

| S. No. | Course Code | Course Name | Category | Type | Credit | L | T | P |
|--------|-------------|--|----------|--------|------------------------|---|---|---|
| 1 | CET-321 | Railway & Airport Engineering | PC | Theory | 4 | 3 | 1 | 0 |
| 2 | CET-322 | Design of Steel Structures | PC | Theory | 4 | 3 | 1 | 0 |
| 3 | CET-323 | Design of Foundations & Earth Structures | PC | Theory | 4 | 3 | 1 | 0 |
| 4 | CET-324 | Design of RC Systems | PC | Theory | 4 | 3 | 1 | 0 |
| 5 | CET-325 | Design of Masonry Structures | PC | Theory | 3 | 2 | 1 | 0 |
| 6 | CET-326 | Water Resources Engineering | PC | Theory | 4 | 3 | 1 | 0 |
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| 1 | CEP-327 | Structural Design & Drawing | PC | Lab | 1 | 0 | 0 | 2 |
| 2 | CEP-328 | Environmental System Design | PC | Lab | 1 | 0 | 2 | 0 |
| 3 | CEP-329 | Geotechnical Engineering Laboratory | PC | Lab | 1 | 0 | 0 | 2 |
| | | | | | Total Credits: 23+3=26 | | | |

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| UG | Department: Civil Engineering |
| Course Code: CET 321 | Course Name: Railway and Airport Engineering |
| Credit: 4 | L-T-P: 3-1-0 |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Railway Engineering: Introduction; Gauges; right of way, gradient, Resistance to traction and stresses in track; Track component parts their functions and requirements viz. Rails; Sleepers; Ballasts. Geometric design of railway track, Super elevation, points and crossing; requirement of rail joints. Track junctions, Design of turn out and cross-over, signaling and interlocking; high speed and ballastless tracks. Airport planning and Design, Airport Engineering: Air Transport scenario in India and stages of development, technical terms relating to airways and airport, aircraft characteristics; site selection; Airport classification; layout, Obstructions and zoning laws; Runway orientation and geometric design of runway; Taxiways; Aircraft parking, runway marking and lighting, system; drainage, apron and visual aids.</p> <p>Books</p> <ol style="list-style-type: none"> 1. Railway Engineering By Saxena and Arora 2. Railway Engineering By Chandra and Agarwal 3. Airport Engineering by Arora and Khanna | |

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| UG | Department: Civil Engineering |
| Course Code: CET 322 | Course Name: Design of Steel Structures |
| Credit: 4 | L-T-P: 3-1-0 |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Structural steel and properties ,Introduction to stability and buckling concepts, Working stress and plastic design methods , Bolted and Welded connections, , Design of tension, compression and flexural members (including built up members):Column bases, Plate Girder and Roof trusses using latest IS codes.</p> <p>Text Books</p> <ol style="list-style-type: none"> 1. Plastic Analysis & Design Of Steel Structures : Wong 2. Design of Steel Structures: N Subramaniam 3. Limit State Design of Steel Structures: S.K.Duggal 4. Design of Steel Structures: P Dayaratnam. | |

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| UG | Department: Civil Engineering |
| Course Code: CET 323 | Course Name: Design Of Foundations And Earth Structures |
| Credit: 4 | L-T-P: 3-1-0 |
| Pre-requisite course: Soil Mechanics | |
| <p>Syllabus</p> <p>Stability of infinite and finite slopes, Swedish slip circle method, Bishop's method, Stability of slopes of earth dam, Earth pressures theories; Stability analysis of retaining structures; Shallow foundations, Bearing capacity and settlement analysis, contact stress beneath foundations, Plate load test, Standard penetration test, Dynamic and static cone penetration test; Allowable bearing pressure on soils and rocks, Raft foundation, Soil Exploration and sampling: Site investigation report. Pile foundation: Classification; Bearing capacity of piles, Pile load test, Group capacity of vertical piles; IS code provisions, Well foundation and caissons; Depth of well, Bearing capacity and settlement of well, Lateral stability of well foundations, Sinking of wells, Tilts and shifts, Machine foundations, Dynamic soil properties, Laboratory techniques, Resonant column test to obtain Young's modulus, Shear modulus and damping characteristics of soils, Cyclic simple shear test, Cyclic triaxial compression test, Field tests: Vertical and horizontal block resonance test, Cyclic plate load test, Reinforced earth.</p> <p>Books</p> <ol style="list-style-type: none"> 1. T. William Lambe, Robert V. Whitman, "Soil Mechanics", John Wiley and Sons, New York. 2. John N. Cernica, "Geotechnical Engineering: Soil Mechanics", John Wiley and Sons, New York. 3. Rodrigo Salgado, "The Engineering of Foundations", Tata McGraw Hill Education Limited, New Delhi. | |

