

Engineering Mathematics - III

ENGINEERING MATHEMATICS-III (BSC-CV301)

Credit 04

SECTION I

Unit 1: Linear Differential equations with constant coefficients:

- 1.1 Linear Differential equations with constants coefficients and their methods of solutions
- 1.2 Applications of Linear Differential equations with constants coefficients to Civil engineering problems (Beam, Cantiliver and strut)

Unit 2: Vector differential calculus:

- 2.1 Differentiation of vectors Consistency of linear system equations
- 2.2 Gradient of scalar point function and directional derivative
- 2.3 Divergence of vector point function and solenoidal vector fields
- 2.4 Curl of a vector point function and irrotational vector field

Unit 3: Probability Distribution:

- 3.1 Random Variable
- 3.2 Binomial Distribution
- 3.3 Poisson distribution.
- 3.4 Normal distribution

SECTION II

Unit 4: Laplace Transform:

- 4.1 Definition and transforms of elementary functions.
- 4.2 Properties of Laplace transform.

Unit 5: Inverse Laplace Transform:

- 5.1 Inverse Laplace Transform Formulae.
- 5.2 Inverse Laplace Transform by using partial fraction and convolution theorem.
- 5.3 Solution of Linear Differential equations with constants coefficients.

Unit 6: Complex Variable:

- 6.1. Functions of complex variable.
- 6.2 Analytic function.
- 6.3 Necessary and sufficient condition for $f(z)$ to be analytic.
- 6.4 Cauchy -Riemann equations in Cartesian and polar coordinates.
- 6.4 Milne- Thomson method.
- 6.5 Harmonic function.

Text Books:

1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar & J. N. Wartikar, Pune Vidyarthi Griha Prakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.
3. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd., New Delhi.
4. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
3. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.

Surveying-I

Surveying-I (PCC-CV302)

Credit 04

SECTION I

Unit 1: Levelling and Contouring:

- a) Introduction to levelling.
- b) Permanent Adjustments of dumpy level.
- c) Reciprocal levelling, Sensitivity of bubble tube, Corrections -

curvature and refraction.

d) Contouring - methods and applications.

Unit 2: Areas and volumes:

a) Planimeter - Area of Zero Circle and Numerical.

b) Area- Trapezoidal, Simpsons rule, Mid - ordinate rule, Average ordinate.

c) Volume- Trapezoidal and Simpsons Rule, Capacity contouring.

Unit 3: Plane Table Surveying:

a) Principles, accessories, significance and adjustments.

b) Methods and applications of plane table survey.

SECTION - II

Unit 4: Theodolite:

a) Vernier theodolite - components, uses and adjustments.

b) Applications - Trigonometrical levelling.

Unit 5: Theodolite Traversing:

a) Objectives, traverse table, plotting.

b) Omitted measurements.

Unit 6: Applications:

a) Usage of minor instruments- Hand Level, Abney Level, Ghat Tracer and Box Sextant.

b) Hydrographic survey.

c) Tunnel survey.

Textbooks:

1. Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni, Pune Vidyarthi Griha Prakashan.

2. Surveying and Levelling by Subramanian, Oxford University Press.

3. Surveying, Vol. I & II by Dr. B. C. Punmia, Ashok K. Jain, ArunK.Jain, Laxmi Publications.

4. Surveying and Levelling by N. N. Basak, Tata McGraw Hill.

5. Surveying, Vol. I & II by S. K. Duggal, TataMc-Graw Hill.

6. Surveying and Levelling - R. Agor, Khanna Publishers, New Delhi.

Reference Books:

1. Principles of Surveying. Vol. I by J. G. Olliver, J. Clendinning - Van Nostrand Reinhold.

2. Plane Surveying by A. M. Chandra, New Age International Publishers.

3. Surveying Vol. I & II by Dr. K. R. Arora, Standard Book House.
4. Plane surveying - David Clark.

Strength of Materials

Strength of Materials (ESC-CV303)

Credit 04

SECTION I

Unit 1: Stress & Strain:

- 1.1 Engineering properties of different materials.
- 1.2 Simple stress and strain, Hooke's law, elastic behavior of the body under external actions.
- 1.3 Composite sections under axial loading, temperature stresses, elastic constants.
- 1.4 Normal stresses and strains in three dimensions.

