

The logo for Visvesvaraya Technological University, consisting of several overlapping circles in blue, black, and yellow.

**Visvesvaraya Technological
University, Karnataka B.E./B.Tech
CSE Sem 1 syllabus**

Calculus & Linear Algebra

CALCULUS AND LINEAR ALGEBRA

Credits : 04

MODULE - I

Differential Calculus - 1: Review of elementary differential calculus, Polar curves – angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature – Cartesian and polar forms; Centre and circle of curvature (All without proof – formulae only) – applications to evolutes and involutes.

(RBT Levels: L1 & L2)

MODULE - II

Differential Calculus - 2: Taylor's and Maclaurin's series expansion for one variable (statements only), indeterminate forms – L'Hospital's rule. Partial differentiation; Total derivatives- differentiation of composite functions. Maxima and minima for a function of two variables; Method of Lagrange multipliers with one subsidiary condition.

Applications of maxima and minima with illustrative examples. Jacobians – simple problems.

(RBT Levels: L1 & L2)

MODULE - III

Integral Calculus: Review of elementary integral calculus.

Multiple Integrals: Evaluation of double and triple integrals.

Evaluation of double integrals – change of order of integration and changing into polar co-ordinates.

Applications to find area, volume and centre of gravity.

Beta and Gamma Functions: Definitions, Relation between beta and gamma functions and simple problems.

(RBT Levels: L1 & L2)

MODULE - IV

Ordinary differential equation (ODE's) of first order:

Exact and reducible to exact differential equations. Bernoulli's equation. Applications of ODE's – orthogonal trajectories, Newton's law of cooling and L – R circuits, Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's and reducible to Clairaut's equations only.

(RBT Levels: L1, L2 & L3)

MODULE - V

Linear Algebra: Rank of matrix – echelon form. Solution of system of linear equations – consistency. Gauss – elimination method, Gauss – Jordan method and approximate solution by Gauss – Seidel method. Eigen values and Eigen vectors – Rayleigh's power method. Diagonalization of a square matrix of order two.

(RBT Levels: L1, L2 & L3)

Textbooks:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons. 10 th Ed.(Reprint), 2016.

Reference books:

1. C.Ray Wylie, Louis C.Barrett: "Advanced Engineering Mathematics", 6 th Edition,
2. McGraw-Hill Book Co., New York, 1995.
2. James Stewart: "Calculus – Early Transcendentals", Cengage Learning India Private Ltd., 2017.
3. B.V Ramana: "Higher Engineering Mathematics", 11 th Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subhodh C Bhunia: "Engineering Mathematics", Oxford University Press, 3 rd Reprint 2016.

5. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt.Ltd., 2015

Engineering Physics

ENGINEERING PHYSICS

Credits : 04

MODULE - I

Oscillations and Waves

Free Oscillations: Definition of SHM, derivation of equation for SHM, Mechanical Simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion. Equation of motion for free oscillations, Natural frequency of oscillations.

Damped and forced oscillations: Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance.

Shock Waves: Mach number, Properties of Shock waves, control volume. Laws of conservation of mass, energy and momentum. Construction and working of Reddy shock tube, applications shock waves. Numerical problems.

(RBT Levels: L1, L2 & L3)

MODULE - II

Elastic properties of materials:

Elasticity: Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening, failure (fracture/fatigue), Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (n) in terms of ν and Y . Relation between Y, n and K, Limits of Poisson's ratio.

Bending of beams: Neutral surface and neutral plane, Derivation of expression for bending moment. Bending moment of a beam with circular and rectangular cross section. Single cantilever, derivation of expression for Young's modulus.

Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum - Expression for period of

oscillation. Numerical problems.
(RBT Levels: L1, L2 & L3)

MODULE - III

Maxwell's equation, EM waves and Optical fibers

Maxwell's equations: Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem.

Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of continuity; displacement current (with derivation) Maxwell's equations in vacuum.

EM waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations) Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves (Qualitative).

