B.Tech. DEGREE PRORAMME (COMMON TO ALL BRANCHES)
(Applicable to students admitted during 2011 and later)

First Year – Course Structure (Group I)

FIRST SEMESTER

Total: 50 Credits

Yr.	Sub. Code	Sub. Name	L	T	P	C
I	MAT-101	Engineering Mathematics I	3	1	0	4
	CIE-101	Mechanics of Solids	3	1	0	4
	ECE-101	Basic Electronics	3	1	0	4
	MME-101	Mechanical Engineering Sciences	3	1	0	4
	PHY-101	Engineering Physics	3	1	0	4
	HSS-101	Communication skills in English	2	1	0	3
	MME-105	Basic Workshop Practice	0	0	3	1
	PHY-111	Engineering Physics Lab	0	0	3	1
		TOTAL	17	6	6	25

SECOND SEMESTER

Total: 50 Credits

Sub. Code	Sub. Name	L	T	P	C
MAT-102	Engineering Mathematics II	3	1	0	4
CIE-104	Environmental Studies	2	1	0	3
ELE-102	Basic Electrical Technology	3	1	0	4
CSE-102	Problem Solving Using Computers	3	1	0	4
CHM-102	Engineering Chemistry	3	1	0	4
MME-104	Engineering Graphics	0	2	4	4
CSE-112	PSUC Lab	0	0	3	1
CHM-112	Engineering Chemistry Lab	0	0	3	1
	TOTAL	14	7	10	25

First Year – Course Structure (Group II)

FIRST SEMESTER

Total: 50 Credits

Yr.	Sub. Code	Sub. Name	L	T	P	C
I	MAT-101	Engineering Mathematics I	3	1	0	4
	CIE-103	Environmental Studies	2	1	0	3
	ELE-101	Basic Electrical Technology	3	1	0	4
	CSE-101	Problem Solving Using Computers	3	1	0	4
	CHM-101	Engineering Chemistry	3	1	0	4
	MME-103	Engineering Graphics	0	2	4	4
	CSE-111	PSUC Lab	0	0	3	1
	CHM-111	Engineering Chemistry Lab	0	0	3	1
		TOTAL	14	7	10	25

SECOND SEMESTER

Total: 50 Credits

Sub. Code	Sub. Name	L	T	P	C
MAT-102	Engineering Mathematics II	3	1	0	4
CIE-102	Mechanics of Solids	3	1	0	4
ECE-102	Basic Electronics	3	1	0	4
MME-102	Mechanical Engineering Sciences	3	1	0	4
PHY-102	Engineering Physics	3	1	0	4
HSS-102	Communication skills in English	2	1	0	3
MME-106	Basic Workshop Practice	0	0	3	1
PHY-112	Engineering Physics Lab	0	0	3	1
	Total	17	6	6	25

FIRST YEAR B.Tech. SYLLABUS (Common for ALL Branches)

MAT 101 ENGINEERING MATHEMATICS I [3 1 0 4]
Differential Calculus: Successive Differentiation, nth derivatives of standard functions, Leibnitz's theorem. Polar curves: Angle between radius vector and the tangent, Angle between two polar curves. Orthogonal curves. Derivatives of arcs/radius curvature/ Evolutes, circle of curvature. Mean value theorem / indeterminate forms: Rolle 's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's mean value theorem with relative problems. Indeterminate forms.
Partial Differentiation: Definition of partial derivative, Euler's theorem on homogeneous functions, total derivative, derivatives of composite & implicit functions, Errors and approximations.
Integral Calculus: Reduction formulae, Tracing of curves; Tracing of cartesian, parametric & polar curves, Applications of integral calculus areas, lengths and volume of revolution of simple curves.
Infinite Series: Definition regarding convergence, divergence of infinite series. Tests: Comparison test, ratio test, Cauchy's root test, Raabe's test, integral test, alternating series, Leibnitz's theorem, absolute and conditional convergence. Taylor's and Maclaurin's expansion of functions

Analytical Solid Geometry: Direction cosines, planes, straight lines, spheres, right circular cones, right circular cylinders.

