Materials science and engineering an introduction, William D. Callister, (Jr.,Wiley.publisher)
2. Principles of the solid state, H.V. Keer, (New age international publishers).

3. Text book of engineering chemistry, R.N. Goyal and Harrmendra Goel, (Ane books India).

Laboratory manual

1. Laboratory manual on Engineering Chemistry, Sudharani (Dhanpat Rai publishing company)
2. Applied Chemistry theory and practical O.P. Virmani and A.K. Narular (New Age International publishers).

Physics

Unit 4 : Wave particle duality and wave equations (08 Hrs.)

Wave Particle Duality :- Limitations of classical mechanics (discuss with reference to theory of relativity), Need for quantum mechanics on the basis of photo electric effect and black body radiation, Planck's quantum theory (discussion of results only), Wave particle duality of radiation and matter, concept of group velocity and phase velocity; Uncertainty principle, Illustration of electron diffraction at a single slit.

Wave Equations :- Concept of wave function and probability interpretation, Schrodinger's time independent and time dependent wave equations, Physical significance of the wave function, Applications of Schrodinger's time independent wave equations to problems of (i) Particle in a rigid box (infinite potential well), Comparison of predictions of classical mechanics with quantum mechanics (ii) Particle in a non-rigid box (finite Potential Well)- Qualitative (results only); Explanation of tunneling effect, Tunnel diode.

Unit 5 : Lasers and superconductivity (08 Hrs.)

Lasers :- Requirement for lasing action (stimulated emission, population inversion, pumping), Coherence (spatial and temporal), Properties–monochromaticity, coherence, directionality, brightness; various levels of laser systems with examples (i) Two level laser system- semiconductor laser (ii) Three level laser system- ruby laser and He-Ne laser. applications (i) Engineering – drilling, welding, micro machining, measurement of long distances in surveying etc (ii) Medicine – as a surgical tool (iii) Communication systems-fiber optics in brief (iv) Information technology holography-construction, reproduction, applications for data storage etc, function of laser in CD write devices, printers.

Superconductivity :- Introduction to superconductivity, Properties of superconductors (zero resistance, Meissner effect, London penetration depth, isotope effect, critical fields, persistent currents), BCS theory. Type I and type II Super conductors, High Tc Superconductors, Applications (super conducting magnets, transmission lines etc), DC and AC Josephson effect, SQUID

Unit 6 : Semiconductor physics and physics of nanoparticles (08 Hrs.)

Semiconductor physics :- Band theory of solids, Classification of solids on the basis of band theory, Types of semiconductors, Introduction to the concept of electrical conductivity, conductivity of conductors and semiconductors, Temperature dependence of conductivity, Hall effect and Hall coefficient, Fermi-Dirac probability distribution function, Position of Fermi level in intrinsic semiconductors (with derivation) and in extrinsic semiconductors (variation of Fermi level with temperature), Band structure of PN junction diode under zero bias, forward bias, reverse bias; Transistor working, PNP and NPN on the basis of band diagrams, Photovoltaic effect, working of a solar cell on the basis of band diagrams, Applications (i) Industrial (street lights,irrigation,solar panels for satellites) (ii) Commercial (iii) Domestic

Physics of nanoparticles :- Introduction, Nanoparticles, Properties of nanoparticles (optical, electrical, magnetic, structural, mechanical), Brief description of different methods of synthesis of nanoparticles (physical, chemical, biological, mechanical, vapour and hybrid methods), Synthesis of colloids, Growth of nanoparticles, synthesis of metal nanoparticles by colloidal route, Applications of nanotechnology-electronics, energy, automobiles, space and defence, medical, environmental, textile, cosmetics.

Reference Books:

1.Principles of Physics, Serway and Jewett (Saunders college publishing)
2.Introduction to Solid State Physics, Kittel C (Wiley and Sons)
3.Laser and Non-Linear Optics, B.B.Laud (Oscar publication)
4.Physics of the Atom, Wehr and Richards (Addison, Wesley)
5.Nanotechnology, Principles and Practices, Dr.S.K.Kulkarni (Capital Publishing Company)

Term Work: Any five experiments

1.Determination of band gap of a semiconductor.
2.Characteristics of a solar cell, calculation of fill factor, To plot power vs. resistance graph and hence to calculate value of R for maximum value of workable power.
3.Hall effect and determination of Hall coefficient.
4.Characteristics of photocell/photo diode.
5.Diode characteristics (Ge/Si, LED, Zener)
6. Synthesis of metal nanoparticles (gold/silver) by the chemical route.
7.Measurement of diameter of a thin wire using a laser.
8.To find refractive index of glass using a laser (using Snell's law). (may show demonstrations of polarisation and diffraction).
9. An experiment based on laser (e.g.: To find number of lines /cm of a given grating using a laser source/ to find beam divergence/true beam width)
10.Determination of width of a slit using a laser.

