

CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 101 ENGINEERING MATHEMATICS I

Module I

Continuity and differentiability of functions of one variable : Rolle's theorem, Mean value theorem, Cauchy's theorem, L'Hospital's rule for the evaluation of limits of indeterminate forms.

Radius of curvature of plane curves, evolutes.

Theory of algebraic equations: relations between roots and coefficients of an equation, transformations of equations, Descarte's rule of signs.

Module II

Functions of more than one variable : partial differentiation , chain rule, Euler's theorem for homogeneous function, differentials and their applications in errors and approximations, Jacobians - Maxima minima of functions of two variables(Proof of the result not required).

Module III

Co-ordinate geometry of two dimensions : Standard equations of parabola, ellipse and hyperbola, their parametric representations, equations of tangents and normals to these curves, simple properties of these curves, asymptotes of a hyperbola, rectangular hyperbola.

Module IV

Co-ordinate geometry of three dimensions : Direction cosines, planes and straight lines, shortest distance between two skew lines, sphere, cone, right circular cylinder.

Module V

Definite integrals : Reduction formulae for $\sin^m x$, $\cos^m x$, $\sin^m x \cos^n x$. Applications of definite integrals in the evaluation of areas, area of surface of revolution, volumes.

Multiple integrals : Evaluation of double and triple integrals, volumes and surface areas of solids using multiple integrals.

Reference:

- | | |
|---|--|
| 1) Higher Engineering Mathematics: | B.S. Grewal, Khanna Publishers |
| 2) Advanced Engineering Mathematics: | Erwin Kreyszig, Wiley Eastern |
| 3) Engg Mathematics Vol I & II | S S Shastri, Prentice Hall |
| 4) Differential calculus | S Balachandra Rao & C K Shantha, Wiley eastern |
| 5) Calculus and analytic geometry | G B Thomas, Addison Wesley |
| 6) Engg Mathematics Vol I & II | Shantinayakan, S Chand & Co |
| 7) Advanced Mathematics for Engineers : | S. Narayanan, Manickavachagom Pillai, & Dr. G. Ramanaiah |

CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 102 ENGINEERING MATHEMATICS II

Module I

Convergence and divergence of infinite series : Integral test, comparison test, ratio test, Cauchy's root test, Raabe's test, series of positive and negative terms, concept of absolute convergence, alternating series, Leibniz test (No proofs for any of the above tests)

Power series : Interval of convergence of power series, Taylor and Maclaurin series of functions, Leibniz formula for the n th derivative of the product of two functions (No proof), use of Leibniz formula for the determination of co-efficients of the power series.

Module II

Matrix algebra : concept of rank of matrix, Echelon and normal form, linear systems of algebraic equations, consistency, Gauss elimination method, homogeneous system of equations, Eigen values and eigen vectors, Cayley-Hamilton (no proof), eigen values of Hermitian and skew-Hermitian and unitary matrices, real quadratic forms, diagonalisation of quadratic forms.

Module III

Ordinary differential equations of second order : linear equations with constant co-efficients, methods of solution of these equations, simultaneous linear differential equations, simple applications of linear differential equations in engineering problems.

Module IV

Laplace transforms : Linearity property, transforms of elementary functions, Laplace transforms of derivatives and integrals, differentiation and integration of transforms, convolution theorem (no proof), use of Laplace transforms in the solution of initial value problems, unit step function, impulse function - transform of step functions, transforms of periodic functions.

Module V

Vector differential calculus : Scalar and Vector point functions, gradient, divergence and curl, their physical meanings.

Vector integral calculus : line, surface and volume integrals, Gauss's divergence theorem, Stoke's theorem (No Proof of these theorem), conservative force fields, scalar potential.

Reference:

- 1) Higher Engineering Mathematics: B.S. Grewal
- 2) Advanced Engineering Mathematics: Erwin Kreyszig
- 3) Mathematical methods: Potter, Goldberg (Prentice Hall)
- 4) Matrix theory: David Lewis, Allied Publishers
- 5) Operational Mathematics: R V Churchill, McGraw Hill
- 6) Operational methods for linear systems: Kaplan W, Addison Wesley

- 7) Advanced Mathematics for Engineering: S. Narayanan, Manickavachagom
Pillai,
& Dr. G. Ramanaiah

Module I

Interference of light: Interference on thin films, colours of thin films- Newton's rings (reflected system)- determination of wave length and refractive index. Air wedge-diameter of thin wire- Testing of planeness of surfaces.