References:
1. Shanti Narayan, "Differential Calculus", Shyam Lal Charitable Trust, Delhi, 2002
2. Shanti Narayan, "Integral Calculus", S. Chand & Co., Delhi, 2005
3. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 2006
4. C. B.Thomas, "Calculus and Analytical Geometry", Narosa Pub., Delhi, 1986
5. N. Piskunov , "Differential Calculus", Vol. I and II, Mir Pub., 1981

CIE 101/102 MECHANICS OF SOLIDS [3 1 0 4]
Mechanics of Rigid Bodies: Introduction, basic principles and concepts, Force systems, resultant of concurrent and non concurrent coplanar force systems; Equilibrium of concurrent and non-concurrent coplanar force systems. Centroid and Moment of Inertia of simple and composite areas, Kinetics: Applications of D'Alembert's, work-energy and Impulse-Momentum principles
Mechanics of Deformable Bodies: Mechanical properties of materials, normal stress and strain, Hooke's law, modulus of elasticity, tension test on ductile and brittle materials, factor of safety, allowable stress, Poisson's ratio, shear stress and shear strain, modulus of rigidity, relation between modulus of elasticity, modulus of rigidity and bulk modulus. Stresses and deformations in tapering bars, stepped bars, thermal stresses, statically indeterminate problems, Stresses on inclined planes, stresses in thin cylindrical pressure vessels

References:
1. Meriam & Kraige, Engineering Mechanics, John Wiley & Sons, 2004
2. Beer & Johnston, Vector Mechanics for Engineers, Tata McGraw Hill, 2004
3. Singer F.L., Engineering Mechanics, Harper & Row, 1994
4. Bhavikatti & Rajasekharappa, Engineering Mechanics, New Age International, 2006.
5. E. P. Popov, Mechanics of Materials, S.I. Version, P H I , 1993
6. Pytel and Singer, Strength of Materials, Harper & Collins, 1987
7. Bhavikatti S.S., Strength of Materials, Vikas Publishers, 2005
8. Basavarajaiah & Mahadevappa, Strength of Materials, CBS Publishers, 2001

ECE 101/102 BASIC ELECTRONICS [3 1 0 4]
Electronic Devices: Diode, zener diode, BJT, LED, Photodiode, Phototransistor, varactor - characteristics and operation; Diode circuits: clipper, clamper circuits; DC power supply: rectifiers - half wave, full wave, regulated power supply, SMPS; BJT biasing, CE-biasing circuits, operating point, h-parameter model, Transistor amplifier, frequency response characteristics; Operational amplifier: basic model; virtual ground concept; inverting amplifier; non-inverting amplifier; integrator; differentiator, comparator, summing amplifier comparator, Schmitt trigger; Basic feedback theory; positive and negative feedback; concept of oscillator; Waveform generator using op-amps - square wave, triangular wave, Wien bridge oscillator for sinusoidal waveform; Filters: low pass, high pass, band pass, notch, all pass filters.

Number systems & codes; Digital arithmetic; Boolean algebra; Logic gates: OR, NOT, AND, NOR and NAND, universal gates, XOR and XNOR gate; Truth tables; Logic function representation, Designing combinatorial circuits: SOP, POS form; K-map; Flip-flop; JK flip flop; D-flip flop; Ripple Counters: configuration, operation; up/down counters; shift registers; 555 timers: description, multivibrators; D/A convertor, A/D converter
Introduction to communication: Frequency Bands, Noise, Transmission media, Wire media, comparisons, Wireless communications. AM: Block diagram, spectral expressions, Waveforms, AM Detector, Definition and applications of SSB, DSB, VSB. FM: Block diagram, spectral expressions and waveforms. Comparison of AM & FM; Super-heterodyne Receiver; Digital Modulation - Sampling theorem, modulation techniques, time division and frequency division multiplexing; Introduction to mobile communication.

References:
1. Albert P. Malvino, David J Bates, Electronic Principles, Seventh edition, TMH.
2. Tokhiem, Digital Electronics, Principles and Applications, , Sixth edition, TMH.

3. George Kennedy, Bernad Davis, Electronic Communication systems.TMH.
4. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, Ninth edition, PHI,
5. Jacob Millman, Christos C. Halkias, Satyabratajit, Millman's Electronic Devices and Circuits, TMH

MME 101/102 MECHANICAL ENGINEERING SCIENCE [3 1 0 4]

Properties of Steam: Steam formation, Types of steam, Steam properties - Enthalpy, Saturation Pressure and Temperature, finding enthalpy and dryness fraction; Steam Boilers: Classification, Working principle of Lancashire boiler, Babcock & Wilcox Boiler. Boiler Mountings, Accessories their location and applications; Steam Turbines: Classification, Working principle of simple Impulse and Reaction turbines. Advantages and application; Refrigeration: Refrigerants, Commonly used refrigerants and desirable properties; Definition of COP, Unit of Refrigeration, Principle and Working of Vapour compression refrigeration.

