**NBKR INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR**

*(AUTONOMOUS)*

**CIVIL ENGINEERING**

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2013-2014)

**IV YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – I SEMESTER**

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| S.No. | Course  Code | Course Title | Contact  Hours/  Week | | | Credits | Evaluation | | | | | | | | | |
| Sessional  Test-I | | | Sessional  Test-II | | Total Sessional Marks (Max. 40) | Semester  End Examination | | Max.  Total Marks | |
| **THEORY** | L | P | T |  | Duration  in Hours | | Max.  Marks | Duration  in Hours | Max.  Marks | 0.8(Better of two sessional tests)  +  0.2(Other) | Duration  in Hours | Max.  Marks |  | |
| 1 | 13CE4101 | Environmental Engineering – II | 4 | - | - | 4 | 2 | | 40 | 2 | 40 | 3 | 60 | 100 | |
| 2 | 13CE4102 | Irrigation & Hydraulic Struc.. | 4 | - | - | 4 | 2 | | 40 | 2 | 40 | 3 | 60 | 100 | |
| 3 | 13CE4103 | Quantity Surveying & Valuation | 3 | - | 1 | 4 | 2 | | 40 | 2 | 40 | 3 | 60 | 100 | |
| 4 | 13CE4104 | Construction Planning & Management | 3 | - | 1 | 4 | 2 | | 40 | 2 | 40 | 3 | 60 | 100 | |
| 5 | 13SH4101 | Economics & Accountancy | 4 | - | - | 4 | 2 | | 40 | 2 | 40 | 3 | 60 | 100 | |
| 6 | 13CE41EX | Elective – II | 4 | - | - | 4 | 2 | | 40 | 2 | 40 | 3 | 60 | 100 | |
|  | | **PRACTICALS** |  |  | | | | | | | |  |  | | | |
| 1 | 10CE41P1 | Concrete Technology Laboratory | - | 3 | - | 2 | | - | - | - | - | Day-to-day Evaluation and a test | 3 | 60 | | 100 |
| 2 | 10CE41P2 | Environmental Engineering Laboratory | - | 3 | - | 2 | | - | - | - | - | 3 | 60 | | 100 |
|  |  | **TOTAL** | **22** | **06** | **02** | **28** | | **12** | **320** | **12** | **320** | **24** | **480** | | **800** |

**Elective – II:**

13CE41E1 Prestressed concrete structures

13CE41E2 Advanced structural design

13CE41E3 Solid waste management

13CE41E4 Traffic engineering

13CE41E5 Applied soil mechanics

13CE41E6 Bridge engineering

**13CE41E1-PRESTRESSED CONCRETE STRUCTURES**

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| **Course category:** | Program core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 1 - 0 |
| **Prerequisite:** | **Design of Reinforced Cement Concrete Structures** | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Outcomes** | CO1 | To calculate resultant stresses in rectangular sections. |
| CO2 | To design prestresses concrete sections. |
| CO3 | To design pre-tensioned and post tensioned members. |
| CO4 | To analyse and design composite prestressed concrete members. |
| CO5 | To design prestressed concrete slabs. |
| **Course Content** | **UNIT – I**  **INTRODUCTION:** Basic concepts of prestressing, historical development, advantages of prestressed concrete, high strength concrete, high tensile steel.  **PRESTRESSING SYSTEM:** Introduction, tensioning devices ,pretensioning and post tensioning systems, thermo-electric and chemical prestressing.  **ANALYSIS OF PRESTRESSED CONCRETE SECTIONS:** Basic assumption, analysis of prestress, resultant stress at a section, pressure line, concept of load balancing, stress in tendons and cracking moment.  **UNIT – II**  **LOSSES OF PRESTRESS**: Nature of losses of prestress, loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip. Total losses allowed for in design.  **DESIGN OF PRESTRESSED CONCRETE SECTIONS:** Design of sections for Flexure, Axial tension, compression bending and for shear. Design of members for bond and the sections for bearing.  **UNIT – III**  **DESIGN OF PRE- TENSIONED AND POST-TENSIONED MEMBERS:** Dimensioning of flexural members, Estimation of self weight of beams, Design of pretensioned and post-tensioned beams. Design of partially prestressed members.  **UNIT – IV**  **COMPOSITE CONSTRUCTION OF PRESTRESSED AND IN SITU CONCRETE:** Composite structural members, types of composite construction, analysis of stress, differential shrinkage, deflection of composite members, flexural strength of composite sections and design of composite sections.  **UNIT – V**  **PRESTRESSED CONCRETE SLABS**: Types of prestressed concrete floor slabs, design of prestressed concrete one way slabs, two way slabs & simple flat slabs | |
| **Text Books and reference Books:** | **TEXT BOOKS:**  1. Prestressed concrete by N.Krishna Raju.  2. Prestressed concrete structures by P. Dayaratham.  **REFERENCE BOOKS:**  1. Fundamentals of Prestressed Concrete by N.C.Sinha and S.K.Roy.  2. Modern Prestressed Concrete by James R.Libby. | |