Production of x-rays - continuous and characteristic x-rays- Mosley's law- Diffraction of x-rays- Bragg's Law- Bragg's x-ray spectrometer - Compton effect - Expression for change in wave length.

Module II

Diffraction- Fresnel and Fraunhofer diffraction- Zone plate- plane diffraction grating - Measurement of wave length- Dispersive power of grating. Resolving power- Rayleigh's criterion- Resolving power of telescope and grating.

Double refraction- Positive and negative crystals- Nicol prism- Huygen's theory of double refraction. Quarter wave and half wave plates. Production and analysis of plane polarized and circularly polarised light using crystal plates. Optical activity- Fresnel's theory- specific rotation- Half shade polarimeter

Module III

Coherence and lasers : Spatial and temporal coherence- coherence length- spontaneous emission - stimulated emission- population inversion- CW & Pulsed Laser, typical laser systems like Helium- Neon, Nd, YAG, Ruby, Semi-conductor lasers. Applications of lasers- Principle of holography- reflection and transmission type- Recording and reconstruction- applications of holography- white light holograms.

Ultrasonic waves- Production, properties, and application.

Recording and reproduction of sound- Magnetic tape recording- sound recording on cine films.

Module IV

Fibre optics and its applications: general ideas of optical fibre- NA of fibre- step index and graded index of fibres- multimode and single mode fibres- applications of optical fibre- fibre optic communication- optical fibre sensors- general ideas of integrated optics.

Module V

Crystallography and lattice planes : Crystallography- space lattice- unit cell- crystal systems- simple cubic- body centred and face centred cubes. Lattice planes and Miller indices- spacing between lattice planes- powder method for crystal study.

Dielectrics: types and applications

Superconductivity: Transition temperature- Meissner effect- Isotope effect- Type I and type II- super conductors- B.C.S theory (qualitative study)- High temperature super conductivity (General idea)- Josephson effect- SQUIDS.

Reference:

- | | | |
|------------------------------|---|---------------|
| 1) Modern physics | : | J.B Rajan |
| 2) Optics and Atomic physics | : | Sathyaprakash |

- 3) Modern physics : Theraja
- 4) Solid state physics : Charles Kittel
- 5) Optical fibre communication : Agarwal
- 6) Optics : Ajoy Ghatak
- 7) A text book for Engg students : S P Nair & K P Jayaprakash

CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 104 ENGINEERING CHEMISTRY

Module I

Water and its treatment : Hard and soft water- Degree of Hardness of Water and its determination- Methods of softening water- Chemical calculations in softening of water- Water for domestic use- Boiler feed waters- defects of using Hard water in boilers and the treatments given- Internal and External conditioning of water- Desalination of water. **Environmental pollution:** Pollution of water-Domestic sewage and Industrial wastes- Air pollution- Causes and control.

Module II

Corrosion: Theories of Corrosion- Factors influencing corrosion- Corrosion control- cathodic protection. **Protective coatings:** Metallic coatings -hot dipping, electroplating, metal spraying, cladding Non-metallic coatings- Properties and functions of ingredients used in Paints- Varnishes, Enamels and Lacquers- Special paints.

Module III

Electrochemistry : Electrode potentials and Electromotive Force-Nernst's equation for single electrode potentials- Measurement of e.m.f and electrode potentials- Standard hydrogen electrode - E.M.F series of metals- concentration cells- Commercial cells- primary cell like Simple Voltaic cell, Daniel cell, Laclanche cell and Weston Cadmium cell- secondary cells or storage cells- Lead -Acid cell and Edison cell- Fuel cells- Hydrogen -Oxygen fuel cell- Applications of e.m.f measurements- Determination of PH and potentiometric Titrations.