Optical fibers: Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication. Merits and demerits Numerical problems.
(RBT Levels: L1, L2 & L3)

MODULE - IV

Quantum Mechanics and Lasers:

Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications (non confinement of electron in the nucleus), Schrodinger time independent wave equation, Significance of Wave function, normalization, Particle in a box, Energy eigen values of a particle in a box and probability densities.

Lasers: Review of spontaneous and stimulated processes, Einstein's coefficients (derivation of expression for energy density), Requisites of Laser system. Conditions for laser action. Principle, Construction and working of and semiconductor Lasers.

Application of Lasers in Defense (Laser range finder) and Engineering (Data storage).

Numerical problems.

(RBT Levels: L1, L2 & L3)

MODULE - V

Material Science:

Quantum Free electron theory of metals: Review of classical free electron theory, mention of failures. Assumptions of Quantum Free electron theory, Mention of expression for density of states, Fermi-Dirac statistics (qualitative), Fermi factor, Fermi level, Derivation of the expression for Fermi energy, Success of QFET.

Physics of Semiconductor: Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band, Hole concentration in valance band (only mention the expression), Conductivity of semiconductors (derivation), Hall effect, Expression for Hall coefficient (derivation)

Dielectric materials: Polar and non-polar dielectrics, internal fields in a solid Clausius Mossotti equation (Derivation), mention of solid, liquid and gaseous dielectrics with one example each. Application of dielectrics in transformers. Numerical problems.

Textbooks:

1. A Textbook of Engineering Physics – M.N. Avadhanulu and P.G.K shirsagar, 10 th revised Ed, S.chand & Company Ltd, New Delhi.
2. Engineering Physics – Gaur Gupta Dhanpat Rai publications – 2107.
3. Concepts of modern Physics – Arthur Beiser: 6 th Ed, /tata McGraw Hill Edu Pvt Ltd – New Delhi 2006.

Reference Books:

1. Introduction to Mechanics, MK Verma: 2nd Ed, University Press (India)Pvt Ltd, Hyderabad 2009.
2. Lasers and Non Linear Optics, BB laud, 3 rd Ed, New Age International Publishers 2011.
3. Solid State Physics – S O Pillai, 8 th Ed New Age International publisher – 2018
4. Shock wave made simple – Chintoo S Kumar, K Takayama and KPJ Reddy: Willey India Pvt. Ltd., New Delhi 2014.
5. Introduction to Electrodynamics, David Griffiths, 4 th Ed, Cambridge University Press 2017.

Basic Electrical Engineering

BASIC ELECTRICAL ENGINEERING

Credits : 03

MODULE - I

D.C Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series - parallel circuits excited by independent voltage sources, Power and Energy.

A.C. Fundamentals: Generation of sinusoidal voltage, frequency of generated voltage, definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.

(RBT Levels: L1, L2 , L3 & L4)

MODULE - II

Single Phase Circuits: Analysis with phasor diagram, of circuits with R, L, C, R-L, RC, R-L-C for series and parallel configurations. Real power, reactive power, apparent power and power factor.

Three Phase circuits: Advantages of 3 - phase power, Generation of 3 - phase power, Three-phase balanced circuits, voltage and current relations in star and delta connection. Measurement of three phase power using two wattmeter method.

(RBT Levels: L1, L2, L3 & L4)

MODULE - III

Single Phase Transformers: Necessity of transformer, Principle of operation, Types and construction of transformers, emf equation, losses, variation of losses with respect to load, efficiency, Condition for maximum efficiency. Domestic Wiring: Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two - way and three-way control. Elementary discussion on circuit protective devices: Fuse and Miniature Circuit Breaker (MCB 's), electric shock, precautions against shock. Earthing: Pipe and Plate earthing.

(RBT Levels: L1, L2 & L3)

MODULE - IV

DC Generators: Principle of operation, Construction of D.C Generators. Expression for induced emf. Types of D.C Generators, Relation between induced emf and terminal voltage.