I.C. Engines: Classification, working of 2-stroke, 4-stroke C.I. and S.I. Engines P.V. diagrams of Otto and Diesel cycles; Working of simple carburetor, and Diesel Fuel Injection pump; Definition of Indicated Power, Brake Power, Mechanical efficiency, Indicated thermal efficiency, and Brake thermal efficiency; Lubrications: Definition, Lubricant types and desirable properties, applications, Splash lubrication, Pressure lubrication used in IC engine.

Power Transmission: Definition, types of pulleys, belt drives, velocity ratio; length of belt and tension in the belt; slip, creep, chain drives; gear drives, types of gears; Gear trains - simple and compound.

Machine Tools:
Lathe: Block diagram, functions of parts; Single point cutting tool nomenclature; Types of operations: Straight turning, Step turning, Facing, Knurling, Chamfering, Thread cutting, Parting-off, Taper turning by Form tool, Tail stock set over, Swiveling compound rest and its calculations.

Drilling: Classification of drilling machines; Block diagrams of sensitive and radial drilling machines; Drilling operations: Drilling, Reaming, Boring, Counter boring, Counter sinking, Spot facing, Trepanning & Tapping.
Casting: Mould making, Preparation of moulding sand and its desirable properties, Types of Patterns and Allowances, Steps in the preparation of two box green sand mould. Defects in casting; Forging: Definition, hand tools and hand forging operations.

Welding: Definition, Classification, Principle and working of Oxy-Acetylene gas welding Principles of Electric arc welding, Resistance spot welding, Soldering and Brazing

References:
1. Gopalakrishna K.R. "Mechanical Engineering Science", Subhash Publications, Bangalore, 1999
2. Roy & Choudhury, "Elements of Mechanical Engineering", Media Promoters & Publishers Pvt. Ltd, Mumbai, 2000

3. Mishra B.K.,"Mechanical Engineering Sciences", Kumar & Kumar Publishers(P) Ltd, Bangalore, 1999
4. Rajan T.S.,"Basic Mechanical Engineering" New Age International(P)Ltd, New Delhi, 1998

PHY 101/102: ENGINEERING PHYSICS [3 1 0 4]

OPTICS: Interference of Light: Two source interference, Double slit interference, Coherence, Intensity in Double slit interference, Interference from thin films, Air-wedge, Newton's rings, Michelson's interferometer. Diffraction of Light: Diffraction and wave theory of light, Single-slit diffraction, Intensity in single-slit diffraction (using Phasor Method), Diffraction at a circular aperture, Double-slit interference and diffraction combined- Intensity in double-slit diffraction(using Phasor Method),Diffraction of light through multiple slits, Diffraction gratings, Dispersion and resolving power of gratings, X-ray diffraction. Polarization of Light: Polarization of electromagnetic waves, Polarizing sheets, Polarization by reflection, Double refraction, Circular polarization, Polarization by scattering.

MODERN PHYSICS: Quantum Physics: Black body radiation and Planck's hypothesis, Stefan's Law, Wein's displacement law, Photoelectric effect, Compton effect, Photons and electromagnetic waves, Wave properties of particles, de-Broglie hypothesis, Davisson-Germer Experiment, Quantum particle (wave packet, phase speed, group speed). The double-slit experiment revisited, The uncertainty principle, An interpretation of quantum mechanics, Wave function and its significance, particle in a box, Schrodinger equation, Particle in a well of finite height, Tunneling through a potential barrier and its applications, The simple harmonic oscillator. Atomic Physics: Atomic spectra of gases, Early models of the atom, Bohr's model of the hydrogen atom, The quantum model of the hydrogen atom, The wave functions for hydrogen, Physical interpretation of the quantum numbers, Pauli,s exclusion Principle, X-rays-Types, Moseley law, Spontaneous and stimulated transitions, He-Ne and Ruby laser, Applications of lasers. Solid State Physics: Molecular bonds, Energy states and spectra of molecules, Bonding in solids, Free electron theory of metals, Band theory of solids, Electrical conduction in metals, Insulators and Semiconductors, Semiconductor Devices-Junction diode, LED/LAD, Transistor, Superconductivity-Properties and Applications.
References:
1. Halliday, Resnick, Krane; PHYSICS; Volume 2; 5TH edition, John Wiley & Sons, Inc
2. Serway & Jewett; PHYSICS for Scientists and Engineers with Modern Physics; Volume 2; 6TH edition, Thomson