Module IV

Fuels: Classification - Calorific Value determination of solids, Liquid and Gaseous fuels- Solid fuels wood, Peat, Lignite, Coal and Coke-Proximate analysis of Coal- Liquid fuels- Petroleum and its refining- Fractions and their uses- Cracking and Reforming- Petrol Knock and octane number- Diesel knock and cetane number. Synthetic petrol- Gaseous fuels- Natural Gas, Water Gas, Producer Gas, Coal Gas, Acetylene- Combustion calculation- Weight/Volume of oxygen/air required

Lubrication and lubricants- Theories of friction and Mechanism of lubrication- classification and properties of lubricants - Production of Lubricating oils- Additives of lubricating oils- Synthetic lubricants, Greases, Solid Lubricants. **Rocket Propellants-** characteristics and composition of Solid and Liquid propellants.

Module V

High Polymers : Classification of High polymers- production of high polymers- general methods- Some important plastics, their production, properties and uses- Polyethylene PVC, Polystyrene, Teflon, Acrylics, Nylon, Polyesters, Phenol Formaldehyde Resins, Urea Formaldehyde Resins and silicones-compounding and moulding of High polymers.

Plastics as engineering materials- Natural rubber- production and properties- Compounding and Vulcanization of Rubber- Synthetic Rubbers - Buna Rubbers, Butyle Rubbers, Neoprene Thiokols, Polyurethane and a Silicons Rubbers.

References:

- 1) Chemistry in Engineering & Technology Volume II : J.C Kuriakose & Rajaram
- 2) Chemistry of Engineering Materials : C V Agarwal
- 3) Engineering Chemistry : P C Jain & Monika
- 4) Chemistry of Engineering Materials : L Munroe
- 5) Chemistry of Engineering Materials : Leighou
- 6) Chemistry of Engineering Materials : Paul & Salger
- 7) Chemistry of Engineering Materials : M Uppal

A) STATICS

Module I

Concurrent forces in a plane: Principles of statics. Composition and resolution of forces. Equilibrium of concurrent forces in a plane. Method of projection. Method of moments. Friction.

Parallel forces in a plane: Two parallel forces. General case of parallel forces in a plane. Centre of parallel forces and centre of gravity. Distributed forces in a plane.

Module II

Properties of areas: Centroids of composite plane figures and curves. Moment of inertia of a plane figure with respect to an axis in its plane. Polar moment of inertia. Product of inertia. Principal axes. Mass moment of inertia of material bodies. Product of inertia of material bodies.

Module III

General case of forces in a plane: Composition of forces in a plane. Equilibrium of forces in a plane. Plane trusses - Method of joints. Method of sections. Plane frames : Method of members. **Principle of virtual work:** Equilibrium of ideal systems, stable and unstable equilibrium.

B) DYNAMICS

Module IV

Rectilinear translation: Kinematics of rectilinear motion. Differential equation of rectilinear motion. Motion of a particle acted upon by a constant force, by a force as a function of time and by a force proportional to displacement. Simple harmonic motion. D'Alembert's principle. Momentum and impulse. Work and energy, ideal systems, conservation of energy. Impact.

Module V

Curvilinear translation: Kinematics of curvilinear translation. Differential equations of motion. Motion of a projectile. D'Alembert's principle in curvilinear motion. Moment of momentum. Work and energy in curvilinear motion.

Module VI

Rotation of a rigid body: Kinematics of rotation. Equation of motion of a rigid body rotating about a fixed axis. Rotation under the action of a constant moment. Compound pendulum. General case of moment proportional to the angle of rotation. D'Alembert's principle of rotation. Resultant inertia force in rotation. Principle of angular momentum in rotation. Energy equation for rotating bodies.

References:

- 1) Engineering Mechanics - Timoshenko and Young - McGraw Hill Book Company.
- 2) Mechanics for Engineers (Vol. 1- Statics and Vol.2 -Dynamics) - Beer F. P. & Johnston E. R. - Tata McGraw Hill.
- 3) Engineering Mechanics (Vol. 1- Statics and Vol.2 -Dynamics) - Merriam H. L. & Kraige L. G. - John Wiley and Sons.

CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 106 ENGINEERING GRAPHICS

Module I

Introduction to engineering graphics. Drawing instruments and their use. familiarisation with current Indian Standard Code of Practice for general engineering drawing.