Unit 2: Shear force diagram & bending moment diagram for determinate beams:

- 2.1 Concept and definition of SF & BM, relation between SFD, BMD & loading.
- 2.2 SFD & BMD due to point load, UDL, UVL & moments/couples.

Unit 3: Analysis of trusses:

- 3.1 Introduction to truss.
- 3.2 Analysis of truss using method of joints & method of sections.

SECTION II

Unit 4: Bending stresses:

- 4.1 Theory of pure bending.
- 4.2 Derivation of flexural formula.
- 4.3 Bending stress for symmetrical & unsymmetrical section.

Unit 5: Shear stresses in beam:

- 5.1 Shear stress distribution for symmetrical & unsymmetrical section.

Unit 6: Strain Energy:

- 6.1 Strain energy due to different types of actions, suddenly applied load, gradually applied load & impact load, strain energy method for deflection of determinate beams.

6.2 Analysis of thin walled cylinder.

Text Books:

1. "Strength of Materials" - R.K.Bansal., Laxmi Publications.
2. "Strength of Materials" - S Ramamrutham, Dhanapat Rai Publications.
3. "Structural Analysis" - Bhavikatti S.S, Vikas Publications house New Dehli.
4. "Strength of Materials" - R.K.Rajput., S.Chand Publications.

Reference Books:

1. "Mechanics of Materials" - Gere and Timoshenko, CBS publishers.
2. "Mechanics of Material" - Beer and Johnston, M.
3. "Strength of Material" - F. L. Singer and Pytel, Harper and Row publication.

Fluid Mechanics-I

Fluid Mechanics-I (ESC-CV304)

Credit 04

SECTION-I

Unit-1: Properties of fluid:

Introduction: Physical Properties of Fluids (Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity: Dynamic and Kinematic Viscosity, Compressibility, Surface tension, Capillary Effect, Vapour Pressure and Cavitation), Newton's law of viscosity, Types of Fluids. Pressure, Types of Pressure, Pascal's Law, Hydrostatic Law.

Unit-2: Fluid Statics:

A. Pressure Measuring Devices, Pressure Head, Pressure Diagram, Total Pressure and Centre of Pressure, Forces on Plane and Curved Surfaces. Forces on vertical walls, gates and dams.

B. Buoyancy and Floatation: Archimedes's Principle, Metacentre, Stability of Submerged and Floating Bodies.

Unit-3: Fluid Kinematics:

Types of Flows, Stream lines, Streak Line, Path Line, Stream Tube, Stream Bundle, Equipotential lines, velocity and acceleration of fluid, Stream Function and Velocity Potential Function, Flow Net- (Properties and Uses), Continuity Equation (3-D Cartesian Form).

SECTION-II

Unit-4: Fluid Kinetics:

Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernoulli's equations, Bernoulli's Theorem assumptions, Limitations and modifications. Bernoulli's Applications: Venturimeter (Horizontal and Vertical), Orificemeter, Orifices, Time required for Emptying the Tank, Concept of HGL and TEL. Theoretical and Experimental determination of hydraulic coefficients of orifice. Introduction of mouthpiece and Rotameter.

Unit-5: Laminar and Turbulent Flow:

A. Laminar Flow and Turbulent Flow: Reynold's Experiment, Hazen Poissulle's Equation for Viscous Flow through Circular Pipes, Prandtl Mixing Length Theory, Introduction to Moody's Chart.

B. Boundary Layer Theory: Concept, Various Thicknesses (Nominal, Displacement, Momentum, Energy), Hydraulically Smooth and Rough Boundaries, Separation of Boundary Layer, Control of Separation.

Unit-6: Losses in Pipes:

A. Major and Minor Losses, Darcy-Wiesbach Equation, Concept of Equivalent Pipe, Dupit's Equation.

B. Pipes in Series, Parallel and Syphon, Two Reservoir Problems, Three Reservoir Problems Concept of Water hammer. Surge Tanks (Function, Location and Uses).

