UNIVERSITY OF MUMBAI
SCHEME OF EXAMINATIONS AND TEACHING
(R – 2001)

FIRST YEAR ENGINEERING:
(Common for all branches)

Semester I

Sr. No.	Subjects	No. of Periods per week (45 minutes each)			Duration of theory paper (hours)	Marks				
		Lecture	Practical	Tutorial		Theory paper	Term Work	Practical	Oral	Total
1	Applied Mathematics –I	5	-	-	3	100	-	-	-	100
2	Applied Sciences – I	4	-	2	3	100	25	-	-	125
3	Engineering Mechanics	6	3	-	3	100	25	-	-	125
4	Basic Electrical & Electronics Engineering	6	3	-	3	100	25	-	-	125
5	Computer Programming -I	4	3	-	3	100	25	-	-	125
6	Basic Workshop Practice - I	-	4	-	-		-	-	-	-
	Total	25	13	2	-	500		-	-	600

Semester II

Sr. No.	Subjects	No. of Periods per week (45 minutes each)			Duration of theory paper (hours)	Marks				
		Lecture	Practical	Tutorial		Theory paper	Term Work	Practical	Oral	Total
1	Applied Mathematics - II	5	-	-	3	100	-	-	-	100
2	Applied Sciences - II	4	-	1.5	3	100	25	-	-	125
3	Engineering Mechanics	2	-	1.5	3	100	25	-	-	125
4	Basic Electrical & Electronics Engineering	4	6	-	4	100	25	-	-	125
5	Computer Programming - II	4	3	-	3	100	25	-	-	125
6	Basic Workshop Practice - II	-	4	-	-	-	100	-	-	100
	Total	19	13	3	-	500	200	-	-	700

Applied Mathematics I

Class F.E (All Branches)	Semester I
Periods per week :- Lectures :- 5 Practicals :- Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- Practical: :- Oral: :- Total: :- 100

	Detailed Syllabus	Periods / Week
1	**Complex numbers** • Idea of Argand diagram(problems based on geometry are not expected) Cartesian, Polar and Exponential form of complex number • De'Moivre's Theorem(without proof), Power and roots of exponential and trigonometric functions • Hyperbolic and logarithmic functions, inverse trigonometric functions • Separation of real and imaginary parts of all types of functions	02 06 03 04
2	**Vector algebra and Vector Calculus** • Vector triple product(proof is not expected), product of four vectors • Differentiations of a vector function of a single scalar variable. Proofs of theorems on derivatives of sum and product are not expected • Curves in space, Serret Frenet formulae(without proof), curvature torsion, osculating plane, normal plane and rectifying plane	03 02 05
3	**Mean value theorems** • Rolle's theorem, Lagrange's and Cauchy's mean value theorem(proofs are not expected but geometrical interpretations are expected) • Taylor's and Maclaurin's theorem(without proof), Taylor's and Maclaurin's series	04 04
4	**Differential Calculus** • Successive Differentiation of nth derivatives of function such as $(ax+b)^m$ $(ax+b)^{-1}$, eax sine(ax+b), cos(ax+b), log(ax+b), e^{ax}sine(bx+c), e^{ax}cos(bx+c) • Leibnitz theorem(without proof), expansions of power series, in determinate forms and L' Hospital rule	04 07
5	**Partial Differentiation** • Partial Derivatives of first and higher order, total differentials, composite functions and implicit functions • Euler's theorem on homogeneous functions with two and three independent variables (with proof), deductions from Euler's theorem • Errors and Approximations, Maxima and Minima of a function of two variables	07 04 04
	Recommended Books • Higher engineering mathematics, Dr B.S.Greval, Khanna Publications • A Text book of Applied mathematics, P N and J N Wartikar, Pune Vidyarthi Griha • Advanced Engineering mathematics, Erurin Kreyszing, Wiley Eastern ltd • Engineering Mathematics, G V Kumbhojkar, C Jamunadas and company • Applied Mathematics I, Dr B V Jungam , K P Patil, Mrs. N M Kumtekar, Nandu publications	