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

****

Engineering Mechanics (101010)

Teaching Scheme	Examination Scheme
Theory : 03 hrs/week	Paper : 100 marks
Practical: 02 hrs/week	Term Work: 25 marks

Section-I (Statics)

Unit 1. Resultant of coplanar force system. (06 Hrs)

A. Principle of statics, Force systems, Resolution and composition of forces, Resultant of concurrent forces.

B. Moment of a force, Couple, Varignon's theorem, Equivalent force couple system, Resultant of parallel and general force system. Distributed forces, Centroid of plane lamina and wire bends.

Unit 2. Equilibrium of Force system. (06 Hrs)

A. Free body diagram, Equilibrium of concurrent, parallel and general forces in a plane, Equilibrium of three forces in a plane, Types of beams, simple and compound beams, type of supports and reaction.

B. Resultant and Equilibrium of concurrent and parallel forces in a Space.

Unit 3. Analysis of structure and friction. (06 Hrs)

A. Two force member, Analysis of plane trusses by method of joint and method of section, cables subjected to point loads.
Multi force member, Plane frames.

B. Friction - Application of friction on inclined plane, wedges, ladders and flat belt.

Section-II (Dynamics)

Unit 4. Rectilinear motion of particles. (06 Hrs)

A. Kinematics- Basic concepts, Equations of motion for constant acceleration and motion under gravity, Variable acceleration, Motion curves, Relative motion and dependant motion.

B. Kinetics- Newton's second law of motion and its applications.

Unit 5. Curvilinear motion of particles. (06 Hrs)

A. Kinematics-Basic concepts, Equation of motion in cartesian, path and polar coordinate, Motion of projectile.

B. Kinetics-Newton's second law of motion. Motion in cartesian and path coordinate of a particle.

Unit 6. Work energy and impulse momentum principle for particle. (06 Hrs)

A. Work, Power, Energy, conservative forces & Potential Energy , Conservation of energy, Work energy principle for motion of particle.

B. Linear Impulse & Momentum, Conservation of momentum, Direct central impact and coefficient of restitution, Impuse momentum principle.

Term Work

Term work consists of the following.

a) Statics-(Any three experiments from the list below)

1. Verification of law of parallelogram of forces/ polygon of forces.
2. Support reaction of simple / compound beams.
3. Determination of coefficient friction of belt/inclined plane.
4. To determine forces in Space Force System.

b) Dynamics-

1. Curvilinear motion.

2. Determination of coefficient of restitution.

c) Exercise-At least two examples on each part of the units should be solved during practical hours under the guidance of the concerned teacher.

d) **Assignment**- Minimum five numerical examples from each unit given by concerned teacher.

Note: Examples in Exercise and Assignment should be unsolved problems from text and reference books prescribed in the syllabus.

Text book (latest editions)

1. Engineering Mechanics statics and dynamics by R. C. Hibbeler, McMillan Publication.

Reference books

1. Mechanics for Engineers - Statics Fourth Edition, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication.
2. Mechanics for Engineers - Dynamics Fourth Edition, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication.
3. Engineering Mechanics statics and dynamics by J. L. Meriam and Craige, John Willey and Son's publication.
4. Engineering Mechanics by S. P. Timoshenko and D. H. Young, McGraw-Hill publication.
5. Engineering Mechanics by F L Singer, Harper and Rowe publication.
6. Engineering Mechanics by A. P. Boresi and R. J. Schmidt, Brooks/Cole Publication.
7. Engineering Mechanics by Shames I. H., P H I India.

