**CT 301: Construction Materials L – T – P : CR**

 **4 - 0 – 0 : 04**

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| Unit I | Rock: Classification, quarrying and dressing. Bricks: Manufacturing processes, classification and tests. Flooring and roofing tiles. |
| Unit II | Production, properties and uses of lime; cement and sand-mortar. Concrete: Plain and reinforced. |
| Unit III | Timber: types and methods of preservation, plywood. Iron and structural steel. |
| Unit IV | Types and uses of paints; varnishes and distemper. Sound and heat insulting materials; Glasses; plastics and asphaltic materials. |

**Books:**

1. Civil Engineering Materials, TTTI, Chandigarh, Tata McGraw Hill, New Delhi
2. Engineering Materials, Sushil Kumar, Metropolitan Publishers, New Delhi
3. Engineering Materials, Rangwala, S.C., Charotar Publishing House, Anand, India
4. Engineering Materials, K P Roy Chowdhury, Oxford & IBH, New Delhi

**CT 302: Surveying - I L – T – P : CR**

 **4 - 0 – 2 : 05**

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| Unit I | Introduction, classification of survey, chain surveying - principle, instruments used, procedure, Problems and errors in chain survey.  |
| Unit II | Compass surveying: types, description and uses, measurement of bearings in WCB and QB systems, local attraction and related problems. |
| Unit III | Levelling: differential levelling, booking and reduction of levels, related problems and practices. |
| Unit IV | Contouring: Principles, methods and applications, contour gradient. |

**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 303: Strength of Materials L – T – P : CR**

 **4 - 0 – 0 : 04**

Unit I: Concept of Stress & Strain, normal & shearing stress and strains , stress-strain relationship, generalized Hooke’s law, plane stress & plain strain, poission’s ratio, stress-strain diagram for uniaxial loading.

Unit II: Torrion of circular shafts. Stress and deflections in closed coiled helical springs subjected to axial forces, members subjected to flexural loads, Colums-Euler, Rankine and Secant formulae and related problems.

Unit III: Relationships between load, shearing force and bending moment, shear force and bending moment diagrams.

Unit IV: Theory of simple bending stresses in beams, Bending and shear stress distribution over cross-sections of determinate beams.

Unit V: Principal stress and strain, principal planes, mohr’s circle of stresses and strain and related problems.

**Books:**

1. Strength of meterials & mechanics of structures, B. C. Punmia, Standard Publishers & Dristributers, Delhi.
2. Mechanics of Materials, J. M. Gera and S. P. Timoshenko, CBS Publishers & Distributors, Delhi.

**CT 501: Construction Technology: L – T – P : CR**

 **3 - 1 – 2 : 05**

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| Unit I | Roads classification, Geometrical features of roads, Construction of WBM, Black top and concrete pavements including grade and base courses. Equipments used for road construction, features of hilly roads. |
| Unit II | Railways - Components of Railway tracks, Construction and Maintenance of tracks. |
| Unit III | Bridge and Culverts - Types of bridges/culverts, criteria for selection of sites, Construction and maintenance of bridges/culverts. |
| Unit IV | Hydraulic Structures - Construction details of dam, construction details of canals/other hydraulic structures. |

**Books:**

1. Highway Engineering, S K Khanna and C E G Justo, Nem Chand and Brothers, Roorkee, India.
2. A Text Book of Railway Engineering, Arora & Saxena, Dhanpat Rai and Sons, New Delhi.
3. Elements of Bridge Engineering, J Victor, Oxford and IBH, New Delhi.
4. Irrigation Engineering & Hydraulic Structures, S.K. Garg, Khanna Publishers, Delhi.
5. Text Book of Railway Engineering, B.L. Gupta, Standard Publishers, New Delhi

**CT 502: Concrete Technology: L – T – P : CR**

 **3 - 1 – 2 : 05**

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| --- | --- |
| Unit I | Concrete: Importance, Production of concrete, operations involved, grades, Ingredients, yield of concrete. |
| Unit II | Aggregates: Objectives, Classification, Characteristics and properties of aggregates; Cement: Objective, Composition, Varieties and respective advantages; Water: Quality, Mixing and Curing. |
| Unit III | Properties of green and hardened concrete, Rheology and mix proportioning.  |
| Unit IV | Admixtures: Objective, Types of admixture and compounds; Quality Control - Influencing Parameters, advantages, measure of variability and Statistical Quality Control.  |
| Unit V | Special Concrete - Ferro-Cement, Polymer Concrete Composites, lightweight & fibre reinforced concrete, Gunniting.  |