DC Motors: Principle of operation, Back emf, Torque equation, Types of dc motors, Characteristics of dc motors (shunt and series motors)

only) and Applications.
(RBT Levels: L1, L2 & L3)

MODULE - V

Three Phase Synchronous Generators: Principle of operation, constructional details, Synchronous speed, Frequency of generated voltage, emf, equation Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors).

Three Phase Induction motors: Principle of operations, Generation of rotating magnetic field, Construction and working of three-phase induction motor, Slip and its significance. Necessity of starter, star-delta starter.

(RBT Levels: L1, L2 & L3)

Textbooks:

1. Basic Electrical Engineering, DC Kulshreshtha, Tata McGraw Hill, Revised First Edition.
2. Principles of Electrical Engineering & Electronics, VK. Mehta, Rohit Mehta, S.Chand Publications.

Reference Books:

1. Fundamentals of Electrical engineering and Electronics, B.L. Theraja, S.Chand & Company Ltd, Reprint Edition 2013.
2. Electrical Technology, E.Hughes, International Students 9 th Editon, Pearson, 2005.
3. Basic Electrical Engineering, D.P Kothari and I.J.Nagrath, Tata McGraw Hill, 2017.

Elements of Civil Engineering & Mechanics

ELEMENTS OF CIVIL ENGINEERING AND MECHANICS

Credits : 03

MODULE - I

Introduction to Civil Engineering: Scope of different fields of Civil Engineering; Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources & Irrigation /engineering, Transportation Engineering and Environmental Engineering. Role of Civil Engineers in the infrastructural development, effect of infrastructural facilities on

social-economic development of a country.

(RBT Levels: L1)

Introduction to Engineering Mechanics: basic concepts of idealization - Particle, Continuum and Rigid Body; Force; Systems of Forces; Basic Principles - Physical Independence of forces, Superposition, Transmissibility, Newton's Laws of Motion. Resolution and Composition of forces, Law of parallelogram of forces, Polygonal law, Resultant of Concurrent coplanar force systems, Coplanar Non Concurrent Force system: Moment of a Forces, couple, Varignon's theorem, Resultant of Coplanar non- concurrent force system.

(RBT Levels: L1, L2 & L3)

MODULE - II

Equilibrium of Forces: Free body diagrams, lami's theorems, Equation of Equilibrium of concurrent and non concurrent coplanar force systems.

(RBT Levels: L1, L2 & L3)

Friction: Type of friction, laws of dry friction, Limiting friction, Concept of Static and Dynamic friction; Numerical problems on motion of single and connected bodies on plane, wedge friction, ladder friction, rope and Pulley systems.

(RBT Levels: L1, L2 & L3)

MODULE - III

Support Reactions: Types of Loads and supports, statically determinate and indeterminate beams,, Support Reaction in beams, Numerical Problems on support reactions for statically determinate beams (Point load, uniformly distributed & uniformly varying loads and moments)

(RBT Levels: L1, L2 & L3)

Analysis of Simple trusses: Types of trusses, Analysis of statically determinate trusses using method of joints and method section.

(RBT Levels: L1, L2 & L3)

MODULE - IV

Centroid: Centroid of simple figures from first principle, Centroid of composite built-up; sections; Moment of Inertia: Introduction, second moment of area of plane sections from first principles, Parallel axes

and perpendicular axes theorems, Radius of gyration, Moment of inertia of composite area and built-up sections. Concept of Product of inertia (No Problems).

(RBT Levels: L1, L2 & L3)

MODULE - V

Kinematics: Definitions, Displacement, Average velocity, Instantaneous velocity, speed, Acceleration, Average acceleration, Acceleration due to gravity, Newton's Laws of Motion. Rectilinear Motion-Numerical problems. Curvilinear Motion-super elevation,

Projectile motion, Relative motion, Numerical problems. Motion under gravity, Numerical problems.

(RBT Levels: L1, L2 & L3)

Kinetics: D'Alembert's principle and its applications in plane motion and connected bodies including pulleys.

(RBT Levels: L2 & L3)

Textbooks:

1. R.C. Hibbler, Engineering mechanics: Principles of Statics and Dynamics, Pearson Press.
2. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications.