**13CE41E2- ADVANCED STRUCTURAL DESIGN**

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| **Course category:** | Program core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 1 - 0 |
| **Prerequisite:** | **Design of Reinforced Cement Concrete Structures, Steel Structures Design** | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Outcomes** | CO1 | Be able to design the long columns, deep beams and concrete walls. |
| CO2 | Be able to design multistory frames, grid slabs and flat slabs. |
| CO3 | Be able to design simply supported and continuous beams, columns using plastic design philosophy. |
| CO4 | Be able to design pre-stressed beams for limit state of collapse and limit state of serviceability. |
| CO5 | Be able to design slabs, pressure pipes and Railway sleepers using pre-stressed concrete concepts. |
| **Course Content** | **UNIT – I**  **REINFORCED CONCRETE:** Design of Slender Columns – Deep Beams – Concrete walls under vertical loads.  **UNIT – II**  **REINFORCED CONCRETE:** Design of Multistorey Building Frames – Grid Floors – Flat Slabs.  **UNIT – III**  **STRUCTURAL STEEL:**  Plastic Design of simply supported and continuous beams and columns – single bay rectangular frames.  **UNIT – IV**  **PRESTRESSED CONCRETE:** Design of beams for strength in limit state in flexure and shear – Limit state strength at transfer conditions – Limit state of deflection and cracking.  **UNIT – V**  **PRESTRESSED CONCRETE:** Design of reinforcement in anchor zones – Design of rectangular slabs – Design of pressure pipes – Design of Railway sleepers. | |
| **Text Books and reference Books:** | **TEXT BOOKS:**  1. Limit State Design of Reinforced Concrete by P.C. Varghese.  2. Advanced Reinforced Concrete Design by N. Krishna Raju.  3. Prestressed Concrete by N. Krishna Raju.  4. Prestressed Concrete by G.S.Pandit & S.P.Gupta.  5. Design of Steel Structures by Ramachandra. | |