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| UG | Department: Civil Engineering |
| Course Code: CET 324 | Course Name: Design of RC Systems |
| Credit:4 | L-T-P: 3-1-0 |
| Version: | Approved on: |
| Pre-requisite course: Design of RC Structures | |
| <p>Syllabus</p> <p>Design of Flat slab & grid Slab; Design of retaining walls; Design of beams curved in plan; Design of domes for axisymmetric loading, uniformly distributed load, ring load and concentrated load at the crown; Design of water tanks, Intze tank; Yield line theory for slabs: basic concepts, location of yield lines, yield line analysis-equilibrium method and virtual work method, analysis and design of rectangular slabs with different support conditions, Yield line pattern in building frames; Prestressed concrete: advantages and disadvantages, methods of prestressing, losses in prestress, analysis and design of prestressed concrete beam; IRC Loading & Slab Bridge</p> <p>Books</p> <ol style="list-style-type: none"> 1. Design of RCC Structures by Jain & Jaykrishana 2. Design of RCC Structures by Krishnaraju 3. Design of RCC Structures by Menon & Pillai | |

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| UG | Department: Civil Engineering |
| Course Code: CET 325 | Course Name: Design of Masonry Structures |
| Credit: 3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: Building Technology | |
| <p>Syllabus</p> <p>Behaviour of Masonry Structures During Past Earthquakes: Common modes of failure, effect of unit shapes and mortar type, effect of roof and floor systems; Common deficiencies.</p> <p>Masonry Under Compression: Prism strength, Failure mechanism, types of construction and bonds; Eccentric loading; Slenderness – effective length and effective height, effect of openings; Code provisions.</p> <p>Masonry Under Lateral Loads: In-plane and out-of-plane loads, bending parallel and perpendicular to bed joints; Shear and flexure behaviour of piers.</p> <p>Earthquake Resistant Measures: Analysis for earthquake forces, role of floor and roof diaphragm; Concept and design of bands, bandages, splints and ties; Reinforced masonry; Code provisions.</p> <p>Masonry Infills: Effect of masonry infills on seismic behaviour of framed buildings; Failure modes; simulation of infills – FEM and equivalent strut; Safety of infills in in-plane action – shear, compression and buckling; Code provisions.</p> <p>Retrofitting of Masonry Building: Techniques of repair and retrofitting of masonry buildings; IS: 13935 (1993) provision for retrofitting.</p> <p>Books</p> <ol style="list-style-type: none"> 1. Drysdale, R. G., Hamid, A. H. and Baker, L. R., "Masonry Structure: Behaviour and Design", Prentice Hall, Englewood Cliffs. 2. Paulay, T. and Priestley, M. J. N., "Seismic Design of Reinforced Concrete and masonry Buildings", John Wiley & Sons. 3. Amrhein, J. E., "Reinforced Masonry Engineering Handbook," Masonry Institute of America, CRC Press. 4. Donald Anderson and Svetlana Brzev, "Seismic Design Guide for Masonry Buildings," Canadian Concrete Masonry Producers Association. 5. "Prestandard and Commentary For The Seismic Rehabilitation of Buildings," FEMA 356, Federal Emergency Management Agency, Washington, D.C. | |

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| UG | Department: Civil Engineering |
| Course Code: CET 326 | Course Name: Water Resource Engineering |
| Credit : 4 | L-T-P: 3-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Introduction, need for harnessing water resources; Water resources projects and their planning; Irrigation practices; Irrigation-its importance and impact on environmental, assessment of water requirements for crops; Irrigation water Quality, Methods of irrigation; canal and well irrigation; canal irrigation; canal alignment; Design principles of irrigation canal, Silt theories, management of canal irrigation; Water logging and Drainage, Seepage theories for design of hydraulic structures; Surface and sub-surface considerations including energy dissipation; salient features of diversion head works; Falls; Regulators; River meandering and river training works, Breif introduction of water conservation and water harvesting technologies; Hydropower; General features and components of a hydropower station.</p> <p>Books</p> <ol style="list-style-type: none"> 1. Water Resources Engineering by Linsley & Franzini 2. Irrigation Engineering by G.L. Asawa 3. Water Resources & Water Power Engg. By P.N. Modi | |