Scales- plain scale ,vernier scale, diagonal scale.

Conic sections- Construction of ellipse, parabola, hyperbola - construction of cycloid, involute, archimedian spiral and logarithmic spiral- drawing tangents and normals to these curves.

Module II

Introduction to orthographic projections- plane of projection- principles of first angle and third angle projections, projection of points in different quadrants.

Orthographic projection of straight lines parallel to one plane and inclined to the other plane- straight lines inclined to both the planes- true length and inclination of lines with reference planes- traces of lines.

Projection of plane laminae of geometrical shapes in oblique positions.

Module III

Projection of polyhedra and solids of revolution- frustum, projection of solids with axis parallel to one plane and parallel or perpendicular to other plane- projection of solids with axis inclined to both the planes- projection of solids on auxiliary planes.

Section of solids by planes inclined to horizontal or vertical planes- true shape of sections.

Module IV

Development of surface of cubes, prisms, cylinders, pyramids and cones

Intersection of surfaces- methods of determining lines of intersection - intersection of prism in prism and cylinder in cylinder.

Module V

Introduction to isometric projection- isometric scales, isometric views- isometric projections of prisms, pyramids, cylinders, cones and spheres.

Introduction to perspective projections : visual ray method and vanishing point method- perspective of circles- perspective views of prisms and pyramids.

References:

- | | |
|------------------------------------|--|
| 1) Engineering Graphics Publishers | P.I.Varghese & K.C. John, JET |
| 2) Elementary engineering drawing | N.D.Bhat, Charotar publishing house |
| 3) Geometric drawing, | P.S.Gill , B.D Kataria & sons Ludhiana |
| 4) Engineering Graphics | P I Varghese, VIP Publishers. |

**CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 107 FUNDAMENTALS OF
ENGINEERING- I**

(A) CIVIL ENGINEERING

Module I

Materials: *Cement* - varieties and grade of cement and its uses. *Steel*- types of steel for reinforcement bars, steel structural sections. *Brick*- varieties and strength , tests on bricks.

Aggregates- types & requirements of good aggregates. *Concrete*- grades of concrete as per IS code, water cement ratio, workability, mixing, batching, placing, compaction and curing.

Module II

Construction: *Foundation*- types of foundations- isolated footing, combined footing, raft, pile & well foundations, machine foundation. *Super structure*- walls- brick masonry, English bond and Flemish bond , Stone masonry, Random rubble masonry. *Roofing*- Steel trusses, roofing for industrial buildings

Module III

Surveying: Principles, instruments, ranging and chaining of survey lines, field work, field book, selection of survey stations, reconnaissance ,alignment of main lines,

Levelling: Levelling instruments, different types, temporary adjustments, datum planes, level surfaces, horizontal surfaces, mean sea level, reduced level of point, booking of fieldnotes, reduction of levels by height of collimation method.

(B) MECHANICAL ENGINEERING

Module IV

Thermodynamics: thermodynamic systems- open, closed and isolated systems, equilibrium state of a system, property and state, process, cycle, work, equations of state, critical constants, Joule-Thomson effect Zeroth law of thermodynamics- concept of temperature, temperature scales. First law - internal energy, enthalpy, application of first law to closed and open systems. Second law- Kelvin-Planck and Clausius statements, Carnot Cycle.

Module V

Air standard cycles: Air standard efficiency of Otto cycle, Diesel cycle, Dual cycle, Brayton cycle.

Internal Combustion Engines: working of two stroke and four stroke Petrol and Diesel engines, simple Carburettor, ignition system, fuel pump, fuel injector, cooling system, lubricating system.

Module IV

Generation and utilisation of steam: Properties of steam- saturation temperature, wet, dry and superheated steam, dryness fraction, enthalpy, specific volume. Boilers- simple vertical boiler, Cochran boiler, Babcock-Wilcox cross drum water tube boiler, high

pressure Benson boiler, boiler mountings and accessories. Steam turbines- Elementary ideas of simple reaction and impulse turbines, compounding of turbines.

