Dr. Babasaheb Ambedkar Marathwada University, Maharashtra B.E./B.Tech CSE Sem 1 syllabus

Engineering Mathematics-I

ENGINEERING MATHEMATICS-I

Unit 1:

Matrices – I: Rank of a matrix, Canonical and Normal form of a matrix, Consistency of the system of linear equations (homogeneous and non-homogenous equations)

Unit – 2:

Matrices – II: Characteristic equation f Matrix, Eigen values and Eigen vectors, Cayley-Hamilton Theorem, Linear dependence and independence of vectors, Linear Transformation, Orthogonal Transformations.

Unit – 3:

Complex Numbers with Applications: Geometrical Representation of a Complex Number, Standard forms of Complex Number, DeMoivre's Theorem, Roots of Complex Number. Complex functions: Circular and Hyperbolic function, Relation between Circular and hyperbolic functions, Inverse Hyperbolic functions. Separation into Real and Imaginary parts of complex functions, Logarithm of Complex numbers. (10 Hours)

Unit - 4:

Successive differentiation: Nth derivative of standard functions. Taylor's & Maclaurin's theorem, Expansion of function using i) standard series ii) method of differentiation & integration Indeterminate forms, Convergence of power series using Ratio Test,

Comparison Test, Cauchy's nth root Test.

Unit 5:

Partial Differentiation: Partial Derivatives, Total differentiation, Euler's Theorem on homogeneous Functions, change of Independent Variables.

Unit 6:

Application of Partial differentiation: Jacobian, chain rule, Maxima and Minima of Function of two variables, Lagrange's method of undetermined multipliers.

Text Books:

1. A Text book of Engineering mathematics (Volume-I, II), P.N. Wartikar and J.N. Wartikar, Pune VidyarthiGirhaPrakashan, Pune.

2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications, New Delhi.

3. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley Eastern Ltd.

4. Engineering Mathematics by Babu Ram, PEARSON.

5. Engineering Mathematics A Tutorial Approach by Ravish R Singh, Mukul Bhat, McGraw Hill

6. A Textbook of Engineering Mathematics by N.P Bali and Manish Goyal

Computer Fundamentals I

COMPUTER FUNDAMENTALS - I

Unit 1: Introduction to computer architecture

CPU, memory communication between various devices of computers using bus. Secondary storage devices. What is a programming language? Types of programming language (Machine Language, Assembly Language, High LevelLanguage), concept of compiler and interpreter

Introduction to C:

Overview, Character set. C Tokens: Keywords and Identifiers. Constants andVariables, Data types. Declaration of Variables, Defining Symbolic Constants. Operators andExpressions: Arithmetic, Relational, Logical, Assignment operators, Increment and Decrement, Conditional, Special operators, Expressions, Operator precedence and associatively, Type casting.

Unit 2: Data Input-Output

Basic structure of program, Character Input and Output, StringInput and Output, Formatted Input and Output.

Control Structures: Decision making - if, if-else, nested if else, switch statement, Loop Controlwhile, do while and for statement, nested loops, break and continue statement, go-to statement.

Unit 3: Arrays: Introduction

Array declaration and Initialization, Array types, One dimensional& Two dimensional arrays, Bubble sort, selection sort. Functions: Introduction, Standard Library Functions, User Defined Functions: Declaration &Definition, Parameter Passing - by value and by reference. Recursive functions.

Text Books:

1. Programming in ANSIC, E. Balagurusamy, Tata McGraw Hill

2. The Complete Reference C - HERBERT SCHILDT, Tata McGraw-Hill

3. The C Programming Language - Kernighan BW, Dennis M. Ritchie, Prentice Hall

Reference Books:

1. Programming with C Byron Gottfried Tata McGraw-Hill

2. Let us C. YashavantKanctkar, BPB Publication

3. Exploring C. Yashavantkanctkar. BPB Publication

4. Introduction to Computer Science, Pearson Education (ISBN: 9788131760307)

Engineering Graphics

ENGINEERING GRAPHICS

Unit - 1 PROJECTION OF POINTS AND LINES:

Projection of points and Projections of lines inclined to both the reference plane including IIT & VT.

Unit - 2 PROJECITONS OF PLANES

Planes with surface inclined to both the planes. Plane such as triangles squares, rectangles, quadrilaterals, pentagon, hexagon, circle, semicircle.

Unit - 3 PROJECTION AND SECTION OF SOLIDS

Projection of solids with double inclination, Solids like prism, cylinder, pyramid, cone, sphere, frustum cube and tetrahedron. Projections of geometrical solids cut by cutting plane inclined to one plane and determination of cutting plane angle from the given true shape of section.