HSS 101/102 COMMUNICATION SKILLS IN ENGLISH [2 1 0 3]
Phonetics: Transcription; Word Accent; Common Errors in English: Subject Verb Agreement; Uses of Tenses/ Sequence of Tense; Prepositions; Punctuation; Articles; Special Usages; Creative Writing Essay: Types of Essays, Argumentative Essay, Descriptive/Expository / Narrative Essays; Reading Comprehension
Non- detailed Text* - Critical Evaluation; Vocabulary: Confused pair of words; Idiomatic Expressions; Antonyms and Synonyms; Tutorials: Group Discussions; Presentation

Skills; Essay writing*Non Detailed Text: English Today- A Course in Reading and Writing, Foundation Books Pvt. Ltd., Cambridge House, New Delhi, 2005.

References:
1. Green David, Contemporary English Grammar, Structures and Composition, Macmillan Publications.
2. Turton N D , Heaton J B, Longman Dictionary of Common Errors, 1998
3. McCarthy Michael English Idioms in Use, London: Cambridge University Press, 2002
4. Jones Daniel, English Pronouncing Dictionary, ELBS London
5. Tickoo Champa, Sasikumar Jaya, Writing with a Purpose, Oxford University Press
6. Quirk *et al,* University Grammar of English, ELBS London

MME 106/105 BASIC WORKSHOP PRACTICE [0 0 3 1]
Introduction to Basic Workshop Practice; Fitting practice: Practical exposure to basic fitting operations; Marking and measuring, Filing, Sawing & Chipping and preparation of joints; Carpentry practice: Practical exposure to basic carpentry operations; Marking and measuring, Planing, Mortising & tenoning, Sawing and Chipping and preparation of joints; Soldering practice: Practical exposure to basic sheet metal & soldering operations; marking & measuring, Cutting, Bending/forming, tinning, soldering and preparation of sheet metal models; Demonstrations on Tapping & Dieing, Welding, Plumbing and Lathe operations.

References:
1. Hajra Chaudhury S.K. and Bose S.K., "Workshop Technology Vol.1", Media Promoters and Publishers Pvt. Ltd., Mumbai, 2003
2. Raghuvanshi B. S. "Workshop Technology, Vol.1", Dhanpat Rai and Sons, Delhi, 2003

PHY 111/112 ENGINEERING PHYSICS LAB [0 0 3 1]
Ultrasonic Interferometer; Series and Parallel Resonances; Diffraction grating; Newton's Rings; Zener diode: V-I Characteristics; Band gap energy; Rectifier and filter circuits; Hall effect; Transistor Characteristics; Photo Electric Effect; Resolving Power of a telescope; Demonstration Experiments: Michelson Interferometer, Biprism, Double refraction, Air Wedge, X-ray diffraction, CRO

MAT 102 ENGINEERING MATHEMATICS II [3 1 0 4]
Ordinary Differential Equations: Definition of order, degree and solutions. Solutions of first order and first degree differential equations-variables separable, homogeneous and non-homogeneous equations, exact equations, linear equations & Bernoulli equation

General Linear Higher Order Differential Equations: Linear homogeneous and non-homogeneous equations with constant coefficients, inverse differential operators and method of variation of parameters. Solution of Cauchy's homogeneous linear equations; Solution of simple simultaneous linear differential equations

Laplace Transforms: Transforms of elementary functions, transformations of periodic functions, unit step function, shifting theorems, transforms of derivatives, inverse transforms, Solutions of differential equations using Laplace transforms. Applications of equations on RLC circuits, string problems and forced vibrations.

Linear Algebra: Generalization of vector concept to higher dimensions, generalized vector operations, linear independence, basis, orthonormal basis. Vector spaces and sub-spaces; Matrices, elementary column and row transformations, Inverse of a matrix, rank of a matrix, systems of linear equations, consistency, solutions by Gauss elimination.

Differential Calculus: Taylor's theorem for a function of two variables, extreme values of a function of two variables, Lagrange's method of undetermined multipliers.
Multiple Integrals: Definitions, evaluation by the change of order of integration, changing of variables, Jacobian's, Applications to areas and volumes.
Beta and Gamma Functions: Definitions, elementary properties.

