**4th Semester**

**CT 401: Structural Analysis: L – T – P : CR**

 **4 - 1– 0 : 05**

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| Unit IThree Hinged Arch, Cables and Suspension Bridges:Equilibrium of a loaded cord,Vector diagram,Cable carrying uniformly distributed load,Suspention bridge with three-hinged stiffening girder. Unit IIInfluence Line Diagram for Reaction, Shear, Bending Moment and their maximum & minimum values for determinate beams, Arches and trusses, ILD for concentrated load, for uniformly distributed load, for single pointed load, for wheel load.Unit IIIDeflections by moment- area, Conjugate beam and energy methods,Virtual work,Unit load method,Deflection by strain energy method.Unit IVDegree of indeterminacy and stability, Determining degree of indeterminacy,Principles of superposition, Betti’s law, Castigliano’s theorems & applications.Unit VAnalysis of indeterminate beams by strain- energy:Strain energy due to bending, analysis of beams and rigid frames by strain energy method and virtual work methods,Principle of virtual work for deformable bodies. |

##### **Books:**

1. Theory and Analysis of Structures (Vol. II), O.P. Jain and A S Arya, Nem Chand & Brothers, Roorkee, India.
2. Basic Structural Analysis, C S Reddy, Tata McGraw Hill, New Delhi.
3. Analysis of Structures Vol. I & II, V N Vazarani & M. M. Ratwani, Khanna Publications, Delhi.
4. Elementary Structural Analysis, S. Utku, C H Noris, and J.B. Wilbur, McGraw Hill, N.Y.
5. Theory of Structures, Timoshenko and Young, McGraw Hill, N.Y..

**CT 402: Water Supply and Sanitary Installation: L – T – P : CR**

 **3 - 0 – 0 : 03**

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| Unit ISources of water supply:Surface runoff, precipitation, measurement of rainfall, types of sources, surfase source, underground sources, wells, tube wells and method of construction, types of pumps with fittings.Unit IICollection of surface water and its conveyance through pipes: canal intake, reservoir intake, river intake, portable intake, type of pipes, methods of layout of pipes, corrosion in pipes and their remedial measures, appurtenances in distribution systemUnit IIISanitary systems- Conservancy and water carriage systems, systems of sewerage, construction and maintenance of privies, Septic tanks, imhoff tanks.Unit IVSewers: materials for sewers, shapes of sewers, joints in sewers, laying and testing of sewers, ventilation of sewers, cleaning of sewers, sewer appurtenances.Unit VPlumbing equipments and operations, Water supply and sanitary fittings, house drainage, concepts of rural water supply and sanitation. |

**Books:**

1. Environmental Engineering Vol. I: Water Supply Engineering, S.K. Garg, Khanna Publishers, Delhi.
2. Environmental Engineering Vol. II: Sewage Disposal & Air Pollution Engineering, S.K. Garg, Khanna Publishers, Delhi.
3. Wastewater Engineering: Treatment, Disposal & Reuse, Metcalf & Eddy, Tata McGraw Hill, New Delhi.
4. Elements of Public Health Engineering, K.N. Duggal, S. Chand & Co, New Delhi.
5. Water Supply & Sanitary Engineering, S.C. Rangawala, Charotar Publishing House, Anand, India.
6. Water Supply and Sanitary Installations, A C Panchdhari, New Age International, New Delhi.

**CT 403: Fluid Mechanics L – T – P : CR**

 **4 - 0 – 0 : 04**

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| Unit IProperties of fluid: mass density, relative density, viscosity, fluid pressure,pressure head. Fluid statics - Pressure at a point, units of measurement, manometers, forces on plane areas, line of action of force, Unit IIFundamentals of fluid flow - steady, unsteady, uniform, non-uniform, one dimensional, two dimensional and three dimensional flows; Streamline, stream tube, equation of continuity. Energy equation and its applications.Unit IIIFluid flow in pipes - Reynolds number, critical velocity, laminar flow, turbulent flow, shearing stresses at pipe wall, velocity distribution, loss of head for laminar flow, steady incompressible flow through simple pipe systems, Darcy - Weisbach equation, simple pipe flow problems, losses of head for sudden expansion and sudden contraction.Unit IVFluid measurements - velocity measurement, Pitot tube, coefficient of discharge, coefficient of velocity, coefficient of contraction, orifices, orifice meter, venturimeter, time to empty tanks, weirs and notches.Unit VIntroduction to open channel flow - prismatic and non-prismatic channels, equation of continuity for steady flow, uniform flow, Manning’s formula, simple problems of steady uniform flow in rectangular and trapezoidal channels.  |

# Books:

1. Hydraulics and Fluid Mechanics including Hydraulics Machines, Modi, P.N. and S.M. Seth, Standard Book House, Delhi.
2. Theory and Problems of Fluid Mechanics, Subramanya, K, Tata McGraw Hill, New Delhi.
3. Fluid Mechanics through Problems, Garde R.J., New Age International, New Delhi.
4. A Text Book of Fluid Mechanics, Rajput, R.K., S. Chand & Co, New Delhi.
5. Fluid Mechanics Hydraulics & Hydraulic Machines, Arora, K.R., Standard Publishers & Distributions, Delhi.