Reference Books:

1. Andy Ruina and Rudra Pratap, Introduction to Statics and Dynamics, Oxford University Press.
2. Reddy Vijayakumar K. and K. Suresh Kumar, Singer's Engineering Mechanics.
3. F.P. Beer and E.R. Johnston, Mechanics for Engineers, Statics and Dynamics, McGraw Hill.
4. Irving H. Shames, Engineering Mechanics, Prentice Hall.

Engineering Graphics

ENGINEERING GRAPHICS

Credits : 03

MODULE - I

Introduction to Computer Aided Sketching:

Introduction, Drawing Instruments and their uses, relevant BIS

conventions and standards, Lettering, line conventions, dimensioning, material conventions and free hand practicing.

Computer screen, layout of the software, standard tool bar/menu and description of most commonly used tool bars, and navigational tools.

Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment.

Selection of drawing sheet size and scale.

Commands and creation of lines, coordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz., tangency, parallelism, inclination and perpendicularity.

MODULE - II

Orthographic projections of points, straight lines and plane:

Introduction, Definitions – Planes of projection, reference line and conventions employed. First angle and Third angle projection.

Projections of points in all the four quadrants.

Projections of straight lines (located in first quadrant/first angle only), true and apparent lengths, true and apparent inclinations to reference planes (No application problems and midpoint problems).

Orthographic projections of plane surfaces (First angle projection only):

Projections of regular plane surfaces-triangle, square, rectangle, pentagon, hexagon and circle-in simple positions inclined to both the planes; planes in different positions by change of position method only. (No problems on punched plates and composite plates).

MODULE - III

Projections of solids:

Introduction, definitions – projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, and cones with axis inclined to both the planes. (Solids) resting with base on HP only

MODULE - IV

Development of Lateral Surfaces of Solids:

Introduction to section planes and sectional views. Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with base on HP only.

Development of their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).

MODULE - V

Isometric Projection (using isometric scale only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. Conversion of given isometric/pictorial views to orthographic views of simple objects.

Textbooks:

1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48 th edition, 2005 - Charotar Publishing House, Gujarat.
2. Engineering Graphics - K.R. Gopalakrishna, 32 nd edition, 2005- Subash Publishers Bangalore.
3. Computer Aided Engineering Drawing - by Dr. M.H.Annaiah, Dr.C.N. Chandrappa and Dr.B.Sudheer Premkumar, Fifth edition, New Age International Publishers.

Reference Books:

1. Computer Aided Engineering Drawing - S.Trymbaka Murthy, - I.K. International Publishing House Pvt.Ltd., New Delhi, 3 rd revised edition- 2006.
2. Engineering Drawing - by N.S Parthasarathy & Vela Murali, Oxford University Press, 2015.
3. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production - Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005-Prentice Hall of India Pvt. Ltd., New Delhi.
4. A Primer on Computer Aided Engineering Drawing -2006, 'published by VTU, Belgaum.
5. Publications of Bureau of Indian Standards
 - a) IS 10711-2001: Technical products documentation - Size and lay out of drawing sheets.
 - b) IS 9609 (Parts 0 & 1) - 2001: Technical products documentation Lettering.
 - c) IS 10714 (Part 20) -2001 & SP 46 - 2003: Lines for technical drawings.
 - d) IS 11669 - 1986 & SP 46 - 2003: Dimensioning of Technical Drawings.
 - e) IS 15021 (Parts 1 to 4) - 2001: Technical drawings - Projection Methods.

Technical English - I

TECHNICAL ENGLISH - I

Credits : 01

MODULE - I

Introduction to Technical Communication

Fundamentals of Technical Communication Skills, Barriers to Effective Communication.

Different styles in Technical; Communication. Interpersonal Communication Skills, How to improve interpersonal Communication Skills, Developing Interpersonal skills.

Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Articles, Conjunctions.

(RBT Levels: L1, L2 & L3)

MODULE - II

Introduction to Listening Skills and Phonetics - I

Introduction Phonetics, Sound Mispronounced, silent and Non silent Letters, Homophones and Homonyms, Aspiration, Pronunciation of 'The' words ending 'age', some plural forms.