**13CE41E3 -SOLID WASTE MANAGEMENT**

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| **Course category:** | Program core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 1 - 0 |
| **Prerequisite:** | **Environmental Engineering** | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Outcomes** | CO1 | Be able to understand the importance, sources, classification and characterization of solid waste. |
| CO2 | Be able to understand collection, handling, storage and processing of solid waste. |
| CO3 | Be able to understand the process of recovery of products and energy. |
| CO4 | Be able to understand the various methods for disposing solid waste and application of GIS in land fill. |
| CO5 | Be able to find the properties of hazardous waste. |
| **Course Content** | **UNIT – I**  **INTRODUCTION:**  Goals and objectives of solid waste management, impacts of solid waste generation in a technological society. Quantities of solid wastes, challenges and opportunities.  **GENERATION OF SOLD WASTES:**  Sold waste generation sources, classification of solid waste, data on Indian city wastes, factors influencing generation of solid wastes, characterization and analysis of solid wastes.  **UNIT – II**  **ONSITE HANDLING, STORAGE AND PROCESSING:**  Public health and aesthetics, onsite handling, methods used at residential and commercial sources, onsite storage dust bins, community containers container locations onsite processing methods.  **COLLECTION:**  Frequency of collection equipment and labour requirements, collection routes, transport means and location of transfer stations.  **UNIT – III**  **PROCESSING TECHNIQUES AND EQUIPMENT:**  Purpose of processing paling shredding, and incineration.  **RECOVERY OF RESOURCE CONVERSION PRODUCTS AND ENERGY:**  Material processing and recovery systems, recovery of chemical conversion products, recovery of biological conversion products recovery of energy from conversion products.  **UNIT – IV**    **DISPOSAL OF SOLID WASTES:**  Sanitary landfills – General considerations, site selection – operational management systems in land fill – gas and  leachate control – construction ocean disposal of solid wastes combustion – incineration and types of incinerators – Application of GIS in Land Fill.  **UNIT – V**  **HAZARDOUS WASTES:**  Special wastes hazardous wastes, hospital wastes, sewage sludges, industrial solid wastes methods of disposal. | |
| **Text Books and reference Books:** | **REFERENCE BOOKS:**  1. Bhide, A.D. and sundaresam B.B. (1983) solid waste management in developing countries INSDOC, New Delhi.  2. Solid waste engineering principles and management issues – Technobanglous, G. Theise, H.and Ehasisn, R. (1996). McGraw Hill, Tokyo. | |

**13CE41E4 - TRAFFIC ENGINEERING**

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| **Course category:** | Program core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 1 - 0 |
| **Prerequisite:** | **Transportation Engineering** | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Outcomes** | CO1 | Understand the necessity of traffic management and its organizational structure in a civil body. |
| CO2 | To compare and analyze detailed parking techniques applicable in the view of street management techniques. |
| CO3 | To inspect various technical aspects of vehicle control and different types of methods used in to ensure a smooth transit. |
| CO4 | To understand and debate various rules and regulations laid upon by the civic administration to provide an environment that provides for a hassle free commute. |
| CO5 | To analyze the effects vehicle use has on the environment and to familiarize with justice issues. |
| **Course Content** | **UNIT – I**  Traffic Engineering Administration – Functions of traffic engineering, Organisational structure in state departments and for a city. Need for Traffic Forecasting.  **UNIT – II**  Parking – Parking surveys, Ill effects of parking, methods of parking – On street and off street, regulations for on street parking, parking metres, peripheral parking schemes, loading and unloading facilities.  **UNIT – III**  Traffic signals – Advantages and disadvantages, Signal indications, signal face, Type of traffic signals systems, warrents for traffic control signal installation.  Miscellaneous traffic control aids and street furniture – Road delineators, hazard markers, object markers, speed breakers, rumble strips, guard rails.  **UNIT – IV**    Traffic regulations – Basic principles of regulation, regulation of speed, vehicles, driver, mixed traffic, parking regulations, enforcement of regulations.  Traffic management – Traffic management measures, restrictions of turning movements, one way streets, tidal flow operation, closing side streets, exclusive bus lanes.  **UNIT – V**  Traffic and environment – Effects of traffic on environment, noise pollution, air pollution, vibration, visual intrusion and degrading the aesthetics.  Fuel crisis and transportataion – factors affecting fuel consumption of motor vehicles – Effect of road condition on fuel consumption of vehicles | |
| **Text Books and reference Books:** | **TEXT BOOKS:**  1. Traffic Engineering and Transport Planning by L.R.Kadiyali.  2. Highway Engineering by Justo and Khanna.  **REFERENCE BOOKS**  1. Transportation Engineering by S.P.Bindra.  2. Transportation Engineering by Ahuja. | |