**Books:**

1. Concrete Technology, M L Gambhir, Tata McGraw Hill, New Delhi.
2. Concrete Technology, M S Shetty, S. Chand & Company, New Delhi.
3. Concrete Manual: Laboratory Testing for Quality Control of Concrete, M L Gambhir, Dhanpat Rai & Sons, New Delhi.
4. Concrete for Construction, V K Raina, Tata McGraw Hill, New Delhi.
5. Properties of Concrete, A. M. Neville, Longman, ELBS, London.

**CT 503: Geotechnical Engineering L – T – P : CR**

 **4 - 0 – 2 : 05**

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| --- | --- |
| Unit IUnit IIUnit IIIUnit IVUnit V | Physical properties of Soil – Void ratio, Porosity, Degree of Saturation, Water content, Unit Weights, Specific Gravity– their relationships, Relative density, Consistency limits determination and various indices – Significance and Importance, Classifications : Mechanical analysis – Sieve analysis, stoke’s law, hydrometer and Pipette Analysis Textural Classification, Structural Classification based on size – unified soil classification system and Indian Standard soil classification system. Soil compaction; mechanism of compaction, Factors effecting compaction – water content, compactive effort, Nature of soil. B.S., Modified AASHO and IS compaction tests. Effect of compaction on physical and engineering properties of soils.Permeability and Seepage:types of soil water, capillary rise and surface tension, Darcy’s law and its limitations constant head and variable head permeameters pumping tests, Factors effecting coefficient of permeability, permeability of stratified soils. Total, ne utral and effective stresses, No flow downward flow and upward flow conditions, quick sand conditions, critical hydraulics gradient. Consolidation : Oedometer Test, e-p and e-log p curves – compression index, coefficient of compressibility and coefficient of volume decrease. Terzaghi’s one dimensional consolidation theory assumption, derivation and application, coefficient of consolidation time curve fitting methods, initial compression, primary compression and secondary compression determination of preconsolidation pressure. Normally consolidated, over consolidated and under consolidated clays. Mohr circle of stress, Mohr coulomb failure theory shear tests – shear box, unconfined compression, and triaxial compression tests, fieldvane shear tests, shear parameters, types of shear tests in the laboratory based on drainage conditions, shear strength of sands, critical void ratio and dilatancy, shear strength of clays, total stress analysis and effective stress analysis, skemptons pore pressure coefficients, stress paths.  |

**Books :**

1. Principles of Soil Mechanics and Foundation Engineering, V.N.S. Murthy, UBSPD, New Delhi
2. Soil Engineering, Part I : Fundamentals & General Principles, Allam Singh & G.R. Chowdhary, C.B.S, New Delhi
3. Fundamentals of Geotechnical Engineering, B.M. Das, Brookes & Cole Publications, London
4. Highway Engineering, S K Khanna and C E G Justo, Nem Chand & Brothers, Roorkee, India

A Text Book of Railway Engineering, Arora & Saxena, Dhanpat Rai & Sons, Delhi

**CT 504: Design of RCC Structures: L – T – P : CR**

 **4 - 0 – 0 : 04**

|  |  |
| --- | --- |
| Unit I | Introduction of Design Concepts; Working Stress Method of Design, Design of Rectangular and Flanged Beams for Flexure (singly and doubly reinforced). |
| Unit II | Design of rectangular and flanges beams for bond, shear and torsion.  |
| Unit III | One-way, Two Way and Continuous slabs. |
| Unit IV | Axially and Eccentrically Loaded Short Columns; axially and eccentrically loaded long columns; Isolated Footings. |
| Unit V | Limit State Method of Design for flexure, shear, torsion and compression. |

##### **Books:**

1. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, New Delhi
2. Design of RCC Structures, M L Gambhir, Macmillan India Ltd, Delhi
3. Reinforced Concrete, S.K. Mallick & A P Gupta, Oxford & IBH, New Delhi
4. Reinforced Concrete, Behaviour, Analysis and Design, P. Purushothaman, Tata McGraw Hill, New Delhi
5. RCC Structures, B C Punmia, Ashok K Jain, and Arun K Jain, Laxmi Publications, Delhi