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Applied Science I

Class F.E (All Branches)	Semester I
Periods per week :- Lectures :- 4 Practicals :- Tutorials :- 2	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
Section I : Applied Physics		
1	**Solid state physics** • Crystal structure: structure of cubic crystals, special form in cubic crystals, diamond structures, Barium Titanate Miller indices,planes,7 directions, Legacy and critical radius ratio in tonic crystals • Formation of energy bands, classification of solids, conductor, semiconductor, insulator, physics of semiconductor junction,(bipolar)photo diode • C-B characteristics, concept of Fermi - level, energy gap, temperature dependence	09
2	**Sound waves** • Audible, ultrasonic and infra sonic waves propagation, piezoelectric effect, principles of ultrasonic transducers and oscillators production of ultrasonic waves , echo sounding, thickness measurement, cavitation and non-destructive testing and flow detection	06
3	**Electricity and magnetism** • Motion of charges, particles in electric and magnetic fields, magnetic and electrostatic focusing, and its use in CRO, use of CRO for measuring amplitude of DC and AC, voltage and phase difference between two AC sinusoidal voltages	06
4	**Quantum Physics** • Introduction to wave nature of particles	03
Section II : Applied Chemistry		
5	**Water and its treatment** • Introduction to hard and soft water • Hardness: types, units, estimation be EDTA method , numerical, understanding effect of hard water in various industries • Softening the water • Lime-soda process, zeolite - Permutit method, ion exchange method, comparison of methods, numerical, numerical methods based on lime-soda process and zeolite process	07
6	**High polymers and elastomers** • Introduction and definition of elastomers and polymers • Classification of polymers: homo polymer and copolymer, limear, branched and cross linked, organic and inorganic • Types of polymerization: addition(e.g. polyethylene, polypropylene), condensation e.g. phenol formaldehyde, urea formaldehyde • Plastics: classification(thermoplastic and thermosetting),compounding of plastics, fabrication of plastics- compression, extrusion, transfer and injection moulding, industrial applications • Rubber structure-cis and trans isomer, properties and drawbacks, vulcanization-mechanism, agents, advantages, effects on properties, synthetic rubber-manufacture properties and uses of polyurethane, silicon rubber	09
7	**Pollution and Pollution control** • Definition of Pollution and Pollutant • Introduction to atmospheric pollution: nature of atmospheric pollutants and their effect,	05

	methods of reducing atmospheric pollution in brief • Introduction to water pollution: nature of water pollutants and their effects, methods of reducing water pollution in brief.	
8	**Introduction to lubricants** • Definition of lubricants, lubrication, purpose of lubrication • Classification of lubricants with examples: solid, semisolid, liquid, blended, synthetic • Mechanism of lubrication-thick film, thin film and extreme lubrication • Properties of ideal lubricant(definition and significance)-viscosity, viscosity index, flash and fire point, cloud and pom point, saponification value, acid value, numerical problems on saponification value	7
	Term Work Each student has to appear for atleast one written test during the term. Report on experiments demonstrated (atleast five each based on above syllabus of section I and II), assignments consisting of minimum ten numerical problems covering the syllabus along with the graded answer paper shall be submitted as term work. The distribution of term work marks will be as follows Report on experiments demonstrated, assignments:15 marks Written tests:10marks : 10 marks	
	Recommended books • Concept of modern physics, Arthur Beiser, Tata MacGrwahill • Engineering Physics, R.K.Gaur and S.L.Gupta, Dhanpatrai pub company • Modern Physics, J.B. Rajam, S. Chand and company • Engineering Chemistry, Jain and Jain, Dhanpatrai Pub CO. • A Text Book of Engineering Chemistry, M.M.Uppal, Khanna pub • Environmental Chemistry, B.K.Sharma. Goel pub house • Engineering Chemistry, S.S.Dara, S.Chand and company.	