References:
1. E. D. Rainville and P. E. Bedient, A Short Course in Differential Equations, Macmillan Pub., 1989
2. E. Kreyzig, Advanced Engineering Mathematics, Wiley Eastern, 2006
3. Shanti Narayan, Differential Calculus, Shyam Lal Charitable Trust. Delhi, 2002
4. C. B. Thomas, Calculus and Analytical Geometry, Narosa Pub., Delhi, 1996
5. N. Piskunov, Differential Calculus & Integral Calculus, Vol. I and II, Mir Pub., 1981
6. G. Hadley, Linear Algebra, Narosa Publishers, 2002

CIE103/104 ENVIRONMENTAL STUDIES [2 1 0 3]
Basic components of the environment: Spheres of the earth, internal structure of the earth; Ecosystem: Structure and functions of the ecosystem, Ecological succession, Threats to major ecosystems; Biodiversity and its conservation: Importance of biodiversity to mankind, Factors affecting Biodiversity, Threats to biodiversity, Conservation of biodiversity; Natural resources: Forest, water, mineral, land and food resources of India, conservation and management; Environmental pollution and control: Air pollution, Water pollution, Soil pollution, Noise pollution sources, characteristics, sampling, analysis and measurement, various pollution control measures; Solid waste and hazardous waste management - Sources, characteristics and control measures of urban and industrial wastes, environmental problems and health risks caused by hazardous waste; Environmental concerns: Urbanization, Industrialization, Agricultural revolution Their impact on the environment, consequences like global warming, ozone layer depletion and acid rain; Environment Impact Assessment: Evolution and history, procedures and practices; Disaster Management: Types of natural and manmade disasters: Their characteristics, causes and impacts; Disaster preparedness Various plans of action for probable disasters, Early warning systems; Disaster mitigation- Identification and evaluation of hazards/risks,

role of IT, Remote Sensing and GIS, GPS in disaster mitigation Response - Search and rescue, Mobilization of the necessary emergency services, Coordination of rescue, basic humanitarian needs; Recovery - Restoration of the affected area and people to its previous state, Reconstruction and Rehabilitation; Sustainable energy and development: Conventional Energy Sources; Non-Conventional Energy Sources; Hydrogen as future energy source; Energy Conservation and Management; Energy audit; Industrial and Building energy management; Tutorials - Includes Field trips; Seminars, group discussions, video shows related to environment

References:

1. P Venugopal Rao, Principles of Environmental Science and Engineering, PHI, 2008
2. Anil Kumar De and Arnab Kumar De, Environmental Studies, New Age International Publishers, New Delhi, 2007
2. Erach Bharucha, Text book of Environmental Studies for undergraduate courses, Universities Press, Hyderabad, 2005
3. Benny Joseph, Environmental Studies, 2nd Edition, TMH, 2009
4. Goel SL and Kumar R, Disaster management, Deep and Deep publications, 2001.

ELE 101/102 BASIC ELECTRICAL TECHNOLOGY [3 1 0 4]

Power Generation: Thermal, Hydel and Nuclear; Renewable Energy Sources; Power generation in Indian context; Electrical Power System: Generation, Transmission, Distribution, Voltage levels, Overhead lines and under ground cables, Domestic, Commercial and Industrial loads. Electric Circuit Elements: Sources: Ideal, practical voltage source, ideal, practical current source, source transformation, controlled sources; Resistor: Resistance, resistors in series, resistors in parallel, current division, power consumed by a resistor; Capacitor: Capacitance, equivalent capacitance of capacitors in series, voltage division, capacitors in parallel, growth of voltage in a capacitor, time constant, discharge of voltage in a capacitor, energy stored by a capacitor; Inductor: Inductance, self induced emf, growth of current in an inductive circuit, time constant, decay of current in an inductor, energy stored by an inductor, inductors in series, inductors in parallel, mutual inductance, coupling coefficient, Dot rule, coils in series-series aiding, series opposition, Analysis of coupled circuits; Resistive networks: Analysis by branch current method, mesh current method, node voltage method, star-delta and delta-star transformations, network reduction technique; Electromagnetism: Magnetic flux, flux produced by a current carrying conductor, magnetic field produced by a solenoid, Force acting on a conductor, Flux density, fundamental equation for force acting on a conductor, Fleming's left hand rule, Faraday's laws, fundamental equation for induced emf in a conductor, Flemings right hand rule, Lenz's law, Induced emf in a coil; Magnetic Circuits: mmf, magnetic field strength, permeability, reluctance, permeance, analogy with electric circuits, Iron losses: hysteresis and eddy current losses, B-H loop;

