



MVCT 101 - Advance Mathematics

Unit 1

Numerical solution of Partial Differential Equation (PDE): Numerical solution of PDE of hyperbolic, parabolic and elliptic types by finite difference method.

Unit 2

Integral transforms: general definition, introduction to Mellin, Hankel and Fourier transforms and fast Fourier transforms, application of transforms to boundary value problems in engineering.

Unit 3

Integral equations: Conversion of Linear Differential equation (LDE) to an integral equation (IE), conversion of boundary value problems to integral equations using Green's function, solution of Integral equation, IE of convolution type, Abel's IE, Integro differential equations, IE with separable variable, solution of Fredholm Equation with separable kernels, solution of Fredholm and Volterra equations by method of successive approximations.

Unit 4

Calculus of Variation: Functionals and their Variational, Euler's equation for function of one and two independent variables, application to enggnerin problems.

Unit-5

FEM: Variational functionals, Euler Lagrange's equation, Variational forms, Ritz methods, Galerkin's method, descrtetization, finite elements method for one dimensional problems.

Reference Books:

1. CF Froberg, Introduction to numerical analysis.
2. SS Sastry, Introductory methods of numerical analysis
3. Krasnove, Kiselevanded Makarenho, Integral equations
4. Buchanan, Finite element Analysis (schaum Outline S), TMH
5. Krishnamurthy, Finite element analysis, TMH
6. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
7. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
8. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH
9. Numerical Methods in engineering, Salvadori and Baron
10. Theory and problems of Numeric analysis (Schaum Outline S), Schied, TMH



MVCT 102 - Construction Materials

1. Material Science :

Classification, Standardisation, Codification and Variety. Details of Micro Structure of Different construction Materials, Different effects on materials of construction.

2. Properties of Materials :

Environmental Influences : Thermal effects : Effect of Chemicals, Fire resistance, Corrosion and Oxidation, Radiation. Properties of fresh & hardened concrete. Shrinkage & creep of concrete.

3. Concrete :

Design and production of concrete ingredients, Additives and admixtures. Special concretes e.g. light weight, Heavy weight, Ready mix concrete, Fibre Reinforced concrete etc.

4. New Construction Materials :

Polymer materials, Thermo - Plastic, Polymer Concrete, Composite materials, Ferrocement, Ferroconcrete, Building materials from Agricultural & Industrial wastes.

5. Quality control in construction :

Various aspects, Principle of statistical quality control. Different techniques of materials and process Quality control, Destructive and non destructive Testing of Materials, I.S. and international procedures of testing.

References :

1. Ammer, D.A. Material Management Irwin Publishers Illionis, 1972.
2. White A.H. Engineering materials, MC Graw - Hill.
3. Deb. A., Engineerig materials, world press.
4. Billmeyer Jr. F.W. Text Book of Polymer Science, Interscience Publishers Inc.
5. Golding Brage Polymers and Resins Nortrand.
6. Schmidt A.X. & Marties CA "Principle of High Polymer Theory & Practice" MC Graw – Hill.
7. Stille, J.K. "Introduction to Polymer Chemistry" Johwiley.
8. Winding C.C. & Hiatt G.D. "Polymetric".



MVCT 103 - Advanced Geotechnical Engineering

1. Site Investigations & Stress Distribution in soils :

Brief review of various methods of subsurface explorations, soil sampling, subsurface soundings, Geophysical explorations. Stress distribution beneath loaded areas by Boussinesq Westergaard's and Steinbrenner methods. Newmark's influence chart. Contact pressure distribution. Settlement analysis.

2. Well Foundations & Cofferdams :

Types of caissons , Wells, and their design criteria. IS and IRC codes and their provisions. Tilt and Shift in wells and their rectifications. Types, Design data for cellular dams, stability analysis. interlock Stresses, Methods of design of cellular coffer dams.

3. Machine Foundations :

Theory of Vibrations. Single and double degree of freedom system. Damped and undamped vibrations. Types of machine foundations, mass spring model of analysis. Apparent mass of soil. Design of block foundations for impact type of machinery. Indian standard on Design and Construction of Foundations for Reciprocating machines.

4. Foundations on Expansive Soils :

Characteristics and treatment of expansive soils. Construction techniques in expansive soils. Use of under-reamed piles and their design criteria, CNS Layer techniques. Construction on collapsible soil.

5. Rock Mechanics :

Problems in Rock mechanics, Classification of rocks, physical, geological and Mechanical properties of rocks, mechanics of rock, deformation and fracture under load. The range and scope of Rock mechanics in relation to civil engineering projects.



MVCT 104 - Construction Technology

1. Advanced Pavement Construction Techniques :

Pavement Construction using Bitumen, Hot mix plant, Concrete Road Construction, Fibre Reinforced Pavement Construction, Low Cost Road Construction Techniques.

2. Form Work and Temporary Structures :

Design and construction features of different types of Temporary Structures. Stationary and slip form work Techniques, Special features of insitu construction. Stripping and Removal of form works, Form works for special structures e.g. shells, bridges, towers etc.

3. Steel Construction :

Shop and insitu construction techniques, different connections. High strength bolts, Clearances and Tolerances, Erection of steel structures like Bridges, Trusses Chimneys, Power Houses.

4. Prestressing :

Plants, Equipment for Prestressed Construction, Different Techniques of Prestressing. Prestressing of Bridge girders, water tanks and special structures.

5. Construction Techniques of Heavy and Special Structures :

Dams, Bridges, large spanroofs, high rise Buildings, off shore Platforms, Pipelines, Tunnels and other under ground structures, Safety measures in Construction.



MVCT 105 - Low Cost Building Materials and Construction Techniques

1. Concepts of low cost materials

Soil, Fly ash, ferrocement, Lime, Fibers, Stone Dust, Boulders and oversize metal, Bitumen etc.

2. Low cost building material products:-

- (a) Walls - Stabilized and sun dried, soil blocks & bricks, Hollow concrete blocks, stone masonry blocks, Ferro-cement partitions.
- (b) Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof.

3. Low cost construction Techniques and Equipment :-

- (a) Techniques :- Rat trap bond construction, Precast R.C. and Ferrocement technique, Mud Technology.
- (b) Equipments :- Brick moulding machine, Stabilised soil block making machine and plants for the manufacturing of concrete blocks.
- (c) Low Cost Roads :-

4. Low cost sanitation :-

- (a) Waste water disposal system
- (b) Low cost sanitation for rural and urban areas
- (c) Ferrocement Drains

5. Cost analysis and comparison :-

- (a) Low cost materials
- (b) Low cost techniques