Engineering Mechanics

Class: F.E.(All Branches)	Semester I
Periods per week :- Lectures :- 6 Practicals :- 3 Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
Section I : Statics		
1	**System of coplanar forces** • Resultant of i)Concurrent forces, ii) Parallel forces & iii) Non - Concurrent non parallel system of forces, moment of forces about any point, Varignon's theorem, Distributed forces in plane	06
2	**Equilibrium of system of coplanar forces** • Conditions of equilibrium for i)concurrent forces ii)parallel forces iii) Non - Concurrent nonparallel forces and couples • Types of supports, determination of reactions at supports for various types of determinate structures(with/without internal hinge) • Centroids of planer areas, centre of gravity of wires bent into different shapes • Analysis of determinate pin jointed plane frames by method of joint and method of sections	06
3	**Forces in space** • Resultant of i) Concurrent forces, ii) Parallel forces, iii) General force system, moment of force about a point, finding scalar and vector components of the force and the moment of the force about an axis	07
4	**Friction** • Laws of friction, cone of friction, equilibrium of body on implying planes, application to problems involving wedges and ladders, screw and belt friction-only simple type involving tension on both side of pulley to be covered	06
5	**Principle of virtual work** • Equilibrium of an ideal system, applications to link systems with single degree of freedom only.	03
Section II : Dynamics		
6	**Kinematics of particle** • Rectilinear motion, acceleration time and velocity time graphs and their uses • Velocity and acceleration in terms of rectangular coordinate system. motion along plane curve path, tangential and normal components of acceleration, projectile motion, simple harmonic motion	14
7	**Kinematics of rigid bodies** • Relative velocity, translation, pure rotation and plane motion of rigid bodies, link mechanism, instantaneous centre of rotation for the velocity and velocity diagrams for bodies in plane motion	06
8	**Kinetics of particles and Kinetics of rigid bodies** • D'Alemert's principle, equation of dynamic equilibrium, linear motion, curvilinear motion • Area moment of inertia, parallel axis theorem, perpendicular axis theorem, mass moment of inertia about centroidal axis, and about any other axis. D'Alemert's principle for body under rotational motion about a fixed axis and plane motion. Application to motion of bars, cylinders, spheres only • Linear momentum, impulse momentum, principle of conservation of momentum, impact of solid bodies elastic impact , semi elastic impact and plastic impact, work done by a force, potential and kinetic energy and power work energy equation, principle of conservation of energy.	06 08 08

Term Work

Each student has to appear for atleast one written test during the term.
Atleast 6 laboratory experiments from those mentioned below(minimum 2 on dynamics) should be conducted.

List of experiments (Statics and Dynamics)

- Polygon law of coplanar forces(concurrent)
- Non - Concurrent nonparallel(general)
- Simple jib crane
- Bell-Crank lever
- Support reactions for beam
- Link polygon
- Inclined plane or wedge friction or ladder friction(to determine coefficient friction)
- Coil friction
- Simple/compound pendulum(time period of vibration)
- Fly wheel(mass moment of inertia)
- Collision of elastic bodies(law of conservation of momentum)
- Rolling disc on inclined plane (to determine experimental mass moment of inertia of disc)

Four problems should be solved graphically along with analytical solutions. Also assignment consisting of minimum 20(almost equal nos. On static's and dynamics)
The distribution of term work marks will be as follows:
Reports on experiments performed, assignments : 10 marks
Assignments and solutions to problems : 05 marks
Written test :10 marks

Recommended Books:

- R.C.Hibbeler, Engineering Mechanics, Mac Mllan
- B.N.Thadani, Engineering Mechanics, Weinall Book Corporation
- Beer Jhanson, Engineering Mechanics, Tat McGraw Hill
- Tayal, Engineering Mechanics, Umesh Publication
- Mariam, Engineering Mechanics, John Wiley
- F.L.Singer, Engineering Mechanics, Harper & Row Publication