BASIC ELECTRONICS ENGINEERING (104011)

Teaching Scheme:
Lectures-3hrs/week
Practicals-2hrs/week
duration)

Examination Scheme:
Paper-100 marks
Termwork-25

1. Diodes & Circuits

PN junction diode, V-I characteristics, Diode as rectifier, Specifications of rectifier diodes, HW, FW, Bridge rectifiers, Equations for I_{DC}, V_{DC}, Vrms, Irms, Efficiency & ripple factor for each configuration. Capacitor filter, ripple factor. Zener diode-Characteristics, Specifications, Zener voltage regulator. LED-Characteristics, Configurations-Discrete, seven segment, bar graph, matrix. Concept of multiplexed display.

2. Semiconductor devices & applications

Characteristics & specifications of BJT, FET & MOSFET (enhancement type). CE, CB, CC configurations, α, β, concept of gain & BW. Operation of BJT in cut-off, saturation & active regions (DC analysis). BJT as switch. Single stage BJT amplifier. MOSFET as switch. Power semiconductor devices-SCR, DIAC, TRIAC-construction, characteristics & specifications, list of applications.

3. OP AMPS and applications

Block diagram, parameters of ideal & practical op amp. Concept of negative & positive feedback, advantages of negative feedback. Applications-Inverting, non inverting, difference, summing, differentiator, integrator, V-I, I-V converters. Op amp waveform generator-sine, square & triangular.

4. Digital Electronics

CMOS NOT, NAND, NOR, AND, OR, EXOR gates, De Morgan's theorem. Technologies-SSI, MSI, LSI, VLSI. Half adder, full adder, mux, demux, D flip flop, shift registers, counters. Block diagram of Microprocessor & Microcontroller. Advantages of using them.

5. Industrial applications

Transducers for-Temperature, level, displacement, pressure. Range, specifications, Limitations & applications. Block diagrams of-Digital thermometer, weighing machine. Introduction & block diagram of-Two wire transmitter, PID controller, data logger, alarm annunciator, CNC machine, PLC.

6. Communication systems

An overview of-Analog, digital, wired & wireless communication systems. IEEE frequency spectrum. Need for modulation, AM & FM techniques, modulation index. Block diagram of-AM & FM Transmitter, Superheterodyne receiver, mobile communication. Communication media-Wireless, Cables-Coaxial, Twisted, Flat, Fibre optic. RG standards of cables.

List of Practical:

1. Study of Passive components- Resistors, Capacitor, Inductors, Relays, Switches, Transformers, Connectors.
2. Study of semiconductor devices I- Study of data sheet specifications of- Diodes, BJT, FET, OPAMP. Build and test positive/negative regulator with bridge rectifier and filter.
3. Study of controls of- Signal generators, Function generator. Build and test OPAMP inverting and non-inverting amplifier and measurement of gain.
4. Build and test BCD counter with 7 segment LED display.
5. Study of controls of CRO. Measurement of- frequency, Phase, AC and DC voltages.
6. Study of settings DMM. Measurement of AC, DC voltage and current. Diode and Transistor testing. Resistance measurement.
7. Build and test half and full adder circuit.
8. Soldering practice and Study of soldering techniques.

Books

1. Art of Electronics- Paul Horowitz, Cambridge LPE
2. Electronics Devices and Circuits An Introduction – Allen Mottershed, PHI
3. Digital Principles and Applications- A P Malvino, Donald Leech. Tata McGraw-Hill Fourth Edition.

Chairman
(E/E)

10/1/08

Engineering Graphics – II (102012)

Teaching Scheme		**Examination Scheme**
Lectures	1 Hours/Week	**Term Work** – 50 Marks
Practical	2 Hours/Week	

NOTE – ONLY FIRST ANGLE METHOD OF PROJECTIONS IS TO BE USED IN ALL THE UNITS.

UNIT – I Projections of Point and Line

Projections of points, projections of lines, lines inclined to one reference plane, lines inclined to both reference planes. (Lines in First Quadrant Only) Traces of lines, Distance between skew lines.

UNIT – II Projections of Planes

Projection of planes, angle between two planes, distance of a point from a given plane, inclination of the plane with HP and VP, True shape of a plane surface.

UNIT – III Projections of Solids

Projections of solids inclined to one reference plane, inclined to both the reference planes, projections of cube, right regular prisms, right regular pyramids, right circular cylinder, right circular cone, tetrahedron, frustum of solids.

UNIT – IV Sections of Solids

Types of section planes, projections of above solids cut by different section planes, True shape of cut surfaces.

UNIT – V Development of Lateral Surfaces (DLS) of Solids.

Applications of DLS, method of development, development of lateral surface of above solids, development of lateral surface of cut solids.