**CT 404: Surveying-II L – T – P : CR**

 **3 - 0 – 2 : 04**

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| Unit IPlane table surveying: methods of plane tabling, two- point and three- point problems and their solutions, errors in plane tabling.Unit IITheodolite-description and adjustment of transit theodolite, measurement of angles and setting out lines. Unit IIITrigonometrical levelling- Height and distance of objects with accessible and inaccessible base, terrestrial refraction, determination of difference in elevation.Unit IVTacheometry - Principles, field observations, reduction of readings, applications. |

**Books:**

1. Surveying-Vol-I, B. C. Punamia, Laxmi Publications, New Delhi.
2. Surveying & Levelling Vol.-I, T. P. Kanetkar & S. V. Kulkarni, Pune Vidyarthi Griha Prakashan, Pune.
3. Surveying Vol.-I, S. K. Duggal, Tata McGraw Hill, New Delhi.
4. Surveying and Levelling, N. N. Basak, Tata McGraw Hill, New Delhi.

**CT 405: Building Construction and Maintenance and Civil Engineering Drawing**

 **L – T – P : CR**

 **4 - 0 – 0 : 04**

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| Unit IFoundation: introduction,functions of foundation, types of foundation; Brick masonry: Introduction, General principles in brick masonry construction, Bond in brick masonry; Form work: Types of form work, types of forms for different structural members; Scaffolding: Component parts and types of scaffolding.Unit IIDoors and windows: Introduction, component parts of doors and windows, sizes of doors and windows,and types of doors and windows; Arches and lintels: Component parts and classification of arches and lintels.Unit IIIRoofs: Introduction and Classification of roofs and roof coverings; Floors: Introduction, components of a floor, types of floors, cement concrete and mosaic floors; Damp proof courses: causes of dampness, methods and materials used for damp proofing.Unit IVStairs: Introduction, component parts of staircase, dimentions of a step, classification of stairs; Protective and Decorative finishes.Unit VMaintenance and repairs of floors, walls, wooden parts, foundations and roofs. |

**Books:**

1. Building Construction, B.C. Punmia, Laxmi Publishers, New Delhi.
2. Building Construction, Shushil Kumar, Standard Publishers, Delhi.
3. Maintenance of Building, A.C. Panchdhari, New Age International, New Delhi.
4. Building Construction Vol I to IV, W.B. Mackey, Orient Longman, Mumbai.

**6th Semester (old course)**

**CT 3201: Computational Methods in Civil Engineering L – T – P : CR**

 **4 - 0 – 2 : 04**

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| Unit IIntroduction to Visual Basic, Introduction to FEM and use of structural analysis package; Optimisation – linear programming by simplex.Unit IIExamples from RCC structures (Design charts for singly and doubly reinforced beams, design of slabs).Unit IIIExamples from Geotechnical Engineering. (Design of footings, settlement analysis, flow nets)Unit IVExamples from Fluid Mechanics (Critical depth calculations in trapezoidal, circular and rectangular channels, pipe network analysis)Unit VExamples from Environmental Engineering (Application to treatment systems and their modelling).Unit VIExamples from Highway Engineering.( Design of super elevation , transition curves etc.) |

**Books**:

1. Numerical Methods for Engineers, S.K. Gupta, New Age International, New Delhi, 1995.
2. FORTAN 77, C. Xavier, Wiley Eastern Limited, New Delhi, 1994.
3. The C++ Programming Language, B. Stroustrup, AWL, Pearson Education, New Delhi, 2000.
4. Beginning Visual BASIC 6, Peter Wright, SPD, Mumbai, 1998.