Basic Electrical and Electronics Engineering

Class: F.E.(All Branches)	Semester I
Periods per week :- Lectures :- 6 Practicals :- 3 Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
1	• Units of work, power and energy, Ohm's law, effect of temperature on resistance, series and parallel circuits, lead acid battery, construction and charging	03
2	• AC fundamentals: sinusoidal voltage and current waveforms, RMS and average value of various waveforms, form factor, crest factor, frequency, R-C,R-L,R-L-C, single phase series circuits (with resonance)parallel circuits (with resonance), statement of relation with line current, phase voltage and power in three phase circuits for a balanced three phase load	12
3	• Elementary network theorems(for DC circuits only),star delta transformations ,superposition's theorem, Thevenin's and Norton's theorem, maximum power transfer theorem	08
4	• Principle and working of single-phase transformer , emf equation, voltage and current ratio of ideal transformer, determination of efficiency and regulation by direct loading	05
5	• General principles and working of electrical motors and generators: DC series and shunt machine, I phase induction motor	04
6	• P-N junction diode as rectifier(half and full wave),intro to filters, light emitting diodes, (LEDs)	04
7	• Principle and working of bipolar junction transistor (BJT and FET) & its use as an amplifier	08
8	• SCR characteristics and its application for single phase converter and inverter circuits (numerical problems not expected)	04
9	• Transducers: Classification of transducers, study of transducers like displacement, temperature and pressure trans., flow meters, LVDT, microphones, loudspeakers(no numerical problems)	06
10	• Basic principles of measurement of electrical quantities, voltmeters, ammeters, watt, meters, multimeters, and power supplies(no numerical problems)	08

Term work

Each student has to appear for atleast one written test during the term

List of lab experiments:

- R-L-C series and parallel circuits and study of resonance
- Study of relationships between line current / voltage and phase current / voltage for balanced star load
- Study of relationship between line current / voltage and phase current / voltage for balanced delta load
- Verification of Norton's theorem, Thevenin's theorem and superposition theorem
- Load test on single phase transformer
- Diode rectifier FW/HW circuits.
- Transistor I/P O/P characteristics
- Measuring of power using 2 wattmeter method
- Transistor as an amplifier
- SCR as control rectifier
- Transducer characteristics

Report on experiment performed, assignments consisting of minimum 10 numerical problems based on the above syllabus, along with the graded answer paper shall be submitted as term work.
The distribution of term work marks will be as follow.

Report on experiments performed, assignments	:10 Marks
Assignments and solutions to problems	:05 Marks
Written test	:10 Marks

Recommended books:

- Vincent Del-torro, Principles of electrical engineering, Prentics hall India Pvt. Ltd.
- R.K. Sugandhi &K.K. Sugandhi, Thyrister theory and applications, Wiley Fastern Ltd.
- Sawhney A.K., A course in Electrical & Electronics Measurements and instrumentation, Dhanpat Rai & Publications
- Allen Mottershead, Electronic Devices and circuits.-An introduction ,Prentice Hall India Pvt Ltd.

Computer Programming I

Class: F.E.(All Branches)	Semester I
Periods per week :- Lectures :- 4 Practicals :- 3 Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
1	**Fundamentals of UNIX** • Multi-user system: Logging in and passwords, Electronic mail, time for UNIX • UNIX file system: Files and Directories, Subdirectories and path names, searching tree for files • File utilities: Ownership and access to files, Make simple text files, Basic editing techniques, Print files • File and data processing utilities: Searching for patterns, Rearranging files, structures and sorting files, relational files	02 02 02 02
2	**Structured Programming** • C Fundamentals: Character set, Identifiers and keywords, data types, constants , variables and arrays, Declarations, Operators and Expressions, Library Functions, Statements, Symbolic constants, Preprocessor directives • Data input and output; getchar(), putchar(), scanf(), printf(), gets(), puts(0, functions • Control statements: if-else , while, do-while, goto, for, nested control structures, switch , break, continue, statements, comma operators • Functions: Function prototype, passing arguments to a function by value, recursion storage classes, automatic external, static register variables in single file environment • Arrays: defining - process array, passing arrays to functions, introduction to multidimensional array, arrays and strings • Pointers: Declarations, referencing and de-referencing, passing pointers to functions, pointer to array, (no reference to dynamic memory allocation) • Structures and Unions: Defining and processing a structure	04 01 10 06 06 06 05

Term work

Term shall consist of graded answer paper of the test and atleast 5 assignments covering UNIX fundamentals, and 10 programmes developed under control structures using C, 10 programmes under arrays, functions and structures using C. Programmes should be debugged and should have suitable comment

The distribution of term work marks:

Written Test (at least 1) :10 marks
Assignments : 05 marks
Programmes :10 marks

Recommended books:

- Programming in C, Balguruswami, Tata McGraw Hill
- A structured programming approach using C,Behrauz Forouzan, Thomas Learning

- Programming in C , Schuam outline series
- Let us C, Yashwant Kanitkar, BPB publications
- Practical C programming, O' reilly.
- Algorithms with C, O'Reilly
- Internet for everyone, A. Leon Techworld

Basic workshop practice I
And
Basic workshop practice II

Class: F.E.(All Branches)	**Semester I**
Periods per week :- Lectures :- Practicals :- 4 Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- Practical: :- Oral: :- Total: :- 100

Detailed Syllabus		**Periods / Week**
Note:	The syllabus and the term work to be done during Sem I and Sem II are given together. Individual instructor for the course is to design the jobs for practice and demonstration and spread the work in entire 2 Sem. Select any 4 trade topics (2 per Sem.)out of the topics sr. No. 3 and sr. No. 10	
1	**Fitting (Compulsory)** • Use and setting of fitting tools chipping, cutting, filing, marking, centre punching, drilling, tapping • Term work to include 1 job involving following operations: Filing to size, one simple male-female joint , drilling and tapping	24
2	**Carpentry(Compulsory)** • Use and setting of hand tools, like hacksaws, jack planes, chisels, and gauges for construction of various joints, wood turning, modern wood turning methods • Term work to include 1 workshop practice carpentry job involving a joint and a report on demonstration of a job involving wood turning	24
3	**Forging (smithy)** • Atleast one workshop practice job (lifting hook and handle) is to be demonstrated	12
4	**Welding** • Edge preparations for welding jobs arc welding for different jobs like; lap welding of two plates, butt welding, of plates with simple cover,. Arc welding to join plates at right angles	12
5	**Machine shop** • Atleast one turning job is to be demonstrated	12
6	**Electrical board wiring** • House wiring**,** staircase wiring for fluorescent tube light, go-down wiring and 3-phase wiring for electrical motors	12
7	**PCB laboratory exercises** • Layout drawing, + ve and - ve film making, PCB etching and drilling, tinning and soldering techniques	12
8	**Sheet metal working and brazing** • Use of sheet metal , working hand tools, cutting , bending spot welding	12
9	**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.	12
10	**Masonry** • Use of Masson's tools, like trowel, hammers, spirit level, square, plumb, lines and pins etc., Demonstration of mortar making, single and one and half brick masonry, English and Flemish bonds, block masonry, pointing and plastering	12

Applied Mathematics II

Class: F.E.(All Branches)	**Semester II**
Periods per week :- Lectures :- 5 Practicals :- Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- Practical: :- Oral: :- Total: :- 100

Detailed Syllabus		**Periods / Week**
1	**Beta and Gamma Functions** • Beta and gamma Functions with properties(without proof) • Relations between Beta and Gamma Functions. Duplication Formula (with Proof)	07
2	**Differentiation under integral sign with constant limits of integration**	02
3	**Integral calculus** • Rectification of plane curves • Double and triple integration. Idea of Jacobian for evaluating integrals with transformation(Theorems and problems on Jacobian are not expected) • Geometrical Interpretation and evaluation by change of order and change to polar form • Application of double and triple integral to area, mass , volume	06 14 03
4	**Differential equations** • First order and first degree exact differential equation and those which can be reduced to exact by use of integrating factor (only 4 rules of I.F and I.F. By inspection) • Linear differential equation and equations. Reducible to linear equation. • Linear differential equation of higher order with constant coefficients Complementary functions. Particular integrals for the equations. Of the type f(D)=X where X = e^{ax}, x^m, sin (ax + b), cos (ax + b), $e^{ax}V$, x.V, where V is the function of x (derivations of P.I. Are not expected) • Cauchy's linear homogeneous equation and Leagendre differential equation. • Variation of parameter method and method of undetermined coefficients • Standard curves: straight line, circle, parabola, ellipse, hyperbola, rectangular hyperbola, catenary, semicubical parabola, cissoids, lemniscates, asteroid, hypocloid, cycloid, cardiode and $ay^2 = x^2(a-x)$, $9ay^2 = (x-2a)(x-5a)^2$	06 10 04 04