Articles: Use of Articles - Indefinite and Definite Articles.

(RBT Levels: L1, L2 & L3)

MODULE - III

Developing Listening Skills (Phonetics and Vocabulary Building) - II

Speech Sounds: Vowels and Consonants - Exercises on it. Preposition, kinds of preposition and Preposition often confused. Word Accent - Rules for Word Accent, Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements) - Some Exceptions in Question Tags and Exercises, One Word substitutes and Exercises. Vocabulary-Synonyms and Antonyms, Exercises on it.

(RBT Levels: L1, L2 & L3)

MODULE - IV

Speaking skills (Grammar and Vocabulary) - I

Syllables, Structures, Strong and Weak corms of words formation - Prefixes and Suffixes (Vocabulary), Contraction and Abbreviations.

Spelling Rules and Words often Misspelt – Exercises on it. Word Pairs (Minimal pairs) – Exercises, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.

(RBT Levels: L1, L2 & L3)

MODULE - V

Speaking Skills (Grammar and Vocabulary) - II

Extempore/Public Speaking, Difference between Extempore/Public Speaking, and Guidelines for Practice.

Mother Tongue Influence (MTI) – South Indian Speakers, Various Techniques for Neutralisation of Mother Tongue Influence – Exercises, Listening Comprehension – Exercises, Information Transfer: Oral Presentation – Examples. Common Errors in Pronunciation.

(RBT Levels: L1, L2 & L3)

Textbooks:

1. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press- 2018. Refer it's work book for activities and exercises – “Communication Skills- I (A Workbook)” published by Oxford University Press – 2018.

2. English Language Communication Skills (Lab Manual cum Workbook), Cengage learning India Pvt Limited [Latest Revised Edition] – 2018.

Reference Books:

1. English for Technical Communication by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2016

2. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Ltd [Latest Revised Edition] – 2018.

3. Practical English Usage by Michael Swan, Oxford University Press – 2016.

4. High School English Grammar & Competition by Wren and Martin, S Chandh & Company Ltd -2015.

5. Effective Technical Communication – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.

Engineering Chemistry

ENGINEERING CHEMISTRY

Credits : 04

MODULE - I

Electrochemistry and Energy storage systems

Use of free energy in chemical equilibria: Thermodynamic functions: Definitions of free energy and entropy. Cell potential, derivation of Nernst equation for single electrode potential, numerical problems on E, E⁰, and E_{cell}.

Electrochemical energy systems: Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode - Definition, construction and principle of Glass electrode and determination of pH using glass electrode. Electrolyte concentration cells, Numerical problems.

Energy storage systems: introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries.

(RBT Levels: L3)

MODULE - II

Corrosion and Metal finishing

Corrosion: Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio to anodic to cathodic areas, nature of corrosion product, nature of medium - pH, conductivity and temperature, Types of corrosion - Differential metal and differential aeration - pitting and water line. Corrosion control: Anodizing - Anodizing of aluminum, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings - Galvanization.

Metal finishing:

Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating - Polarization, decomposition potential and overvoltage.

Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel & copper distinction between electroplating and electroless plating processes.

(RBT Levels: L1, L2)

MODULE -III

Energy Systems

Chemical Fuels: Introduction, classification, definition of CV, LCV and HCV, determination calorific value of solid/liquid fuel using bomb

calorimeter, numerical problems. Knocking of petrol engine -

Definition, mechanism, ill effects and prevention.

Power alcohol, unleaded petrol and biodiesel.

Fuel Cells: Introduction, differences between conventional cell and fuel cell limitations & advantages. Construction, working & applications of methanol- oxygen fuel cell with electrolyte, and solid oxide fuel cell(SOFCs)

Solar Energy: Photovoltaic cells - Introduction construction and working of a typical PV cell, Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells.