Term Work : Term Work should be prepared on Five A2 (594X420mm) (Half imperial) size drawing screen using any drafting software/package as detailed below.

Sheet No. – 1	Projection of Line	Minimum 2 Problems
Sheet No. – 2	Projections of Planes	Minimum 2 Problems
Sheet No. – 3	Projections of Solids	Minimum 2 Problems
Sheet No. – 4	Sections of Solids	Minimum 2 Problems
Sheet No. – 5	DLS of Solids	Minimum 2 Problems

Important Note: The problems for Term Work should be different for each student.
The Term Work of a batch should be preserved in a form of CD/DVD and the same should be produced before a TW Verification Committee appointed by the University.

Text Books :

1. N.D. Bhatt, Elementary Engg. Drawing, Chartor Pub. House, Anand, India.
2. D. N. Johle, Engineering Drawing, Tata Mcgraw-hill Publishing Co. Ltd..

Reference Books :

3. P.S. Gill, Engineering Graphics.
4. N.D. Bhatt, Machine Drawing, Chartor Publishing house, Anand, India.
5. Warren J. Luzzader, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi.
6. Fredderock E. Giesecke, Alva Mitchell & others, Principles of Engineering Graphics, Maxwell McMillan Publishing.

(102013) Basic Mechanical Engineering

Teaching Scheme:
Theory:: 3 Hours
Practical: 2 Hours

Examination scheme
Theory: 100 marks (3 hours)
TW: 25 marks

Unit 1
Thermodynamics
Thermodynamic work, p-dV work in various processes, p-V representation of various thermodynamic processes and cycles
Ideal gas equations, Properties of pure substance, Statements of I and II laws of thermodynamics and their applications in Mechanical Engineering.
Carnot cycle for Heat engine, Refrigerator and Heat pump.

[18 Marks]

Unit 2
Energy conversion devices (Theoretical study using schematic diagrams only)
Package Boiler, Turbine(Impulse & Reaction turbine, Gas turbine, Hydraulic turbines), Working principle and applications of Reciprocating I.C. engines, Air motor. Reciprocating pumps (single acting & double acting), reciprocating compressor, rotary compressors, fans, blowers, Study of household refrigerator, window air conditioner, split air conditioner Ratings and selection criteria of above devices. Refrigerants and their impact on environment.

[16 Marks]

Unit 3
Heat Transfer
Statement and explanation of Fourier's law of heat conduction, Newton;s law of cooling, Stefan Boltzmann's law. Conducting and insulating materials and their properties. Selection of heat sink and heat source.
Power Plants (Description with Block Diagrams)
Thermal, Hydroelectric, Nuclear and Solar-Wind Hybrid Power Plants.

[16 Marks]

Unit 4
Machine elements:
Power transmission shafts, axles, keys, bush and ball bearings, Flywheel and Governors.
Power Transmission Devices
Types of Belts and belt drives, Chain drive, Types of gears, Types of Couplings, friction clutch (cone and single plate), brakes (types and applications only)
Applications of these devices.
Mechanisms:.(Descriptive treatment only)
Slider crank mechanism, Four bar chain mechanism, List of various inversions of Four bar chain mechanism, Geneva mechanism, Ratchet and Paul mechanism

[16 Marks]

Unit 5

Materials Used in Engineering and their Applications

Metals – Ferrous and Non-Ferrous, Nonmetallic materials, Material selection criteria

Design considerations

Steps in Design

Introduction to manufacturing processes and Their Applications:

Casting, Sheet metal forming, Sheet metal cutting, Forging, Fabrication, Metal joining processes.

[18 Marks]

Unit 6

Machine Tools (Basic elements, Working principle and types of operations)

Lathe Machine **–** Centre Lathe

Drilling Machine – Study of Pillar drilling machine

Introduction to NC and CNC machines

Grinding machine, Power saw, Milling Machine.