References:

- | | |
|--|-----------------------------|
| 1) Engineering thermodynamics | : P.K. Nag, TMH |
| 2) Engineering thermodynamics | : D.B. Splading & E.H. Cole |
| 3) Engineering thermodynamics | : Van wylon |
| 4) Thermodynamics | : J.P. Holman, McGraw Hill |
| 5) Thermal Engineering | : P.L Ballaney |
| 6) Engineering materials | : Rangwala |
| 7) Building construction | : Punmia |
| 8) A text book of building construction | : N.K.R. Murthy |
| 9) A text book of building construction | : Sharma & Kaul |
| 10) A text book of building construction | : Jha & sinha |
| 11) Surveying & Levelling | : T P Kanetkar |
| 12) Surveying & Levelling | : Hussain |

**CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 108 FUNDAMENTALS OF
ENGINEERING II**

(A) ELECTRICAL ENGINEERING

Module I

Basic principles of Electric circuits: Review of - Ohms law - Definitions of resistance, current, voltage and power series and parallel circuits- constant voltage source and constant current source.

Network Theorems: Kirchoff's laws- Network analysis by Maxillas circulation currents - Thevenin's theorem - super- position theorem - Norton's theorem - simple illustrative problem on network theorems.

Module II

Review of electrostatics - Coulomb's Law, Electric field strength and Electric flux density capacitance. Magnetic circuits-magnetic fields of a coil-Ampere turns and its calculation - magnetic flux - flux density - field strengths. **Review of electromagenetic induction** - Faraday's Law- Lenz's Law - mutually induced emf. **Review of electromagnetic principles** - magnetic circuits - magnetic fields of a coil - Ampere turns calculation - magnetic flux - flux density field strength - **Measuring instruments:** Working principle of galvanometer - Ammeter - votmeter-watt meter - energy meter.

Module III

AC fundamentals: Generation of alternative voltage and current - equations of sinusoidal voltage and current - wave form, cycle frequency, time period, amplitude, phase difference r.m.s value, average value, power factor, form factor - vector diagram using r.m.s values, addition and subtraction of vectors, sine waves in phase and out of phase, A.C circuits:RC, RL, RLC circuits, series and parallel current, voltage and power relationships - poly phase circuits ÷ vector representations, phase sequence, star and delta connections.

(B) ELECTRONICS ENGINEERING

Module IV

Semiconductors: - Energy band diagram - instrinsic, extrinsic - semi conductors, - doping -P N junction - diodes. Characteristics - current components - zenerdiodes.

Rectifiers: - Half wave and full wave rectifier - captive filter - wave forms - ripple factor - regulation characteristics - Bridge rectifier. **Transistors:** - PNP and NPN transistors - theory of operation - Transistor - configurations - characteristics - comparison.

Module V

Transducers - Definition - Classification - Electrical transducer - Mechanical transducer - Strain guage - Transducer for pressure - velocity - vibration - temperature measurements. **Special semiconductor devices** - FET - SCR - LED - LCD - V I characteristics - Applications. CRO - principles operation - measurement of amplitude, frequency and phase.

Module VI

Fundamentals of Communication:- Analog communication - concept of modulation - types - AM - FM - block - diagram of general communication system - demodulation . Basic concepts of digital communication - Block diagram only.

References:

1. Electrical Technology : Hughes, ELBS publication
2. Advanced Electrical Technology : H. Cotton, Wheeler Publication.
3. Electronic Devices & Circuits : G.K. Mithal
4. solid State Electronics Devices :Streetman

Module I

Introduction to Computer Organisation: Central Processing Unit, Memory, Input-Output devices. Secondary storage devices, machine language, assembly language, and high level language, system software, operating system, BIOS, DOS, GUI based OS (Windows), Compilers and assemblers, General introduction to computer networks, LAN, WAN, MAN, INTERNET.

Module II

Introduction to programming in C Fundamental data types- integer, floating point, and enumerated data types, Expressions- arithmetic , relational and logic operators, Type conversion- simple and compound statement, Access to standard library, standard I/O- getchar, putchar, Formatted I/O, scanf, printf, error handling, line input and out put, control structures, selection statement, IF, SWITCH, WHILE, DO WHILE, FOR, BREAK, CONTINUE, GOTO, RETURN statements.