MODULE - IV

Environmental Pollution and Water Chemistry

Environmental Pollution: Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide, oxides of nitrogen and Sulphur, hydrocarbons, Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air pollutant: Ozone, Ozone depletion

Waste Management: Solid waste, e-waste & biomedical waste: Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse)

Water Chemistry: Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages scale and sludge formation, boiler corrosion (due to dissolved and). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides tertiary methods.

Softening of water by ion exchange process. Desalination of sea water by reverse osmosis

(RBT Levels: L3)

MODULE - V

Instrumental methods of analysis and Nanomaterials

Instrumental methods of analysis: Theory, Instrumentation and applications of Colorimetry, flame Photometry, Atomic Absorption Spectroscopy, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base)

Nanomaterials: Introduction, size dependent properties (Surface

area, electrical, optical, catalytic and thermal properties). Synthesis by Sol-gel, Carbon nanotubes and graphenes – properties and applications.

(RBT Levels: L1, L2)

Textbooks:

1. P.C. Jain & Monica Jain. “Engineering Chemistry”, Dhanpat Rai Publications, New Delhi (2015- Edition).
2. S.S. Dara, A textbook of Engineering Chemistry, 10 th edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P.W. Atkins, Oxford Publications (Eighth edition-2006).

Reference books:

1. O.G Palanna, “Engineering Chemistry”, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (2015 - Edition).
2. R.V.Gadag & A.Nityananda Shetty., “Engineering Chemistry”, I K International Publishing House
3. “Wiley Engineering Chemistry”, Wiley India Pvt. Ltd. New Delhi, Second Edition – 2013.
4. B. Jaiprakash, R.Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for engineering Students, Subhash Publications, Bengaluru, (2015 - Edition).

C Programming for Problem Solving

C PROGRAMMING FOR PROBLEM SOLVING

Credits : 03

MODULE - I

Introduction to computer Hardware and Software: Computer generations, computer types, bits and words, CPU, Primary memory, Secondary memory, ports and connections, input devices, output devices, Computers in a network, Network hardware, Software basics, software types.

Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions.

(RBT Levels: L1 & L2)

MODULE - II

Managing Input and output operations. Conditional Branching and Loops. Example programs, Finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle.

(RBT Levels: L1 & L2)

MODULE - III

Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and sorting algorithms (Linear search, Binary search, Bubble sort and Selection sort)

(RBT Levels: L1, L2 & L3)

MODULE - IV

User Defined Functions and Recursion. Example programs, Finding of a positive integers and Fibonacci series.

(RBT Levels: L1, L2 & L3)

MODULE - V

Structure and Pointers, Preprocessor Directives

(RBT Levels: L1, L2 & L3)

Textbooks:

1. E.Balagurswamy, programming in ANSI C, 7 th Edition, Tata McGraw-Hill
2. Brian W.Kernighan and Dennis M.Ritchie, The 'C' Programming Language, Prentice Hall of India.

Reference Books:

1. Sumitabha das, Computer Fundamentals & C Programming, McGraw Hill Education.
2. Gary J Bronson, ANSI C Programming, 4 th edition, Cengage Learning
3. Dey and Ghosh, Programming in C, 3 rd Edition, oxford University Press 2013
4. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013
5. R S Bichkar, Programming with C, University Press 2012.
6. V Rajaraman: Computer Programming in C, PHI, 2013.
7. Basavaraj S.Anami, Shanmukahappa A Angadi, Sunilkumar S. Manvi, Computer Concepts and C Programming: A Holistic Approach to Learning C, Second edition, PHI India, 2010.

Basic Electronics

BASIC ELECTRONICS

Credits : 03

MODULE - I

Semiconductors Diodes and Applications:

p-n junction diode, Equivalent circuit, Zener Diode, Zener diode as a voltage regulator, Rectification - Half wave rectifier, Full wave rectifier, Bridge rectifier, Capacitor filter circuit (2.2, 2.3, 2.4 of Text 1).

Photo diode, LED, Photo coupler. (2.7.4, 2.7.5, 2.7.6 of text 1).