Recommended books

- Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publications
- A text Book of Applied Mathematics, P.N. & J. N. Wartikar, Pune Vidyarthi Griha
- Advanced Engineering Mathematics, Erurin Kreyszing, Wiley Eastern Ltd.
- Engineering Mathematics I, G, V. Kumbhojkar, C. Jamanadas & co.
- Applied Mathematics I, Dr. B. V. Jungam, K.P. Patil, Mrs. N. M. Kumthekar, Nandu Publications

Applied Science II

Class: F.E.(All Branches)	Semester II
Periods per week :- Lectures :- 4 Practicals :- Tutorials :- 1.5	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
Section I: Applied Physics		
1	**Optics** • Interference: coherence, interference in thin film, wedge shaped film, Newton's rings, qualitative explanation of Cornu's fringes for finding strains and stresses in bent beams • Diffraction Fraunhoffer's diffraction at single slit, double slit, diffraction at parallel slit, diffraction grating, resolving power • Principles and working of optical fibers	10
2	**X-rays** • Production of x-rays(Coolidge tube), origin of x-rays, properties of x-rays, Mosseley's law, x-ray diffraction, Bragg's Law (with derivation), Bragg's x-ray spectrometer, and determination of crystal structure	06
3	**Laser** • Spontaneous and stimulated emission, population inversion, pumping device and active system • The Ruby Laser, He-Ne laser, and CO2 laser, semiconductor laser, applications of laser	04
4	**Nuclear Physics** • Radiation detectors, ionization chamber, G. M. "Counter", nuclear reactions, fission , fusion, nuclear reactors	05
Section II : Applied Chemistry		
5	**Corrosion and its control** • Introduction: definition, electrochemical theory of corrosion, factors influencing rate of corrosion, • Types of corrosion: galvanic, atmospheric, water line, differential aeration, pitting soil, microbiological • Corrosion control: by proper selection of material and design, by cathodic protection, (impressed current-sacrificial anode), by anodic protection, by preventive coating(metallic coatings - galvanizing, tinning, non-metallic / organic coatings - paints, varnishes, enamels, lacquers)□	08
6	**Fuels** • Introduction: classification of fuels, (based on physical state , origin), characteristics of fuels, Calorific value - high and low calorific value, units, Delong's formula, numerical problems • Solid fuels: types of coal, selection of coal, analysis of coal (proximate and ultimate), numerical problems • Liquid fuels: Petroleum, - composition, classification, mining, and refining, Cracking - thermal, catalytic, reactions, Knocking - Octane number, Cetane number, antiknock agents • Gaseous fuels : composition and properties of natural gas, LPG, composition, manufacture and properties of coal gas	10
7	**Alloys** • Introduction: definition , principle of alloying, purpose of making alloys , classification based on principle constituent • Ferrous alloys : plain carbon steel, - composition, properties, classification based on	05

	Carbon content, applications, Alloy steels - special effects of alloying elements on the properties, composition and properties and uses of Nichrome, stainless steel • Non-ferrous alloys - Alloys of Aluminium, - composition. Properties and uses of duralumin, magnetism, Alloys of Copper - brass - general composition, properties and uses of commercial brass, and German silver, Bronze - general properties, composition, uses of gunmetal, aluminium bronze, nickel bronze, Alloys of lead and tin(solders), - composition , properties and uses of soft solders, Tinman's solders	
8	**Biotechnology** • Introduction: scope and importance of biotechnology, application to of biotechnology to energy development and environment • Manufacture of biogas from organic waste	05

Term work

Each student has to appear for atleast one written test during the term.

Report on experiments demonstrated (at least five each based on above syllabus of section I and section II), assignment consisting of minimum 10 numerical problems covering the syllabus, along with the graded answer paper shall be submitted as term work.

The distribution of term work marks will be as follows:

Report on experiments demonstrated, assignments :15 marks

Written test :10 marks

Recommended books:

- Concept of modern physics, Arthur Besier, Tata McGraw Hill
- Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co.
- Modern Physics, J B Rajam, S Chand & co.
- Engineering Chemistry, Jain & Jain, Dhanpat Rai Publishing co.
- A Text book of engineering Chemistry, M M Uppal, Khanna publishers
- Environmental chemistry, B K Sharma, Goel publishing house
- Engineering Chemistry, S S Dara, S Chand & co.