**CT 505: Transportation Engineering L – T – P : CR**

 **4 - 0 – 2 : 05**

|  |  |
| --- | --- |
| Unit IUnit IIUnit III | Highway development and planning, Classification of roads, Highway alignmentGeometric design – factors, considerations; design of Cross sectional elements, Sight distance, horizontal and vertical alignment. Traffic control devices, traffic Characteristics, Traffic studies. |
| Unit IVUnit VUnit VI | design of pavements – Design of flexible pavements, CBR Methods, Design of Rigid pavements, recommendations for design of concrete roads. Construction of roads – Earthen roads – W.B.M. roads – Bitumens roads –cement concrete roads – Highway materials and their properties and tests. Railways – Rails, sleepers, ballast; Geometrics for broad guage, cent defficiency; points and crossing, station yard. |

**Books**

1. Highway Engineering, S K Khanna and C E G Justo, Nem Chand & Brothers, Roorkee, India
2. A Text Book of Railway Engineering, Arora & Saxena, Dhanpat Rai & Sons, Delhi

**CT 506: Environmental Engineering: L – T – P : CR**

 **3 - 0 – 0 : 03**

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| Unit I | Introduction, estimation of quantity of water, per capita demand, designs period, population forecasting. |
| Unit II | Sources of water and their suitability with regard to quality & quantity, storage capacity of reservoirs, water quality parameters, standards. |
| Unit III | Treatment of water- screenings, sedimentation, coagulation and flocculation, filtration & disinfection, distribution system, methods of water supply and storage. |
| Unit IV | Sewerage system, estimation of quantity of sewage, dry weather flow (DWF), wet weather flow (WWF), variation in flows, Nomograms, hydraulic design of sewers, pumping of sewage. |

**Books:**

1. Wastewater Engineering: Treatment, Disposal and Reuse, Metcalf & Eddy, Tata McGraw Hill, New Delhi
2. Environmental Engineering Vol. I: Water Supply Engineering, S.K. Garg, Khanna Publications, Delhi
3. Environmental Engineering Vol II: Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi
4. Water Supply & Sanitary Engineering, G.S. Birdi and J.S. Birdi, Dhanpat Rai Publishing Co., New Delhi

Environmental Engineering, Peavy, Tachobanoglous & Rowe, McGraw Hill International, N.Y.

**CT 3101: Construction Technology: L – T – P : CR**

 **3 - 1 – 2 : 05**

|  |  |
| --- | --- |
| Unit I | Roads classification, Geometrical features of roads, Construction of WBM, Black top and concrete pavements including grade and base courses. Equipments used for road construction, features of hilly roads. |
| Unit II | Railways - Components of Railway tracks, Construction and Maintenance of tracks. |
| Unit III | Bridge and Culverts - Types of bridges/culverts, criteria for selection of sites, Construction and maintenance of bridges/culverts. |
| Unit IV | Hydraulic Structures - Construction details of dam, construction details of canals/other hydraulic structures. |

**Books:**

1. Highway Engineering, S K Khanna and C E G Justo, Nem Chand and Brothers, Roorkee, India.
2. A Text Book of Railway Engineering, Arora & Saxena, Dhanpat Rai and Sons, New Delhi.
3. Elements of Bridge Engineering, J Victor, Oxford and IBH, New Delhi.
4. Irrigation Engineering & Hydraulic Structures, S.K. Garg, Khanna Publishers, Delhi.
5. Text Book of Railway Engineering, B.L. Gupta, Standard Publishers, New Delhi

**CT 3102: Concrete Technology: L – T – P : CR**

 **3 - 1 – 2 : 05**

|  |  |
| --- | --- |
| Unit I | Concrete: Importance, Production of concrete, operations involved, grades, Ingredients, yield of concrete. |
| Unit II | Aggregates: Objectives, Classification, Characteristics and properties of aggregates; Cement: Objective, Composition, Varieties and respective advantages; Water: Quality, Mixing and Curing. |
| Unit III | Properties of green and hardened concrete, Rheology and mix proportioning.  |
| Unit IV | Admixtures: Objective, Types of admixture and compounds; Quality Control - Influencing Parameters, advantages, measure of variability and Statistical Quality Control.  |
| Unit V | Special Concrete - Ferro-Cement, Polymer Concrete Composites, lightweight & fibre reinforced concrete, Gunniting.  |

**Books:**

1. Concrete Technology, M L Gambhir, Tata McGraw Hill, New Delhi.
2. Concrete Technology, M S Shetty, S. Chand & Company, New Delhi.
3. Concrete Manual: Laboratory Testing for Quality Control of Concrete, M L Gambhir, Dhanpat Rai & Sons, New Delhi.
4. Concrete for Construction, V K Raina, Tata McGraw Hill, New Delhi.
5. Properties of Concrete, A. M. Neville, Longman, ELBS, London.
6. IS: 456 2000, B I S.