Unit - 4 ORTHOGRAPHIC PROJECTIONS

Obtaining orthographic projections and sectional orthographic projections of different machine parts from the given 3D view

Unit - 5 ISOMETRIC PROJECTIONS

Obtaining orthographic projections and sectional orthographic projections of different machine projections of simple machine parts.

Unit - 6 ENGINEERING CURVES

To draw Ellipse, Parabola, Hyperbola, involute, Cycloid, Epicycloid, Hypocycloid, Helix, Archimedcan Spiral, Drawing, Normal and tangents to curves MACHINE PARTS: Free hand sketching of Hexagon headed nut and bolt, foundation bolts, screw thread forms.

Reference Books:

1. Engineering Drawing Dhananjay A. Jolhe Tata McGraw Hill Education.

2. Engineering Drawing Basant Agarwal C.M Agarwal Tata McGraw Hill Education

3. Engineering Drawing M.B.Shah, B.C. Rana Pearson Education, India

4. A Text book of Engineering Graphics M.I. Dhabhade Association of Technicla Authors, Pune.

5. Engineering Drawing B.V.R. Gupta, M.RajaRoyI.K. International Pvt. Ltd.

6. A Text Book of Engineering Drawing R.K. DhawanS.Chand and Co.

7. Engineering Drawing Mali& Chaudhary Vrindha Publishers.

Engineering Physics

ENGINEERING PHYSICS

UNIT-I Electron optics

Positive rays-production properties, Determination of q/m by Thomson's Parabolic method, Separation of isotopes by Bain bridge mass spectrograph. Aston's mass Spectrograph. Aston's mass Spectrograph, Electron refraction – Bethe's Law, Cathode ray oscilloscope – Block diagram, Cathode Ray Tube (CRT), Construction and working – Time base circuit and trigger circuit and Applications of CRO.

X – Rays: Continuous and characteristics spectra, Diffraction of X – Rays, Bragg's law, Bragg's X-ray spectrometer, Applications of X-Rays. Compton's effect – derivation of Compton Shift.

UNIT – 2: OPTICS

Interference: Appearance of Newton's rings by reflected light, expression for diameter of dark and bright ring. Engineering applications of interference 1. Determination of refractive index of liquid 2. Testing of optical flatness.Michelson's interferometer and its application for determination of Refractive index of thin film.

Diffraction: Diffraction light, Theory of Plane Transmission grating, Resolving power of diffraction grating.

Polarisation: quarter-wave plate and half-wave plat, Production and detection of plane, circularly, elliptically polarized light – optical activity, specific rotation, Laurentz's half shade polarimetry, photoelasticity.

UNIT-3: SUPERCONDUCTIVITY AND MAGNETISM

Superconductivity: Introduction, critical magnetic field, Zero resistivity, Meissner effect, Isotope effect type I, type-II, Superconductor, BCS theory, applications of superconductor Josephshon junction, SQUID.

Magnetism: Introduction, Magnetic Susceptibility, properties of dia.para and ferromagnetic materials, Magnetic domain and Hysteresis loop, applications of magnetic materials.

UNIT-4: SEMICONDUCTORS AND MODERN PHYSICS:

Semiconductors: Introduction – Energy band structure of intrinsic and extrinsic semiconductors, Fermi Energy – Fermi Dirac distribution function – Position of Fermi level in intrinsic and extrinsic semiconductor and its variation with temperature (with derivations), Hall effect, Hall coefficient.

Modern Physics: Heisenberg's uncertainty principle, Experimental illustration of uncertainty principle Schrodinger time dependent and time independent wave equation, physical significance of wave function.

Atomic structure: Zeeman effect – Classical expression for Zeeman shift, Raman effect – derivation for Raman shift.

UNIT-5: THEORY OF LIGHT AND SOUND:

Laser: Properties of LASER, Interaction of radiation with matter, spontaneous and stimulated emission, population inversion, Pumping mechanism (three level pumping, four level pumping), Construction and working of Ruby laser and Helium – Neon gas laser, Semiconductor laser.

Fiber optics: Basic structure and classification of optical fiber, Acceptance angle – Acceptance cone, numerical aperture, applications of optical fiber.

Acoustics: Echo, Reverberation and reverberation time, Absorption coefficient, Sabine's formula – Acoustical design of a hall, Acoustical materials.

Ultrasonic: Limit of audibility – properties of ultrasonic waves, Production of ultrasonic wave by piezoelectric & magneto striction method, Applications of ultrasonic waves.

UNIT 6: NANOTECHNOLOGY

Introduction – Properties of Nanoparticles, Synthesis of Nanoparticles, Ball Milling, Sputtering, Sol-gel technique, Laser vaporization, electrodeposition and Chemical vapour deposition, applications.