**CT 3202: Design of Steel Structures: L – T – P : CR**

 **4 - 1 – 0 : 05**

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| Unit IConcept of elastic and plastic design of steel structures. Introduction to rolled Steel Sections, Loads, Factor of Safety, Permissible and Working Stresses.Unit IIRiveted, Welded, Pinned and Bolted Connections, Strength and Efficiency and Design of Joints. Introduction to High Strength Friction Grip Bolts. Unit IIIEffective length. Slenderness Ratio, Strength of Compression Member, Design of Struts, Column, Built-up Columns, Encased Columns, Design of Eccentrically Loaded Columns, Splices. Design of Slab and Gusset Bases, Design of Grillage Footing. Unit IVTension members: Net and gross Sectional Areas, Strength of Members and their Design, Lug Angle. Unit VBeams: Web Crippling and Web Buckling, Design of Laterally Supported Beam, Design of Laterally unsupported Beam, Encased Beam Lintel, Purlins, Builtup Beams, Bearing plate.  |

**Books:**

1. Steel Structures, A S Arya and J L Azmani, Nem Chand & Brothers, Roorkee, India
2. Design of Steel Structures, P Dayaratnam, Wheeler Publishing, Allahabad
3. Design of Steel Structures Vol. I, Ram Chandra, Standard Book House, Delhi
4. Design of Steel Structures, L.S. Negi, Tata McGraw Hill, New Delhi, 1996.
5. Design of Steel Structures, Kazmi and Jindal, Prentice Hall of India, New Delhi

**CT 3203: Construction and Project Management: L – T – P : CR**

 **4 - 0 – 0 : 04**

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| Unit IScientific management , Need of management, function and application of management, organization, site and construction management.Unit IIControl and monitoring of progress, Cost control, Inspection and quality control:quality control daily report,Equipment checks,Activity schedule,Safety manual.Unit IIIThe Elements of Project Management:Network analysis, PERT and CPM, Critical path activities, Project network, Normal distribution,Times: Optimistic, Most likely,Pessimistic.Unit IVLabour welfare and labour law. Departmental procedure and accounts, PWD accounts. Stores and material management: Store accounts, Materials issue and receipt, Inventory Management and Quality Control.  |

**Books:**

1. Construction Management and Accounts, Harpal Singh, Tata McGraw Hill, New Delhi
2. Construction Management Practices, V K Raina, Tata McGraw Hill, New Delhi
3. Management in Construction Industry, P.P.Dharwadker, Oxford & IBH, New Delhi
4. Construction Planning & Management, P.S. Gahlot &B.M Dhir, New Age International, New Delhi

**6th Semester (New course)**

**CT 601 : Estimation and Costing: L – T – P : CR**

 **4 - 0 – 2 : 05**

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| Unit I | Unit of measurements and payments, Methods of estimates & examples. |
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| Unit II | Preparation of detailed estimates of earthwork, masonry, concreting, flooring. |
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| Unit III | Estimates of plastering, white washing and painting, wood and steel work, RCC work and sanitary fittings, Estimate preparation for buildings, roads, culverts. |
| Unit IV | Estimate preparation for water tank, septic tank and retaining wall, etc. |
| Unit V | Rate analysis for construction, materials and various items of work. |

**Books:**

1. Estimating & Costing in Civil Engineering, B.N. Dutta, UBS Publishers Distributors Ltd., New Delhi
2. Estimating & Costing Professional Practice, S.C. Rangwala, Charotar Publishing House, Anand, India
3. Quantity Surveying: Estimating and Costing, P L Bhasin, S Chand & Co, Delhi
4. Estimating, Costing, Specifications & Valuation, M Chakroborty, Author, Calcutta

**CT 602 : Design of Steel Structures: L – T – P : CR**

 **4 - 1 – 0 : 05**

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| Unit IConcept of elastic and plastic design of steel structures. Introduction to rolled Steel Sections, Loads, Factor of Safety, Permissible and Working Stresses.Unit IIRiveted, Welded, Pinned and Bolted Connections, Strength and Efficiency and Design of Joints. Introduction to High Strength Friction Grip Bolts. Unit IIIEffective length. Slenderness Ratio, Strength of Compression Member, Design of Struts, Column, Built-up Columns, Encased Columns, Design of Eccentrically Loaded Columns, Splices. Design of Slab and Gusset Bases, Design of Grillage Footing. Unit IVTension members: Net and gross Sectional Areas, Strength of Members and their Design, Lug Angle. Unit VBeams: Web Crippling and Web Buckling, Design of Laterally Supported Beam, Design of Laterally unsupported Beam, Encased Beam Lintel, Purlins, Builtup Beams, Bearing plate.  |

**Books:**

1. Steel Structures, A S Arya and J L Azmani, Nem Chand & Brothers, Roorkee, India
2. Design of Steel Structures, P Dayaratnam, Wheeler Publishing, Allahabad
3. Design of Steel Structures Vol. I, Ram Chandra, Standard Book House, Delhi
4. Design of Steel Structures, L.S. Negi, Tata McGraw Hill, New Delhi, 1996.
5. Design of Steel Structures, Kazmi and Jindal, Prentice Hall of India, New Delhi