Communication skills

Class: F.E.(All Branches)	Semester II
Periods per week :- Lectures :- 2 Practicals :- Tutorials :- 1.5	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
1	**Communication** • Concept and meaning of communication, barriers to communication, methods of communication, techniques to improve communication,	04
2	**Summarization** • Techniques to summarize a given passage to test comprehension ability to present written matter in a brief and concise manner	2-3
3	**Comprehension and vocabulary** • Technical , scientific and general text with multiple choice questions to test analytical skills, comprehension, expression, vocabulary and grammar (synonyms, antonyms, one-word substitution, word information)	2-3
4	**Basic official correspondence** • Principles of correspondence, language and style in official letters, formats of letters, (enquiry, replies to enquiries, claims and adjustments, application with bio-data)	9-10
5	**Technical writing** • Framing definitions, classification and description of objects, explanation of process, writing instructions	3-4

Tutorials

Topics to be assigned for speech practise in the form of elocution and debates to test diction modulation, fluency, and non-verbal communication

Term work

Each student has to appear for atleast 1 written test during the term

Term work shall consist of graded answer paper of the test and atleast 8 hand-written assignments (2 on communication, 3 on correspondence, 1 on summarization, 1 on comprehension and vocabulary, 1 on technical writing)

The distribution of term work marks will be as follows:

Written test (atleast one) : 10 marks

Assignments : 15 marks

Recommended books

- Business correspondence and report writing, R. C. Sharma, & Krishna mohan, Tata McGraw Hill
- Business communication (revised edition), Rai & Rai, Himalaya publishing house Lesiker & Petit: Business communication, McGraw hill publications
- Modern business correspondence , McCommas & Satterwhite; 6th edition, McGraw hill publication
- English for engineers and technologists: a skill approach(books 1 & 2) Course Authors (humanities and social science division, Anna University, Madras, Orient Longman, (Mainly for comprehension)
- Technical writing , Eisenberg, Anne, McGraw hill publications,(Teacher reference only)
- Technical writing and professional Communication, Huckins, Thomas, McGraw hill publications
- Written Communication, Freeman, Sarah, Orient Longman

Engineering Drawing

Class: F.E.(All Branches)	**Semester II**
Periods per week :- Lectures :- 4 Practicals :- 6 Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

Detailed Syllabus		**Periods / Week**
Section – 1:		
1	**Introduction** • Drawing instruments, symbolic lines, letterings, dimensioning system, as per I.S. Conventions, geometrical constructions and tangential arcs	02
2	**Engineering curves** • Parabola, ellipse, hyperbola, cycloid, and involute by various methods	07
3	**Projections** • Projection of points, and lines inclined to both the reference planes(excluding HT and VT planes, applications and problems on them) • Projections of planes inclined to both reference planes(excluding HT and VT planes) • Projections of right regular solids (cube, prism, pyramid, tetra-hedron, cylinder. Cone) inclined to both H.P. And V.P.(excluding spheres, hollow, and composite solids)	05 04 05
4	**Sections** • Sections of solids,(cube, prism, pyramid, tetr-hedron, cylinder, cone)cut by planes perpendicular to atleast 1 reference plane (excluding curves cutting planes)	03
5	**Development** • Development of lateral surfaces, of solids, cut by plane and curved plane(solid position with axis perpendicular to 1 of the reference planes)	05
Section – II :		
6	**Orthographic projection** • Multi-view orthographic projection of simple machine parts by first angle method and third angle method of projection as recommended by Indian Standard	05
7	**Sectional views** • Sectional views of simple machine parts(full section , half section, offset section , partial section, revolved and removed sections)	05
8	**Reading of orthographic projection**	06
9	**Isometric projection** • Isometric projections/ drawing of simple blocks(plain and cylindrical excluding spheres)	04
10	**Free hand Sketches** • Thread profiles - IS convention of external and internal threads, drilled hole, blind hole, tapped hole • Bolts, hexagonal head, square head , cylindrical bolt • Nuts - hexagonal, square wing and capstone • Sets screws- heads and ends	03
11	**Introduction to computer 2-D drafting**	03

Term work

Term work shall consisting of the following:

(all drawings to be prepared on A2 or half imperial drawing sheets)

- One drawing sheet on engineering curves(1 problem)
- One drawing sheet on projection of points and lines(2 problems), projection of planes(2 problems)
- One drawing sheet on (4 problems) on projection of solids , section of solids and development of

lateral surfaces.