Carbon Nano Tube (CNT): Introduction, types of CNT, Important Properties, Electric Magnetic Mechanical, Applications.

Text Books:

1. Engineering Physics – Gaur and Gupta, S.Chand publication

2. Engineering physics – Avadhanalu and Kshirsagar, S.Chand Publication

Reference Books:

1. Fundamentals of optics – Jenkins and White, McGraw Hill Publication.

2. A Text Book of Optics – Subrahmanyam, Brijlal, S.Chand Publication.

3. Fiber optic Communication – D.C. Agarwal. Wheeler Publication, New Delhi

4. Fiber optic communication – Keiser, McGraw Hill Publication

5. Engineering Physics – Hitendra K Malik, A.K.Singh, Tata McGraw Hill Education Private Limited, New Delhi.

6. Essential University Physics – Volume 1 and 2 – Richard Wolfson, Pearson, Noida.

7. Modern Physics B.L.Theraja, S.Chand and Company Ltd.

8. Engineering Physics Dattu R Joshi – Tata McGraw Hill education Private Limited

9. Nanotechnology, Principles and Practices – Dr. S.K. Kulkarni, Capital Publishing Co., New Delhi.

Engineering Chemistry & Environmental Science

ENGINEERING CHEMISTRY AND ENVIRONMENTAL SCIENCE

Unit 1: Polymer Science

Introduction, Classification, Functionality in monomer, Polymerisation: addition and condensation, polymerization, Free radical mechanism of addition polymerization, effect of polymer structure on properties. Plastics: properties, compounding of plastic, types of plastics (thermosetting and thermoplastics), synthesis, properties and applications of polyethene, PVC, PVA, Teflon, PMMA, Kevlar, ABS, Bakelite, elastomers. Vulcanization, need of vulcanization of rubber. Synthetic rubber Buna-s. Buna-N, butyl rubber, polymers in medicine and surgery.

Unit 2: Abrasives and Adhesives

Definition, Natural and artificial abrasives, Cement: Introduction, classification, manufacturing and chemical composition of Portland cement, Adhesives: Introduction, bonding processes by adhesives, Classification. Physical and chemical factors affection on adhesive action.

Unit 3: Water Technology

Sources of water, Hardness. Type and causes of hardness, units of hardness, disadvantages of hard water, Scaleand sludge, Priming and foaming, caustic embrittlement, Alkalinity, Numericals on water analysis, softening methods such as Zcolite process, Ion exchange process, purification of water by electro dialysis and Reverse osmosis, Applications of pH meter and Conductometer.

Unit 4: Corrosion Science and lubricants

Definition, chemical and electrochemical corrosion and its mechanism, factors influencing on corrosion, Corrosion control, anodizing and phosphating, galvanizing and tinning, cathodic and anodic protection.Lubricants: Introduction classification, mechanism of lubrication, Characteristics of lubricants such asviscosity, viscosity index, cloud and pour points, flash and fire point, acid value and aniline point, selection ofbest lubricant.

Unit 5: Chemical and Electrochemical energy sources

Introduction, classification of chemical energy (Fuels). Characteristics of good fuel, Calorific values and its determination by Bomb calorimeter, Coal: classification, proximate and ultimate analysis of coal, petroleum; source, composition, refining, octane number, certain number, Gaseous fuels, Natural gas. CNG.

Electrochemical energies: electrolysis, conductivity of electrolytes, factor affecting on conductivity of electrolytes, Batteries, types of batteries, Construction, working and application of Acid storage batteries,Lithium-ion batteries, Nickel Cadmium battery, Fuel cells.

Unit 6: Chemistry in Environment

Introduction, segments of environment, Pollutions such as Air, water, soil, noise and radioactive and their preventive measures, concept of acid rain, global warming, depletion of ozone layer.

TEXT BOOKS:

1) A Textbook of Engineering Chemistry by S. S. Dara, S. Chand Publication

2) Engineering Chemistry by Jain & Jain, Dhanpat Rai And Sons

REFERENCE BOOKS:

1) A Textbook of Engineering Chemistry by M.M.Uppal

2) Applied Chemistry by Krishnamurthy. P. Vallinayagam and K. Jeysubramanian TMH Publication

3) A Textbook of Engineering Chemistry by Shashi Chawla

4) A textbook on experiment and calculations in Engineering Chemistry by S. S. Dara, S. ChandPublication

5) Engineering Chemistry by R.V.Gadag and A.N. Shetty

6) Textbook of polymers science by E.W.Billmer, John Wiley and sons.