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| UG | Department: Civil Engineering |
| Course Code: CEP 327 | Course Name: Structural Design and Drawing |
| Credit:2 | L-T-P: 0-0-2 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Detailed syllabus:</p> <p>Design and detailed drawings Flat slab & grid Slab, retaining walls, curved beams, domes, water tanks with foundation, pile & pile foundations, pile caps, ductile detailing of RC Structural systems, building frames, prestressed concrete beams, slab bridge.</p> <p>Design and Drawings of Bolted and Welded connections.</p> <p>Design and Drawings of Beam Column Connections.</p> <p>Design and Drawing of tension, compression and flexural members. (including built up members).</p> <p>Design and Drawing of Column bases.</p> <p>Design and Drawing of Plate Girder.</p> <p>Design and Drawing of Roof trusses.</p> <p>Text Books</p> <ol style="list-style-type: none"> 1. Design of RCC Structures by Jain & Jaykrishana 2. Design of RCC Structures by Krishnaraju 3. Design of RCC Structures by Menon & Pillai 4. Plastic Analysis & Design Of Steel Structures : Wong 5. Design of Steel Structures: N Subramaniam 6. Limit State Design of Steel Structures: S.K.Duggal 7. Design of Steel Structures: P Dayaratnam | |

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| UG | Department: Civil Engineering |
| Course Code: CEP 328 | Course Name: Geotechnical Engineering Laboratory |
| Credit: 1 | L-T-P: 0-0-2 |
| Pre-requisite course: Soil Mechanics, Design of Foundations and Earth Structures | |
| <p>List of Experiments</p> <ol style="list-style-type: none"> 1. Determination shear strength parameters using Triaxial test. 2. Determination shear strength parameters using Vane shear test. 3. Swelling pressure determination. 4. Determination of differential free swell. 5. Determination of pH value of soils. 6. Determination of total soluble sulphates. 7. Determination of total soluble solids by Gravimetric method. 8. Determination of organic matter. 9. Determination of allowable bearing pressure using Standard Penetration 10. Test, Dynamic cone Penetration test. 11. Demonstration of Static Cone Penetration Test (SCPT). 12. Determination of allowable bearing pressure and settlement using Plate Load 13. Test on soils. 14. Determination of unconfined compressive strength of rock materials. 15. Determination of point load strength index of rocks. 16. Determination of strength of rock materials in triaxial compression. 17. Determination of water content, porosity, density and related properties of rock materials. 18. Field Determination of Dynamic soil properties Vertical and horizontal block resonance test. 19. Determination of Dynamic soil properties by Cyclic triaxial compression test. <p>Books</p> <ol style="list-style-type: none"> 1. Head, K.H, "Manual of Soil Laboratory Testing", John Wiley and Sons, New York. 2. T. William Lambe, "Soil Testing for Engineers", Wiley Eastern Limited, New Delhi. 3. Joseph E. Bowles, "Engineering Properties of Soil and their Measurement", McGraw Hill Inc., New York. 4. Shamsheer Prakash and P.K. Jain, "Engineering Soil Testing", Nem Chand & Bros. Roorkee. 5. Leonard Obert and Wilbur I. Duvall, "Rock mechanics and design of structures in rock", John Wiley and Sons, Inc., New York. 6. Swami Saran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Limited, New Delhi. | |

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| UG/PG : UG | Department: Civil Engineering |
| Course Code: CEP 329 | Course Name: Environmental System Design |
| Credit: 2 | L-T-P: 0-2-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Analysis of waste water quality: COD, BOD, TOC, SS, VSS. Systems Lab: Design of water distribution system; analysis of Hardy Cross Method ; design of sewerage system; design of water & sewage treatment system including software applications.</p> <p>Books</p> <ol style="list-style-type: none"> 1. Water Works Engineering: Planning Design and Operation : Qasim, Motley and Zhu 2. CPHEEO Manual on Water Supply and Treatment 3. Waste water Treatment Plant: Design and Operation: Qasim 4. Wastewater Engineering: Treatment and Reuse by Metcalf & Eddy, TMH. 5. Manual of Sewage treatment by CPHEEO, Ministry of Urban Dev., GOI 6. APHA (1995): Standard methods for the examination of water and wastewater. 17th edition APHA, Washington DC. | |