Single-phase AC Circuits: Alternating voltages and currents, generation of single phase alternating voltage, average value and rms value of periodic sinusoidal and non-sinusoidal wave forms, form factor; Representation of time-varying quantities as phasors; the operator 'j'; Representation of complex quantities; Basic ac circuits, sinusoidal alternating current in a pure resistor, pure inductor and a pure capacitor, waveforms of voltage, current and power, phasor diagram, inductive and capacitive reactances, mechanical analogy to inductor and capacitor; Steady-state analysis of RL, RC and RLC circuits, concept of impedance and phasor diagram, expression for average power, power factor, parallel ac circuits, conductance, susceptance and admittance, analysis of series parallel circuits and phasor diagrams, active power, reactive power, and apparent power, complex power and power triangle, improvement of power factor; Resonance : Series and parallel resonance, variation of reactance/susceptance and impedance/admittance with frequency, Q factor, half-power frequencies, bandwidth, relation between Q factor and bandwidth;

Three-phase AC Circuits: Generation of 3-phase balanced sinusoidal voltages, waveform of 3-phase voltages, star and delta connections, line voltage and phase voltage, line current and phase current, analysis of 3-phase circuit with balanced supply voltage and with star/delta connected balanced and unbalanced loads, 3-phase 4-wire system, 3-phase 3-wire system, phasor diagram of voltages and currents, power, measurement of active power, two-wattmeter method with unbalanced and balanced loads;

Measuring Instruments: Constructional details and principle of operation of PMMC instruments, moving iron instruments, dynamometer-type wattmeter and induction type energy meter.

Transformers: Types, constructional features, principle of operation, equation for induced emf, transformation ratio, ideal transformer, equivalent circuit, transformer under no-load and loaded conditions, applications, principle of auto-transformer.

Three-phase Induction Motors: Types, constructional details, production of rotating magnetic field, synchronous speed, principle operation, slip, speed of rotor, frequency of rotor current, equivalent circuit of rotor, starting, applications; Single-phase Induction Motors: Construction, Double revolving field theory, principle of operation, capacitor-start induction motors, and applications. Stepper motors.

References:

1. Hughes E., Electrical & Electronic Technology (8e), Pearson Education, 2002
2. Nagasarkar T.K. & Sukhija M.S., Basic Electrical Engineering, OUP 2005
3. Kothari D. P. & Nagarath I.J., Basic Electrical Technology, TMH 2004

CSE 101/102 PROBLEM SOLVING USING COMPUTERS [3 1 0 4]

Introduction to Computers: Block diagram of a computer, Hardware, Software-system software and application software, Language translators, computer memories, introduction to operating system, Number System - binary, decimal, octal, hexadecimal, 1's complement, 2's complement; Algorithms and Flowcharts: Problem Solving steps, Definition of Algorithm, Characteristics of an algorithm, Algorithmic notations, Writing algorithms for simple problems, Space complexity, Time complexity, Definition of flowchart, Flowchart symbols, Writing flowcharts for simple problems; C++ Fundamentals: The C++ character set, identifiers and keywords, data types, variables, declarations, statements, C++ program structure, Simple I/O operations. Operators and Expressions: Operator precedence and associativity, arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, conditional operator, comma operator, type conversions, arithmetic expressions, evaluation of expressions; Flow of Control: Statements and blocks, simple if, if-else, nested if statements, else-if ladder, switch-case statement, looping constructs - entry controlled and exit controlled loops, break and continue statements, exit statement, problem solving using above statements. 1-Dimensional and 2-Dimensional Arrays: 1-D arrays- Declaration and Initialization, programs on array manipulation, sorting (selection and bubble sort techniques), searching (linear and binary search techniques), 2-D arrays- basics, simple programs on matrix manipulation, strings- operation on strings, built-in string handling functions, programs on strings. Functions: Modular programming, library functions and user-defined functions, function declaration, definition and function call, parameter passing techniques, storage classes, function overloading, default arguments, inline functions, examples. Structures, Unions and Pointers: Structures - basic operations and programs, advantages of structures over arrays, array of structures, unions, pointers-pointers to simple variables, pointers to arrays, basic operation on pointers, pointers to strings, pointers to structures, pointers to functions. Introduction to Object Oriented Programming: Procedure oriented programming versus object oriented programming, basic concepts of object oriented programming:-inheritance, polymorphism, examples, benefits of object oriented programming. File Manipulation: File handling functions - open, close, put, get, writing simple programs. Introduction to Software Life Cycle Models: Classical waterfall model, Iterative waterfall model, Prototyping Model, Evolutionary model, Spiral model, Comparison. Networking Concepts: Different types of networks- LAN, WAN, MAN, internet.