7) University Chemistry, Mahan. Pearson education

Basic Civil Engineering

BASIC CIVIL ENGINEERING

Unit 1: Building Planning and Construction:

Branches of civil Engineering, Role of civil Engineer, Site selection for residential building, plinth area, carpet area, Floor Space Index, cost of building. Classification, properties and uses of following engineering materials.

a) Bricks b) Stones c) Aggregates d) Sand c) Cement I) Steel g) Concrete.

Loads coming on Structure. Types of construction a) Load bearing structure b) Framed Structure.

Substructure: Functions of Foundation, safe, ultimate and net bearing capacity of soil, isolated footing, and combined footing. Superstructure: Typical cross-section through load-bearing wall. Basic requirements of various Components of the building (Walls, Floors, Doors and windows, Stairs, & Roof).

Unit 2: Geographical Measurement and Transportation Engineering:

Geographical Measurement: Definition, classification and Principles

of surveying, measurement of distance by chain and tape. Prismatic compass, measurement of bearing and calculation of included angles study and use of dumpy level, leveling stall, benchmark, determination of reduced levels by height of instrument method and rise and fall method.

Transportation Engineering:

Various modes of transportation, their merits and demerits, Classification of roads, Rigid and Flexible pavements composite pavement, while topping etc. typical road section. Camber, width formation, carriageway, sight distance, numerical on sight distance.

Unit 3: Environmental and Water Resource Engineering

Environmental Engineering: Water demands; design period, per capita demand, Methods of forecasting population: Arithmetic increase, geometric increase and incremental increase method. Flow diagram of Water treatment plant and function of different units.

Water Resource Engineering: Definition of watershed, Necessity of Waves management works, Different structures involved in watershed management, Roof top rainwater harvesting and groundwater recharge. Necessity of irrigation and benefits of irrigation.

References:

1. Anderson "Introduction to Surveying" Mc Graw Hill International student edition.

2. Arora S.P. and Bindra S.P. "Building Construction", Dhanpat Rai and Sons Delhi.

3. Duggal A.K. "Surveying and Levelling", Vol.I, Prentice Hall of India

4. Garg S.K. "Irrigation Engineering and Hydraulic Structures", Khanna Publishers Delhi.

5. Shah, Kale and Patki "Building Design and Drawing". TATA Mc Graw Hill

6. Highway Engineering by "Justo Khanna.

Basic Electrical Engineering

BASIC ELECTRICAL ENGINEERING

Credits: 4

Unit 1: Fundamentals of Electrical Circuits

Concept of emf, energy sources – ideal and practical, current and voltage sources and source conversion, Current and Voltage division formula, Resistance, Effect of
Temperature on Resistance, Resistance Temperature Coefficient, Insulation Resistance, Capacitor, Charging and discharging of Capacitor, Time constant, Types
and Batteries of Cells, Lead-Acid Battery, Nickel-Cadmium Battery, Current Capacity and Battery rating.

Unit 2: DC Circuits

Classification of Electrical Networks, Application of Kirschoff's laws, study of Loop analysis method and Node analysis – Simple networks, Superposition Theorem,
Thevenin's theorem, Star-Delta Transformation conversion, Maximum power transfer theorem.

Unit 3: Electromagnetism

Concept of mmf, Flux, Flux Density, reluctance, Permeability and Field Strength-their units and relationships, simple series and parallel Magnetic circuits, Comparison of electrical and magnetic circuits, force of current carrying conductor placed in a
magnetic field. Fleming's left and right hand rule, concept of Magnetic hysteries, Faraday's law of Electromagnetic Induction, Statically and dynamically induced emf, Self and
inductance, Coefficient of coupling, Energy stored in a magnetic field.

Unit 4: AC Fundamentals and Circuits

Concept of generation of alternating emf-single plane and three plane, instantaneous, peak, average and RMS values of AC quantities, Frequency and Time period. Power factor, Form factor, study of AC circuit consisting of pure Resistance,, pure Capacitance, pure inductance and corresponding V-I phasor diagrams and waveforms, Concept of Reactance and Impedance, study of Series and parallel

RL, RC and RLC circuits and resonance, Concept of Apparent, Real and Reactive Power and Power
Factor and its Importance.

Unit 5: Single Phase Transformer

Construction, Principle of working, emf equation, Voltage and Current ratios, Losses, Definition of regulation and efficiency by direct loading method.

Unit 6: Electrical Utilities

Types of wiring – House wiring, Staircase wiring, Godown wiring, Significance of Earthing, Electrical safety precautions, Study of different types of lamps-CFL, CFT, W-
LED-Construction, working and their rating, Metal Halide lamp, Electronic choke, Measuring Instruments – Multimeter, Sources of Electrical Power Generation –
Conventional and Non-Conventional Power plants.