**CT 3103: Geotechnical and Transportation Engineering L – T – P : CR**

 **4 - 0 – 2 : 05**

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| Unit I | Introduction, definitions and relationships; Index properties of soils; Soil classification; Soil structure; Soil compaction; Permeability and Seepage. |
| Unit II | Effective stress; Stress distribution in soil mass; One dimensional consolidation; Shear strength of soils and shear tests. |
| Unit III | Roads; Introduction, Classification of road pattern; Geometric design – factors, considerations; Traffic control devices. |
| Unit IV | Railways – Rails, sleepers, ballast; Geometrics for broad guage, cent defficiency; points and crossing, station yard. |

**Books :**

1. Principles of Soil Mechanics and Foundation Engineering, V.N.S. Murthy, UBSPD, New Delhi
2. Soil Engineering, Part I : Fundamentals & General Principles, Allam Singh & G.R. Chowdhary, C.B.S, New Delhi
3. Fundamentals of Geotechnical Engineering, B.M. Das, Brookes & Cole Publications, London
4. Highway Engineering, S K Khanna and C E G Justo, Nem Chand & Brothers, Roorkee, India
5. A Text Book of Railway Engineering, Arora & Saxena, Dhanpat Rai & Sons, Delhi

**CT 3104: Design of RCC Structures: L – T – P : CR**

 **4 - 0 – 0 : 04**

|  |  |
| --- | --- |
| Unit I | Introduction of Design Concepts; Working Stress Method of Design, Design of Rectangular and Flanged Beams for Flexure (singly and doubly reinforced). |
| Unit II | Design of rectangular and flanges beams for bond, shear and torsion.  |
| Unit III | One-way, Two Way and Continuous slabs. |
| Unit IV | Axially and Eccentrically Loaded Short Columns; axially and eccentrically loaded long columns; Isolated Footings. |
| Unit V | Limit State Method of Design for flexure, shear, torsion and compression. |

##### **Books:**

1. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, New Delhi
2. Design of RCC Structures, M L Gambhir, Macmillan India Ltd, Delhi
3. Reinforced Concrete, S.K. Mallick & A P Gupta, Oxford & IBH, New Delhi
4. Reinforced Concrete, Behaviour, Analysis and Design, P. Purushothaman, Tata McGraw Hill, New Delhi
5. RCC Structures, B C Punmia, Ashok K Jain, and Arun K Jain, Laxmi Publications, Delhi

**CT 3105: Estimation and Quantity Surveying: L – T – P : CR**

 **4 - 1 – 0 : 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. |
|  |  |
| 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 3106: Environmental Engineering: L – T – P : CR**

 **3 - 0 – 0 : 03**

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| --- | --- |
| Unit I | Introduction, estimation of quantity of water, per capita demand, designs period, population forecasting. |
| Unit II | Sources of water and their suitability with regard to quality & quantity, storage capacity of reservoirs, water quality parameters, standards. |
| Unit III | Treatment of water- screenings, sedimentation, coagulation and flocculation, filtration & disinfection, distribution system, methods of water supply and storage. |
| Unit IV | Sewerage system, estimation of quantity of sewage, dry weather flow (DWF), wet weather flow (WWF), variation in flows, Nomograms, hydraulic design of sewers, pumping of sewage. |

**Books:**

1. Wastewater Engineering: Treatment, Disposal and Reuse, Metcalf & Eddy, Tata McGraw Hill, New Delhi
2. Environmental Engineering Vol. I: Water Supply Engineering, S.K. Garg, Khanna Publications, Delhi
3. Environmental Engineering Vol II: Sewage Disposal and Air Pollution Engineering, S.K. Garg, Khanna Publications, Delhi
4. Water Supply & Sanitary Engineering, G.S. Birdi and J.S. Birdi, Dhanpat Rai Publishing Co., New Delhi

Environmental Engineering, Peavy, Tachobanoglous & Rowe, McGraw Hill International, N.Y.