[16 Marks]

Term work: Term work shall consist of record of any eight experiments out of the following;

1. Assembly and working of 4-bar, 6-bar, 8-bar planer mechanisms
2. Finding relation between input angle and output angle for various link lengths
3. Demonstration of operations of centre lathe (turning, step turning, facing, boring, taper turning, knurling, grooving, threading)
4. Demonstration of operations on drilling machines (drilling, reaming, spot facing , counterboring)
5. Demonstration of Two stroke and four stroke engine
6. Study of Package type boilers
7. Study of domestic refrigerator & window air-conditioner
8. Study of power transmitting elements: Coupling, Gears and bearings.
9. Joule's porous plug experiment
10. Joule's paddle wheel experiment.
11. Experimental verification of effect of insulating material on heat transfer

References :

Text Book:

P. K Nag "Thermodynamics", Tata McGraw-Hill Publishing Co. Ltd

Hajra-Chaudhari " Workshop Technology"

Reference Books:

1. Yunus A. Cengel and Boles, " Thermodynamics ",Tata McGraw-Hill Publishing Co. Ltd
2. Arora and Domkunwar, "Thermal Engineering", Dhanpat Rai and Sons.
3. R. K. Rajput, "Heat transfer", S Chand Publication, Delhi.
4 V. B. Bhandari "Design of Machine Elements" Tata McGraw-Hill Publishing Co. Ltd

Communication Skill

Teaching Scheme:
Practical: 02 Hrs.

The teacher shall explain in detail, the gist and techniques involved in the following work units to the students. The Students should complete practical work based on the following topics. The teacher shall subsequently formulate the exercises to adjudge the skill sets acquired by the students. These exercises will be undertaken by the groups of the students of suitable strength.

Work Unit 1- Fundamentals of Communication:
Elements of communication, types of Communication- diagonal, downward, upward, horizontal communication. Importance of effective communication, manners and etiquettes in communication, stages of communication, ideation, encoding, transmission, decoding, response, general communication, technical communication. , barriers to effective communication, Listening skill, speaking skill, Reading skill, writing skill.

Work Unit 2- Organization and Listening Comprehension in Communication:
Spatial organization, chronological organization, order of increasing and decreasing importance, styles of communication, accuracy, brevity, clarity, objectivity, impersonal language, professional speaking ability, listening process, hearing and listening, types of listening- superficial, appreciative, focused, evaluative, attentive, empathetic. Barriers to listening- physical, psychological, linguistic, cultural. Speech decoding, oral discourse analysis, effective listening strategies, listening in conversational interaction, listening to structured talks, pre-listening analysis, predicting, links between different parts of the speech, team listening, listening and notes taking.

Work Unit 3- Speaking Skills:
The speech process, message, audience, speech style, feedback, conversation and oral skills, fluency and self expression, body language phonetics and spoken english, speaking techniques, word stress, correct stress patterns, voice quality, correct tone, types of tones, Job interview, interview process, characteristics, of the job interview, pre-interview preparation techniques, interview questions and answers, positive image projection techniques. Group discussion- characteristics, subject knowledge, oral and leadership skills, team management, strategies, individual contribution. Presentation skills-planning,preparation, organization, delivery.

Work Unit 4- Reading and language skills:
The reading process, purpose, different kinds of texts, reference material, scientific and technical texts, active and passive reading, strategies-vocabulary skills, eye reading and visual perception,, prediction techniques, scanning skills, distinguishing facts and opinions, drawing inferences and conclusions, comprehension of technical material- scientific and technical texts, instructions and technical manuals, graphic information. Note making- tool for study skills, topicalising, organization and sequencing. Summarizing and paraphrasing.

Work Unit 5 - Referencing and Writing skills:
Methods of referencing, book references, user guides, references for reports, journal references, magazines and news papers, unpublished sources, internet references, explaining and elucidating.
Writing skills - Sentence structure, sentence coherence, emphasis. Paragraph writing. letter writing skills - form and structure, style and tone. Inquiry letters, Instruction letters, complaint letters, Routine business letters, Sales letters.

Work Unit 6 – Reports, Resumes and Job Applications:
Types of reports, information and analytical reports, oral and written reports, formal and non formal reports, printed forms, letter and memo format, manuscript format, proposals, technical articles, journal articles and conference papers, review and research articles.
E-mails, Business Memos, Employment Communication- resume design, resume style,

Reference Book:

1. 'Effective Technical Communication' by M Ashraf Rizvi, Tata McGraw Hill Publishing Company Ltd.
2. Basic Managerial Skills for all' E. H. McGrath, Eastern Economy Edition, Prentice hall India.
3. 'Developing Communication Skills' Krishna Mohan, Meera Banerji, McMillan India Ltd.
4. 'Principles and Practice of management' Dr. P. C. Shejwalkar, Dr. Ghanekar and Dr. Bhivapathaki, Everest publishing House