**CT 603 : Construction and Project Management: L – T – P : CR**

 **4 - 1 – 0 : 05**

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| Unit IScientific management , Need of management, function and application of management, organization, site and construction management.Unit IIControl and monitoring of progress, Cost control, Inspection and quality control:quality control daily report,Equipment checks,Activity schedule,Safety manual.Unit IIIThe Elements of Project Management:Network analysis, PERT and CPM, Critical path activities, Project network, Normal distribution,Times: Optimistic, Most likely,Pessimistic.Unit IVLabour welfare and labour law. Departmental procedure and accounts, PWD accounts. Stores and material management: Store accounts, Materials issue and receipt, Inventory Management and Quality Control.  |

**Books:**

1. Construction Management and Accounts, Harpal Singh, Tata McGraw Hill, New Delhi
2. Construction Management Practices, V K Raina, Tata McGraw Hill, New Delhi
3. Management in Construction Industry, P.P.Dharwadker, Oxford & IBH, New Delhi
4. Construction Planning & Management, P.S. Gahlot &B.M Dhir, New Age International, New Delhi

**CT 611 : Construction Methods and Machinery L – T – P : CR**

 **4 - 0 – 2 : 04**

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| Unit I | Engineering and construction economy, steps involved in construction. |
| Unit II | Supervision of concreting in hot and cold climate, quality control, precautions to be taken in construction of high rise buildings. |
| Unit III | Erection of steel structures. Use of compressed air in construction. |
| Unit IV | Standard and special equipments, Selection, operation and maintenance of equipments. |
| Unit V | Construction accidents; types and causes, effective preventive measures. |

**Books:**

1. Construction Equipments, Job Planning, S.V. Deodhar, Khanna Publishers, New Delhi, 1988.
2. Construction of Structures & Management of Works, S.C. Rangawala, Charotar Publishing House, Anand, India, 1985.
3. Construction Planning Equipments and Methods, R.L. Peurifoy, W B Ledbetter and C J Schexnayder, McGraw Hill, NY, 1996.

**CT 612: Water Resource Engineering L – T – P : CR**

 **4 - 0 – 2 : 04**

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| Unit I | Hydrological cycle - precipitation, measurement of precipitation, preparation and presentation of data, mass curve, hydrograph, point rainfall, depth-area-duration relationships, maximum precipitation. Evapotranspiration and Infiltration. |
| Unit II | Stream flow measurement, measurement of stage and velocity, Rainfall - runoff characteristics, rainfall runoff correlation, flow duration curve, flow mass curve. Hydrographs - definition, influencing factors and components of a hydrograph, base flow separation, effective rainfall, unit hydrograph, use and limitations. |
| Unit III | Groundwater - forms of surface water, aquifer, aquitard, aquiclude, aquifuse; Aquifer properties, specific yield and specific retention, Darcy’s law, hydraulic conductivity, transmissibility - steady flow in a well.  |
| Unit IV | Crops and crops season; Soil - water relationships, field capacity, infiltration, consumptive use, requirement and frequency of irrigation; Canal irrigation, Canal outlets. Water logging and Canal lining. River training works. |

# Books:

1. Engineering Hydrology, Subramanya, K., Tata McGraw Hill, New Delhi, 1994.
2. Hydrology, Principles, Analysis and Design, Raghunath, H.M., New Age International, New Delhi, 1985.
3. Applied Hydrology, Chow, VT, D R Maidment and L W Mays, McGraw Hill Book Company, New York, 1988.
4. Elementary Hydrology, Singh, V.P., Prentice-Hall India, New Delhi, 1994.
5. A Text Book of Hydrology, Rani Reddy, P.J., Laxmi Publications, New Delhi, 1999.

**CT 613: Computational Methods in Civil Engineering L – T – P : CR**

 **4 - 0 – 2 : 04**

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| Unit I | Computing, computer programming, basic matrix algebra, Data type, Arrays, input/output, Branching, loops, plotting and graphics. |  |
| Unit II | Examples from RCC structures (Design charts for singly and doubly reinforced beams, design of slabs). |  |
| Unit III | Examples from Geotechnical Engineering. (Design of footings, settlement analysis, flow nets ) |  |
| Unit IV | Examples from Fluid Mechanics (Critical depth calculations in trapezoidal, circular and rectangular channels, pipe network analysis) |  |
| Unit V | Examples from Environmental Engineering (Application to treatment systems and their modelling). |  |
| Unit VI | Examples from Highway Engineering.( Design of super elevation , transition curves etc.) |  |