**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)

**II YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – II SEMESTER**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| S.  No. | | Course  Code | Course Title | Contact Hours/  Week | | | Cred-its | 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 | | 13CE2201 | Strength of materials | 3 | - | 1 | 4 | 2 | 40 | 2 | | 40 | 3 | 60 | 100 | |
| 2 | | 13CE2202 | Fluid Mechanics - II | 3 | - | 1 | 4 | 2 | 40 | 2 | | 40 | 3 | 60 | 100 | |
| 3 | | 13CE2203 | Soil Mechanics | 3 | - | 1 | 4 | 2 | 40 | 2 | | 40 | 3 | 60 | 100 | |
| 4 | | 13CE2204 | Transportation Engineering - I | 4 | - | - | 4 | 2 | 40 | 2 | | 40 | 3 | 60 | 100 | |
| 5 | | 13CE2205 | Building Planning & Drawing | 1 | 3 | - | 4 | 2 | 40 | 2 | | 40 | 3 | 60 | 100 | |
| 6 | | 13CE2206 | Surveying - II | 3 | - | 1 | 4 | 2 | 40 | 2 | | 40 | 3 | 60 | 100 | |
|  | | | **PRACTICALS** |  |  | | | | | | | |  |  | | | |
| 1 | 13CE22P1 | | Surveying Laboratory - II | - | 3 | - | 2 | - | - | | - | - | Day-to-day Evaluation and a test | 3 | 60 | | 100 |
| 2 | 13CE22P2 | | Fluid Mechanics & Hydraulic Machinery Laboratory | - | 3 | - | 2 | - | - | | - | - | 3 | 60 | | 100 |
|  |  | | **TOTAL** | **17** | **09** | **04** | **28** |  |  | |  |  |  |  | | **800** |

**Note:-** *Survey camp for a duration of 10 days to be conducted before the last day of instruction for II B.Tech, II – Sem. This shall be evaluated as part of Survey Laboratory –II.*

**13CE2203 - SOIL MECHANICS**

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

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| **Course Outcomes** | CO1 | Understand basic concepts of soil mechanics. Be able to make volume and weight calculations and draw phase diagrams. Be able to calculate the index properties. Understand the methods of grain size analysis. Be able to determine atterberg limits. Be able to classify a given soil. |
| CO2 | Be able to derive equations for permeability. Be able to calculate permeability. Be able to sketch flownets and make calculations from flownets. Understand the effective stress principle and be able to calculate effective stresses under different flow conditions. |
| CO3 | Understand and apply the concept of compaction for soils. Understand and apply the CBR test. Be able calculate vertical stresses at any point in the soil for various types of loadings. Understand the concept of pressure bulb. |
| CO4 | Understand the basics of soil consolidation and be able to derive Terzaghi’s 1—D equation. Be able to calculate consolidation settlements. |
| CO5 | Understand Mohr-Coulomb failure criteria for shear strength. Be able to calculate the shear parameters from different types of tests and under different drainage conditions. Be able to calculate Skemptons pore pressure parameters and appreciate its practical relevance. |
| **Course Content** | **UNIT – I**  **PHYSICAL PROPERTIES OF SOILS:** Soil as a 3-phase system –Fundamental relationships by volume and weight – Index properties of soils – Sieve analysis – Sedimentation analysis – Atterberg limits and density index.  **IDENTIFICATION AND CLASSIFICATION OF SOILS**: Tests for field identification and classification of soils – Textural classification, Unified soil classification and Indian Standard classification systems.  **UNIT – II**  **PERMEABILITY AND SEEPAGE**: Permeability of soil – Laboratory and field determination – Seepage analysis – Elementary principles of flownets – Phreatic line in an Earth dam – Seepage through earth dam – Critical hydraulic gradient – Piping.  **EFFECTIVE STRESS PRINCIPLES:** Effective & Neutral pressures.  **UNIT – III**  **SOIL COMPACTION:** Compaction of cohesive and cohesionless soils – Standard Proctor’s test and Modified proctor’s test – Field compaction – Compaction control – C.B.R. test and its use.  **STRESS DISTRIBUTION IN SOILS:** Boussinesq’s equation – Vertical stress due to line load, strip load, and uniformly loaded circular area – Newmark’s chart – Westergard’s approach – pressure bulb concept – Approximate methods.  **UNIT – IV**  **CONSOLIDATION**: Pressure – void ratio curve – Compression index – Coefficient of Compressibility – Modulus of volume change – Consolidation process – Consolidation settlement - Terzaghi’s theory of one dimensional consolidation – coefficient of consolidation – Preconsolidation pressure – Normally consolidated and over consolidated soils.  **UNIT – V**  **SHEAR STRENGTH OF SOILS:** Shear strength of soil – Mohr’ – Coulomb Failure Criteria – Measurement of shear strength – Direct shear, Unconfined compression and Triaxial compression tests – Vane Shear test - Shear strength parameters – Test conditions – Shear strength of cohesive and cohesionless soils – Drainage conditions – Pore pressure parameters. | |

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| **Text Books and reference Books:** | **TEXT BOOKS**:   1. Soil Mechanics and Foundation Engineering by K.R. Arora 2. Geotechnical Engineering by C. Venkatramaiah. 3. Soil Mechanics and Foundation Engineering by B.C.Punmia.   **REFERENCE BOOKS:**   1. Basic and applied soil mechanics by A.S. Rao & Gopal Ranjan. 2. Geo Technical engineering by V.N.S.Murthy. 3. Numerical Problems, Examples and Objective Questions in Geotechnical Engineering by 4. Prof. A.V.Narasimha Rao and Prof. C.Venkatramaiah. |