78XX series and 7805 Fixed IC voltage regulator (8.4.4 and 8.4.5 of Text 1).

(RBT Levels: L1, L2 & L3)

MODULE - II

FET and SCR:

Introduction, JEFT: Construction and operation, JEFT Drain Characteristics and Parameters, JEFT Transfer Characteristics, Square law expression for I_D , Input resistance, MOSFET: Depletion and Enhancement type MOSFET Construction, Operation, Characteristics and Symbols, (refer 7.1, 7.2, 7.3, 7.4, 7.5 of Text 2), CMOS (4.5 of Text 1).

Silicon Controlled Rectifier (SCR) - Two-transistor model, Switching action, Characteristics, Phase control application (refer 3.4 upto 3.4.5 of Text 1).

(RBT Levels: L1, L2 & L3)

MODULE - III

Operational Amplifiers and Applications:

Introduction to Op-amp, Op-Amp Input Modes, Op-Amp Parameters - CMRR Input Offset Voltage and Current, Input Bias Current, Input and Output Impedance, Slew Rate(12.1, 12.2 of Text 2).

Applications of Op - Amp - Inverting amplifier, Non-Inverting amplifier, Summer, Voltage follower, Integrator, Differentiator, Comparator (6.2 of Text 1).

(RBT Levels: L1, L2 & L3)

MODULE - IV

BJT Applications, Feedback Amplifiers and Oscillators:

BJT as an amplifier, BJT as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using a relay (refer 4.4 and 4.5 of Text 2). Feedback amplifiers - Principle, Properties and advantages of Negative Feedback, Types of feedback, voltage series feedback, Gain stability with feedback (7.1-7.3 of Text 1).

Oscillators - Barkhausen's criteria for oscillation, RC Phase Shift oscillator, Wien Bridge oscillator (7.7-7.9 of Text 1).

IC 555 Timer and Astable Oscillator using IC 555(7.2 and 17.3 of Text 1).

(RBT Levels: L1, L2 & L3)

MODULE - V

Digital Electronics Fundamentals:

Difference between analog and digital signals, Number System - Binary Hexadecimal, Conversion - Decimal to binary, Hexadecimal to decimal and vice-versa, Boolean algebra, Basic and Universal Gates, Half and Full adder, Multiplexer, Decoder, SR and JK flip-flops, Shift register, 3 bit Ripple Counter (refer 10.1-10.7 of Text 1).

Basic Communication system, Principle of operations of Mobile phone (refer 18.2 and 18.18 of Text 1).

(RBT Levels: L1& L2)

Textbooks:

1. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 2 nd Edn, McGrawHill, 2018.
2. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9 th edition, 2012.

Reference Books:

1. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 1st Edn, McGrawHill, 2014.
2. Boylestad, Nashelskey, "Electronic Devices and Circuit theory", Pearson Education, 9 th Edition, 2007/11 th edition, 2013.
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5 th Edition, 2008.
4. Muhammad H. Rashid, "Electronics Devices and Circuits", Cengage Learning, 2014.

Elements of Mechanical Engineering

ELEMENTS OF MECHANICAL ENGINEERING

Credits : 03

MODULE - I

Sources of Energy: Introduction and application of energy sources like fossil fuels, hydel, solar, wind, nuclear fuels and bio-fuels; environmental issues like global warming and ozone depletion:

Basic concepts of Thermodynamics: Introduction, states, concept of work, heat, temperature; Zeroth, 1st, 2nd and 3rd laws of thermodynamics. Concept of internal energy, enthalpy and entropy (simple numericals).

Steam: Formation of steam and thermodynamic properties of steam (simple numericals).

(RBT Levels: L1, L2 & L3)

MODULE - II

Boilers: Introduction to boilers, classification, Lancashire boiler, Babcock and Wilcox boiler. Introduction to boiler mounting and accessories (no sketches).

Turbines: Hydraulic Turbine – Classification and specification, Principles and operation of Pelton wheel turbine, Francis turbine and Kaplan turbine (elementary treatment only).