- One drawing sheet (4 problems) on orthographic projections, sectional views, and reading of orthographic projections
- One drawing sheet(3 problems) on isometric projections
- One printout of computer aided 2-D drawing for missing view

Each student has to appear for atleast one written test during the term
The distribution of term work marks will be as follows:
Written Test (atleast one) :10 marks
Assignments :15 marks

Recommended books

Elementary Engineering Drawing, N.D. Bhat, Charotar Publishing House
Machine Drawing, N.D. Bhat, Charotar Publishing House
Engineering Drawing I & II, M.B.Shah & B.C.Rana

Computer Programming II

Class: F.E.(All Branches)	Semester II
Periods per week :- Lectures :- 4 Practicals :- 3 Tutorials :-	Evaluation System :- Theory paper(3 hours) :- 100 Term Work: :- 25 Practical: :- Oral: :- Total: :- 125

	Detailed Syllabus	Periods / Week
1	**C++ Fundamentals:(Moving from C to C++)** • Data types, operators, preprocessor directives, Declarations, Input and Output, Manipulators, (endl, setw(), setprecision()), control structures, functions and arrays	03
2	**Objects and classes:** • Data hiding and encapsulation, Private and public member, member functions, Accessing class members, Objects as function parameters, Static data and member functions, friend functions and friend classes	08
3	**Object Initialisation and Cleanup**: • Constructors, parameterised constructors, Destructor, constructor overloading, constructors with default arguments, constructors with dynamic operations	02
4	**Function and operator overloading** • Function overloading, function with default arguments, inline functions, Unary operator overloading, , Operator returning value, binary operator overloading, Overloading arithmetic, relational and assignment operators	05
5	**Inheritance** • Derived and base class, protected members , overriding functions, private, protected and public inheritance, derived class constructors, levels of inheritance and multiple inheritance	08
6	**Pointers** • Void pointers, pointer to function and objects, this pointer, pointers and memory management, new and delete operators, Dynamic memory allocation, creating one and two dimensional arrays with dynamic memory allocation	08
7	**Virtual Function and Polymorphism** • Need for virtual functions, pointer to derived class objects, Pure virtual functions, Abstract classes, Dynamic or late binding □	05
8	**File handling** • Files and streams, Opening and closing of file , Input and Output, Classes and files	03
9	**Templates:(Only for concepts)** • Function templates and class templates	02

Term work

Each student has to appear for atleast one written test (preferably on line) during the term.

Recommended compilers: UNIX / LINUX , Turbo C / Borland C

- Ten (10) programs should be developed under classes, objects and pointers, Ten (10) programs should be developed under inheritance, operator overloading, function overloading. Atleast 5 assignments involving classes should be developed for manipulation of data store in single dimensional array, Two dimensional array, link list and strings. Applications on data manipulation , matrix manipulation and statistics

- Programs should be debugged (handwritten / computer printout) with suitable comments to be submitted along with one assessed test paper together covering complete syllabus.

The distribution of term work should be as follows:

Written test (atleast one) :10 marks
Assignments: :05 marks
Programs: :10 marks

Recommended books:

- Programming in C++, Balaguruswamy, TataMcGraw Hill publications
- Starting out with C++, Tony Gaddis, PENRAM International Publishing (India)
- Complete reference by Herbert Shield, Tata McGraw Hill
- Object oriented Programming in Turbo C++, Robert Lafore, Galgotia
- Programming in C , Schuam Outline series,
- Let Us C++, Yashawant Kanitkar, BPB Publications
- Practical C++ Programming , O'Reilly
- Beginning C++, Ivor Horton
- A First book of C++, Gary Bronson