Text Books:

1. Fluid Mechanics - A.K. Jain - Khanna Pub., Delhi.
2. Fluid Mechanics - Hydraulic and Hydraulic Mechanics - Modi/Seth - Standard Book House, Delhi.
3. Fluid Mechanics - S. Nagrathanam - Khanna Pub., Delhi.
4. Fluid Mechanics - Garde-Mirajgaonkar - Nemchandand Bros., Roorkee.
5. Fluid Mechanics - Arora.
6. Fluid Mechanics through Problems - Garde R. J.
7. Fluid Mechanics and hydraulic machine-R.K.Bansal, Laxmi Publication.

Reference books:

1. Fluid Mechanics - Streeter-McGraw-Hill International Book Co., Auckland.
2. Elementary Fluid Mechanics - H. Rouse - Toppan C. Ltd. Tokyo.
3. Fundamentals of Fluid Mechanics, Munson, Young, Okiishi, Huebesch, Wiley Publication.

Building Construction and Materials

Building Construction and Materials (PCC-CV305)

Credit 05

SECTION I

Unit 1: Engineering properties and use of following materials:

1.1 Stones – Requirements of good building stone, uses of building stones.

1.2 Bricks – Manufacturing, Types (clay bricks, fly ash, cellular light weight concrete brick, aerated cement concrete brick or autoclave brick) and Engineering Properties.

1.3 Timber – Natural and Artificial wood and their application in Civil Engineering.

1.4 Steel – Standard structural sections, steel as reinforcement.

1.5 Tiles – Ceramic, Vitrified, Natural Stone, Paving Blocks.

1.6 Miscellaneous – Aluminium, Glass, Plastic.

Unit 2:

a) Basic requirements of a building as a whole: Strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques, heat insulation, day lighting and ventilation. Sound insulation and anti termite treatment.

b) Building components and their basic requirements : Foundations, plinth, walls and columns in superstructure, floors, doors and windows, sills, lintels and weather sheds, roofs, steps and stairs, utility fixtures.

c) Formwork: Materials (wooden, steel and aluminium).

d) Foundations: Types and their suitability (Stepped, isolated, combined, strip, raft, strap or cantilever, pile.)

Unit: 3

a) Stone Masonry – Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry.

b) Brickwork and Brick Bonds – English, Flemish, Composite masonry.

SECTION II

Unit: 4

a) Lintel: Necessity, Materials: wood, stone, brick, steel, R.C.C. and reinforced brick lintels.

b) Doors - Classification, T.W. Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening.

c) Windows - Classification, T.W. Glazed Windows, Aluminum Glazed Windows, fixtures and fastening.

Unit: 5

Stairs: Technical terms, requirements of a good stair, uses, types, materials for construction. Design of stairs (Dog Legged, quarter turn and Open Well), Ramps, lifts and escalator.

Unit: 6

a) Roofs and Roof coverings: Terms used. Roof and their selection, pitched roofs and their types, Steel Trusses types and their suitability, roof covering, material, details, fixtures manglore tiles, A. C., G. I. and Precoated sheets, concept of proflex (truss less) roof and their selection.

b) Construction of floors: Concrete Flooring, R.C.C. slabs, R.C.C. beams and slab. Flat slab floor.

c) Waterproofing: Materials, methods and systems.

Text Book:

1. Building Construction - B.C.Punmia (Laxmi Publications).
2. Basic Civil Engineering - G. K. Hiraskar (Dhanpat Rai Publications).
3. A Text Book of Building Construction - S.P. Arora, S.P. Bindra (Dhanpat Rai Publications).
4. Construction Technology (Volume 1 to 4) - R. Chudley (ELBS).
5. A Course in Civil Engineering Drawing - V.B.Sikka (S.K.Kataria and Sons)
6. Civil Engineering Drawing - M. Chakraborty.
7. Engineering Materials - R.K.Rajput (S Chand).

References Book:

1. A to Z of Practical Building Construction and Its Management- Sandeep Mantri Satya Prakashan, New Delhi.
2. Handbook of Building Construction- M. M. Goyal (Amrindra Consultancy).

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