Hydraulic Pumps: Introduction, Classification and specification of pumps, reciprocating pump and centrifugal pump, concept of cavitation and priming.

(RBT Levels: L1, L2 & L3)

MODULE -III

Internal Combustion Engines

Classification, I.C Engines parts, 2 and 4 stroke petrol and 4 – stroke diesel engines. P – V diagrams of Otto and Diesel cycles. Simple problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption.

Refrigeration and Air conditioning

Refrigeration – definition – Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, relative COP, /unit of Refrigeration, Refrigerants, Properties of Refrigerants, List of commonly used

Refrigerants. Principle and working of vapor compression refrigeration and vapor absorption refrigeration. Domestic Refrigerator.

Principles and applications of air conditioners, window and split air conditioners.

(RBT Levels: L1, L2 & L3)

MODULE -IV

Properties, Composition and Industrial Applications of engineering materials

Metals - Ferrous; Cast iron, tool steels and stainless steels and nonferrous; aluminium, brass, bronze. Polymers - thermos plastics and thermosetting polymers Ceramics - Glass, optical fiber glass, cermets. Composites - fiber reinforced composites, Metal Matrix Composites Smart materials - Piezoelectric material, shape memory alloys, semiconductors and insulators.

Joining Processes: Soldering, Brazing and Welding

Definitions - Classification and, methods of soldering, brazing and welding. Brief description of arc welding, oxy-acetylene welding, TIG welding, and MIG welding.

Belt drives

Open & crossed belt drives, Definitions - slip creep, velocity ratio, derivations for length of belt in open and crossed belt drive, ratio of tension in flat belt drives, advantages and disadvantages over belt drives, simple numerical problems on velocity ratio.

Gear drives

Types - spur helical, bevel, worm and rack and pinion. Velocity ratio, advantages and disadvantages over belt drives, simple numerical problems on velocity ratio.

(RBT Levels: L1, L2 & L3)

MODULE - V

Lathe - Principle of working a center lathe. Parts of a lathe.

Operations on lathe - Turning, Facing, Knurling, Thread Cutting, Drilling, Taper turning by Tailstock offset method and Compound slide swiveling method, Specification of Lathe.

Milling Machine - Principle of milling, types of milling machines.

Working of horizontal and vertical milling machines. Milling processes - plane milling, end milling, slot milling, angular milling, form milling, straddle milling, and gang milling. (Layout sketches of the above machines need not be dealt. Sketches need to be used only

for explaining the operation performed on the machines)

Introduction to Advanced Manufacturing Systems

Computer Numerical Control (CNC): Introduction, components of CNC, open loop and closed loop systems, advantages of CNC, CNC Machining centers and Turning centers.

Robots: Robot anatomy, joints and links, common robot configurations. Applications of Robots in material handling, processing and assembly and inspection.

(RBT Levels: L1, L2 & L3)

Textbooks:

1. Elements of Mechanical Engineering, K.R. Gopalaakrishna, Subhas Publications, Bangalore, 2008.
2. Elements of Mechanical Engineering, Vol. - 1 & 2, Hajra Choudury media Promoters, New Delhi, 2001
3. A Text book of Elements of Mechanical Engineering, S.Trymbaks Murthy, 3 rd revised edition 2006, I.K. International Publishing House Pvt. Ltd., New Delhi.

Reference Books:

1. Elements of Mechanical Engineering, R.K. Rajput, Firewall Media, 2005.
2. Elements of Mechanical Engineering, Dr.A.S. Ravindra, Best Publications, 7 th edition, 2009.
3. CAD/CAM/CIM, Dr.P.Radhakrishnan, 3 rd edition, New Age International Publishers, New Delhi.
4. Introduction to Robotics: Mechanics and Control, Craig, J.J., 2 nd Ed.Addison- Wesley Publishing Company, Readong, MA, 1989.
5. Introduction to Engineering Materials, BK Agarwal, Tata McGrawHill Publications, New Delhi.
6. Thermal Science and Engineering, Dr.D.s. Kumar, S.K. Kataria & sons Publications, New Delhi.