Module III

Functions : Declarations and functions, parameter passing mechanism, storage classes- scope, visibility, and life time of variables, AUTO, EXTERN, STATIC and REGISTER modifiers, Recursion.

Module IV

Arrays : Single and multi dimensional arrays, sorting, selection sort, search- linear search and binary search, Structures and union, pointers and addresses, pointer arrays, function returning pointers, pointers to function, pointer arithmetic, pointers to structures, array of structures, preprocessor directive, command line arguments, typedef.

Module V

Introduction to DBMS: Relational, network and hierarchical models (description only), Introduction to relational algebra and SQL.

Reference:

- 1) Computers and common sense : Roger Hunt and John Shelly (PHI)
- 2) Internet for everyone : Leon & Leon (Leon Tech world, Chennai)
- 3) Programming in C : B. S. Gotfried (Schaum series, TMH)

CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 110 HUMANITIES

Module I

Communication: Introducing communication: Importance of communication. Communication in primitive societies. Objectives of communication : introduction, information, advice, order, suggestion, persuasion, education, warning, raising morale, motivation. Mass communication : written & oral communication, visual communication, audio-visual communication: Role of news papers, radio, cinema & TV. Principles of communication: clarity, completeness, conciseness, consideration, courtesy, correctness. Choice of the right word .The art of listening-learning through listening - body language.

Module II

Types of communication Official and business communication: downward communication, upward communication, horizontal communication. Comprehension: comprehension of ideas in a passage, expansion of an idea for a particular purpose. Summarising a passage for official usage, communicating a given idea to suit different contexts. Report writing- importance of reports, preparing a report, technical report writing.

Module III

Engineering Economics: Nature and scope of economics, economic decision and technical decision, wants and utility, demand and supply, elasticity of demand and supply, concept of cost and revenue, concept of equilibrium and margin. Four factors of production and their peculiarities , **Money and banking-** Functions of money, functions of banks, commercial and central banks, monetary policy of the Reserve Bank of India. **National income-** Macro economics approach, GNP, NNP, NI, DI, PI methods of calculation of national income.

Module IV

History of Science & Technology: Science in the ancient world: contributions of ancient civilizations- Chinese, Indian, Egyptian, and Greek. Renaissance and the intellectual revolution: Contributions of Descartes, Newton, Darwin, and Einstein. The industrial revolution and its impact on society.

Module V

Science in the 20th Century: The transportation and communication revolution, Indian science and Technology in the post independence period. Achievements in the fields of Agriculture, space, and atomic energy. Intermediate and appropriate technology. Science & Religion.

Reference:

- 1) Essentials of business communication: Rajendra Pal & J S Korlahalli (S Chand & Sons, New Delhi)
- 2) Business Communication: Gyani (Jeevandeep Prakashan, Bombay)
- 3) Industrial economics : R R Barthwalk

- 4) Economics- An introductory analysis : Paul A Samuelson
- 5) Science in History : J D Bernal (Penguin Books Ltd)
- 6) History of Science : W C Dampier (Cambridge University Press)
- 7) History of Science - History of Technology: Encyclo[edia Britannicaa.

**CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 111 COMPUTER
PROGRAMMING LAB**

1. Study of OS commands. General introduction to application packages.
2. Programming using C control structures & pointers.
3. Searching & sorting
4. Creation and use of databases in a suitable database package.

CE/ME/EC/CS/SE/IT/EB/EI/EE/MRE 112 WORKSHOPS

MECHANICAL WORK SHOP

- 1) Fitting Shop.
- 2) Sheet Metal Shop
- 3) Foundry Shop
- 4) Welding Shop
- 5) Carpentry Shop

(Preliminary exercises for beginners in all shops. Specific models may be designed by the teachers.)

ELECTRICAL WORKSHOP

1. One lamp controlled by one switch
2. Series and parallel connections of lamps.
3. Stair case wiring.
4. Hospital Wiring.
5. Godown wiring.
6. Fluroscet lamp.
7. Connection of plug socket.
8. Different kinds of joints.
9. Transformer winding.
10. Soldering practice.
11. Familiarisation of CRO.