

BE-301 ENGINEERING MATHEMATICS – I

UNIT I

Numerical analysis: Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi ,Newton-Raphson, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

Definite Integrals : Definite Integrals as a limit of a sum, its application in Summation of Series.

UNIT II

Calculus : Expansion of functions by Maclaurin's and Taylor's theorem. Partial differentiation, Euler's theorem and its application in approximation and errors, Maxima and Minima of function of two variables, Curvature : Radius of curvature.

UNIT III

Differential Equations : Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square). Linear Differential Equations with Constant Coefficients, Cauchy's Homogeneous differential Equation, Simultaneous differential Equations, Method of Variation of Parameters

UNIT IV

Matrices : Rank, Nullity, Solution of Simultaneous equation by elementary transformation, Consistency of System of Simultaneous Linear Equation, Eigen Values and Eigen Vectors, Cayley -Hamilton Theorem and its Application to find the inverse.

UNIT V

Graph Theory : Graphs, Subgraphs, Degree and Distance, Tree, cycles and Network, Algebra of Logic, Boolean Algebra, Principle of Duality, Basic Theorems, Boolean Expressions and Functions. Elementary Concept of Fuzzy Logic

References:

- 1) Higher Engineering Mathematics by B.S. Grewal, Khanna Publication.
- 2) Engineering Mathematics volume I & III by D.K. Jain
- 3) Engineering Mathematics volume I by D.C.Agrawal

CE- 302 Transportation Engineering-I

UNIT-I Introduction, Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort.

- i) Rails: types, welding of rails, wear and tear of rails, rail creep.
- ii) Sleepers: types and comparison, requirement of a good sleeper, sleeper density.
- iii) Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.
- iv) Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track.

UNIT-II Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves.

UNIT-III Types, locations, general equipments, layouts, marshalling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and interlocking.

UNIT-IV Airport Engineering Introduction : Airport site selection, wind rose diagram, basic runway length & corrections, classification of airports, geometrical, runway capacity zoning regulation, emergency surface, airport lightening & traffic controls.

UNIT-V Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts 2, Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

References

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
6. Railway Track by K.F. Antia
8. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
9. Railway, Bridges & Tunnels by Dr. S.C. Saxena
10. Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRS codes
11. Airport planning and design by S.K Khanna, Arora and Jain.

CE – 303 Building Design & Drawing

UNIT I

Study of general principles of composition, unity, symmetry, balance and proportion ,functional treatment.

UNIT II

Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UNIT III

Building Planning – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

UNIT IV

Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT V

Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc.

References

1. Malik & Meo; Building Design and Drawing By
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling
4. Building Design Management – Colin Gray and Will Hughes.

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of Auto CAD for preparation of drawing

CE- 304 Engineering Geology

UNIT I

Introduction to Geology: Objects and scope of geology. The crust and the interior of the earth, origin and age of the earth, Sub-aerial and sub-terrain weathering, denudation and deposition, wind, river, glacial and marine erosion, volcanoes, soil formation, soil profile, geological classification of soil and concept of earthquake Plate- tectonics, landslides.

UNIT II

Mineralogy and Crystallography: Fundamentals of mineralogy, study of properties of common rock forming minerals, ores and minerals of economic importance to civil engineering., elements of crystallography and introduction to crystal systems, engineering properties of rocks.

UNIT III

Petrology: Composition of earth's crust, study of igneous, sedimentary and metamorphic rocks and their formation, characteristics classification, Rocks of civil engineering importance. Geology of India: Physical features of India, Brief geological history of India, occurrence of important ores and minerals in India.

UNIT IV

Structural Geology: Structures related to rocks, Dip, Strike and outcrops, Classification and detailed studies of geological structures i.e. folds, Faults, Joints, Unconformity and their importance in Civil Engineering.

UNIT V

Selection of sites for roads, bridges, dams, reservoirs and tunnels. Prevention of engineering structures from seismic shocks, stability of hill sides, water bearing strata, artesian wells. Remote Sensing technique in study of Engineering Geology and Applications: Electromagnetic Spectrum, Platforms & Sensors, Aerial Photography and satellite remote sensing, Basic principles, data acquisition & data products, Photo and image interpretation keys, Recognition of various rock types, Geological mapping by using Aerial Photographs and satellite imagery.

References:

1. Prabin Singh – “Engineering and General Geology”
2. Gulati ; Geotechnical Engineering; TMH
3. P.K. Mukerjee – “ A text Book of Geology”
4. S.K. Garg – “ A text Book of Physical and Engineering Geology”
5. Textbook of Engineering Geology by N Chenna Kesavulu
6. A textbook of Geology & Engineering by L.M.Bangar
7. Engineering Geology by Goodman R.E.

List of Experiment (Expandable)

1. Identification of simple rock forming minerals and important ores
2. Identification of rock
3. Simple map Exercises.
4. Field Visit / Geological Excursion

AE/CE/ME-305 Strength of materials

UNIT I

Simple Stress and strain: stresses in members of a structure, axial loading, normal stress, shear stress, bearing stress, analysis of simple structures, stepped rods, members in series and parallel: stress strain diagram, Hooke's law, modulus of elasticity, Poisson's ratio, Relation between the elastic moduli, Thermal stress and strain,

UNIT II

Compound stress and strain: principal stresses and principal planes, normal and shear stress, Graphical method-Mohr's circle, Mohr's circle construction for like stresses, unlike stresses, two perpendicular direct stresses as the state of simple shear, ductile and brittle failures,

UNIT III

Deflection of beam: pure bending, symmetric member, deformation and stress, bending of composite sections, eccentric axial loading, shear force and BM diagram, relationship among load, shear and BM, shear stresses in beams, strain energy in bending, deflection of beams, equation of elastic curve, Macaulay's method.

UNIT IV

Torsion in shafts: stresses in a shaft, deformation in circular shaft, angle of twist, stepped-hollow, thin walled-hollow transmission shafts, comparison of solid and hollow shaft, shafts in series, shaft in parallel, combined bending and torsion,

UNIT V

Theories of failures: maximum normal stress & shear stress theory; maximum normal and shear strain energy theory; maximum distortion energy theory; application of theories to different materials and loading conditions.

Columns: stability of structures, Euler's formula for columns with different end conditions, Rankin's formula.

References:

1. Er. R.K.Rajput;Strength of materials;Chand & Company Pvt LTD
2. Rattan; Strength of materials; TMH
3. Nash William;Schaum's Outline Series;Strength of Materials;TMH
4. Negi ; strength of materials; TMH
5. Singh Arbind K; Mechanics of Solids; PHI
6. Sadhu Singh; Strength of Materials; Khanna Pub.
7. Kamal K and Ghai RC; Advanced Mechanics of Materials; Khanna Pub.

List of experiments (Pl. expand it):

1. Standard tensile test on MS and CI test specimen
2. Direct/ cross Shear test on MS and CI specimen
3. Transverse bending test on wooden beams to obtain modulus of rupture
4. Fatigue test
5. Brinell Hardness tests
6. Vicker hardness test
7. Rockwell *hardness test*
8. Izod/ Charpy impact test