**13CE41E5 - APPLIED SOIL MECHANICS**

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| **Course category:** | Program core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 1 – 0 |
| **Prerequisite:** | **Foundation Engineering, Soil Mechanics** | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Outcomes** | CO1 | Be able to apply the knowledge of ground improvement techniques for shallow layers |
| CO2 | Be able to apply the knowledge of ground improvement techniques for deep layers |
| CO3 | Be able to estimate the pressure distribution for bulk heads |
| CO4 | Be able to design anchored bulk heads by various methods |
| CO5 | Be able to design various components of bracing. |
| **Course Content** | **UNIT – I**  **SOIL IMPROVEMENT TECHNIQUES FOR SHALLOW LAYERS:**  Soil improvement – Mechanical treatment – Lime stabilization – Cement Stabilization – Bituminous stabilization – Chemical Stabilization – Freezing and heating – Geotextiles.  **UNIT – II**  **SOIL IMPROVEMENT FOR DEEP LAYERS :**  Dynamic compaction and consolidation – Preloading – Sand drains – Electro – osmosis – Lime columns – Stone columns – Grouting.  **UNIT – III**  **BULKHEADS:**  Uses of sheet piling walls – Common types of sheet piling walls – Common sheet pile sections – Cantilever sheet piling walls in cohesionless soils – cantilever sheet piling walls in cohesive soils (Approximate analysis only).  **UNIT – IV**  **ANCHORED BULKHEADS:**  Anchored bulkhead design by free earth support method – Anchored bulkhead design by fixed earth support method – Methods of reducing lateral pressure – Tyes of anchorage.  **UNIT – V**  **BRACED EXCAVATIONS:**  Braced cut – Apparent pressure diagrams for cuts in both sands and clays – Types of bracing systems – Design of various components of bracing – Bottom heave of cuts in soft clays – Piping failure of cuts in sands. | |
| **Text Books and reference Books:** | **TEXT BOOKS:**  1. Alam Singh “Modern Geotechnical Engineering”  2. Gopal Ranjen & A.S.R.Rao, “Basic and Applied Soil Mechanics.  3. K.R.Arora – “Soil Mechanicas and Foundation Engg”.  4. C.Venkatramaiah – Geotechnical Engineering.  5. A.V.Narasimha Rao and C.Venkatramaiah – Numerical Problems, Examples and Objective  Questions in Geotechnical Engg. | |

**13CE41E6 - BRIDGE ENGINEERING**

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| **Course category:** | Program core | **Credits:** | 4 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3 - 1 – 0 |
| **Prerequisite:** | **D.R.C.C.S., S.S.D** | **Sessional Evaluation :**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Outcomes** | CO1 | Be familiar with site investigation principles and various loading conditions and be able to design box culverts and bridge bearings. |
| CO2 | Be able to design bridge deck slab using effective width method of analysis for different loading conditions. |
| CO3 | Be able to design T-beam bridge by pigeauds method. |
| CO4 | Be able to design plate girder and composite bridges. |
| CO5 | Be able to analyze stability of piers and abutments. |
| **Course Content** | **UNIT - I**  **INTRODUCTION:**  Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.  **BOX CULVERT:** General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.  **BRIDGE BEARINGS :**  General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.  **UNIT - II**  **DECK SLAB BRIDGE :**  Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.  **UNIT - III**  **BEAM & SLAB BRIDGE (T-BEAM BRIDGE)**  General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.  **UNIT – IV**  **PLATE GIRDER BRIDGE :**  Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.  **COMPOSITE BRIDGES :**  Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders’ including shear connectors  **UNIT V**  **PIERS & ABUTMENTS:**  General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design). | |
| **Text Books and reference Books:** | **TEXT BOOKS :**   1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi. 2. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi. 3. Relevant – IRC & Railway bridge Codes.   **REFERENCE :-**   1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain. 2. Design of Bridges Structure by D.J.Victor. 3. Design of Steel structures by Ramachandra. 4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain.   5. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi. | |