References:
1. E.Balaguruswamy, "Computing Fundamentals & C Programming", TMH, 2008
2. E. Balaguruswamy, "Object Oriented Programming with C++", 3rd edition, TMH, 2007
3. Rajib Mall, "Fundamentals of Software Engineering", PHI, 2nd Edition, 2003
4. Robert LaFore, "Object Oriented Programming with Turbo C++", Galgotia Publications, 2002
5. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Computer Algorithms", Galgotia Publications, 2001
6. Andrew S. Tannenbaum, "Computer Networks", 4th Edition, PHI Pvt. Ltd., 2005

CHM 101/102: ENGINEERING CHEMISTRY [3 0 1 4]

Electrochemistry: Electrochemical cells: galvanic cell and electrolytic cell. Representation of a galvanic cell; Development of liquid junction potential in electrochemical cell and function of a salt bridge Calculation of emf of a galvanic cell using electrode potential , Energetics of cell reactions: Thermodynamic derivation for rG, rH and rS . Determination of e.m.f of galvanic cell. Standard cell-Weston cadmium cell; Construction, working and applications of calomel electrode and Glass electrode; Application of emf measurements: calculation of thermodynamic functions of electrochemical reactions, determination of pH and pKa. Basic principles of potentiometric and conductometric titrations; Concentration cells: classification, Concentration cells with transference. Metal finishing: Polarization, decomposition potential and over voltage. Characteristics of a good deposit, factors influencing the nature of deposit, Methods of cleaning the metal surface, Chromium plating (hard chromium and decorative chromium) Electroless plating- electroless plating of copper; Printed circuit board preparation; Battery technology: Batteries- basic concept, battery characteristics. Classification of batteries: Primary and secondary batteries. Primary batteries: solid cathode lithium cells and lithium MnO_2 battery. Secondary batteries: Lithium ion cells and manganese lithium cells. Scope and development of fuel cells: Introduction, Classification of fuel cells , construction and working of alkaline fuel cell, phosphoric acid fuel cell, proton exchange membrane fuel cell, direct methanol fuel cell, molten carbonate fuel cell and solid oxide fuel cell; Corrosion Engineering: Introduction, metallurgical and economic consideration of corrosion, corrosion classification, electrochemical aspects of corrosion, galvanic series. Some forms of corrosion: Galvanic corrosion, pitting corrosion, stress corrosion and stress cracking, inter-granular corrosion, erosion corrosion, Factors affecting corrosion- Environmental effect: effect of oxygen and oxidizer, agitation, temperature & pH, corrosive concentration and galvanic coupling. Corrosion prevention: material selection and design, alternation of environment by changing medium and by adding inhibitor, cathodic and anodic protection, coatings: metallic coating. Chemical Fuels: Introduction, classification, calorific value and its determination, Bomb calorimeter and Boys calorimeter. Coal and its analysis proximate and ultimate; Liquid Fuels: Petroleum cracking - catalytic cracking, reforming of petrol, knocking, octane number reforming of gasoline. Knocking in internal combustion engines; anti-knocking agents, unleaded petrol and power alcohol, cetane number; Gaseous Fuels: LPG, Water gas, producer gas; Polymers and Elastomers: Introduction to polymer chemistry: tacticity, types of polymerization, Mechanism of free radical polymerization, mechanism of coordination polymerization

using Ziegler Nutta catalyst. Polymerisation techniques: Bulk, solution, suspension and emulsion polymerization; Glass transition temperature, effect of structure on properties of polymers - strength, plastic deformation, crystallinity, elasticity and chemical resistance. Molecular weights of polymers number average and weight average. Preparation, properties and uses of Teflon, Nylon 66, P-F resin, Epoxy resin. Polymer blends and alloys, conducting polymers, biodegradable polymer. Natural rubber- isomers, vulcanisation & compounding of rubber, Synthetic rubber-Preparation, properties and applications of SBR, and silicone rubber; Reclaimed rubber; Water Technology: Introduction, characteristics imparted by impurities in water. Hardness of water: types and estimation. Softening of hard water: internal treatment by phosphate and calgon condition, external treatment by lime soda process and ion exchange method; Boiler feed water: scales and sludges, priming and foaming and boiler corrosion. Waste water treatment: Primary, secondary and tertiary treatment. Desalination of brakish water by mulptistage flash distillation, reverse osmosis and electro-dialysis; Liquid Crystals and nano-materials: Introduction to liquid crystals, classification with examples, types of mesophases - nematic, chiral nematic (cholesteric) smectic and columnr. Homologous series (PAA and MBA) Applications of liquid crystals in display systems; Nano-materials: Introduction, general method of synthesis, structure determination and particle size analysis, applications of nano-particles, introduction to nano-tubes.

References:

1. Jain P.C. and Monika Jain, Engg. Chemistry, Dhanpat Rai and Sons, Delhi, Revised, 15th Edn. 2006.
2. J.C. Kuriacose, J. Raja ram, Chemistry in Engg. and Technology, Vol I/II TMH 1988.
3. Puri B.R. Sharma L.R. And Madan S. Pathania, Principles of Physical Chemistry, S.N. Chand and Co. Jalandhar, 31st Edn. 1990.
4. Agarwal C.V., Chemistry of Engg. Materials, Tata Publications, Varanasi, 6th Edn. 1979.
5. B. Sivasankar, Engineering Chemistry, TMH 2008.
6. S.K. Singh, Engineering Chemistry, New Age International (P) Limited, 2008.

MME 103/104 ENGINEERING GRAPHICS [0 2 4 4]
Principle of Orthographic Projections: Points, straight lines parallel to one ref. plane (HP/VP) and inclined to other ref. plane; Straight lines inclined to both HP and VP; Straight lines inclined to both HP & VP and parallel to PP; Straight lines with traces; Practical problems on straight lines. Projections of Plane surfaces: Perpendicular one ref. plane (HP/VP) and inclined to other ref. plane, Inclined to both HP & VP, Inclined to both HP & VP and perpendicular to PP. Projections of Solids (right regular) by change of position method: Axis parallel to one ref. plane (HP/VP) and inclined to other ref. plane, Resting on one of the ref. plane, axis inclined to both HP & VP, Suspended freely, axis inclined to both HP & VP, Axis inclined to both HP & VP parallel to PP. Projections of solids by Auxiliary plane method: Axis inclined to both HP and VP. Sections of solids (right regular and no

spheres): Using Horizontal and vertical section planes, Using section plane perpendicular to one ref. plane and inclined to the other ref. plane, Given the regular true shapes of various solids and find the inclination of section plane. Development of surfaces: Parallel line development, Radial line development, Triangulation development. Isometric projections: Plane surfaces and simple solids (prisms & cylinders), Frustum and combination of solids, Simple machine elements. Introduction to Computer Aided Drafting.

References:
1. Gopalkrishna K. R. (2001) "Engineering Graphics" Suhas Publications, Bangalore.
2. Venugopal K. (2001) "Engineering Drawing and Graphics + Autocad" Newage International Publishers, Delhi.
3. Narayana K. L. and Kannaiah P. (2002) "Text book on Engineering Drawing" Scitech Publications, Chennai.
4. Bhat N. D. (2000) "Engineering Drawing" Charotar Publishing House, Anand.

CSE 111/112 PROBLEM SOLVING USING COMPUTERS LAB [0 0 3 1]
Familiarization with PC and working with DOS commands; MS Windows basic operations, working with MS-Word; Working with MS-Excel and PowerPoint.; Simple C++ Programs (expression oriented operations); Programs using branching constructs; Programs using looping constructs; Programs on 1D Arrays; Programs on 2D Arrays; Programs on strings; Programs using user defined functions; Programs on structures and pointers; Programs using class declarations and operations on objects, file manipulation.

References:
1. E.Balaguruswamy, "Computing Fundamentals & C Programming", TMH, 2008.
2. E. Balaguruswamy, "Object Oriented Programming with C++", (3e), TMH, 2007.

CHM111/112 ENGINEERING CHEMISTRY LAB [0 0 3 1]
Determination of strength of oxalic acid; Determination of zinc; Hardness of water; Chloride content of water; Copper in brass; Iron in hematite; Manganese dioxide in pyrolusite; Ammonia Nitrogen in fertilizer; pKa of weak acid; Conductometric titration

Reference: Vogel A.I. Text book of Quantitative Inorganic Analysis, ELBS 5th Edition