# LESSON PLAN

| DISCIPLINE: CIVIL ENGG. | SEMESTER: 3RD | NAME OF THE FACULTY: SUSHREE SOURAVI ROUT |
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| SUBJECT: GEOTECHNICAL ENGG | NO OF DAYS/WEEK CLASS ALLOTED: 45 | SEMESTER FROM DATE: 14.07.2025 TO 15.11.2025 |
| **WEEK** | **CLASS/DAY** | **THEORY TOPICS** |
| 1ST | 1 | **Overview of Geology and Geotechnical Engineering:** Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth |
| | 2 | Definition of a rock: Classification based on their genesis (mode of origin), formation. Classification and engineering uses of igneous, sedimentary and metamorphic rocks. (Concepts only) |
| | 3 | Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. (Concepts only) |
| 2ND | 4 | Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam. (Concepts only) |
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| | 6 | **Physical and Index Properties of Soil:** Soil as a three phase system, water content, determination of water content by oven drying method as per BIS code, void ratio, porosity and degree of saturation, density index., air Content,Percentage of air voids, Relation between the parameters. |
| 3RD | 7 | |
| | 8 | Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight. Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, Determination of specific gravity by pycnometer |
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| 4th | 10 | Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index. |
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| | 12 | Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil. |
| 5th | 13 | |
| | 14 | **Permeability and Seepage:** Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and falling head tests, |
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| 6th | 16 | |
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| | 18 | simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (Concepts only No numerical problems).Effective stress,quick Sand |
| 7th | 19 | |
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| 8th | 22 | **Compaction,Consolidation and stabilization of soil:** Concept of compaction, Standard and Modified proctor test as per IS code, Plotting of Compaction curve for determining: Optimum moisture content (OMC), maximum dry density (MDD), Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration |
| | 23 | |
| | 24 | Consoildation,Difference between compaction and consolidation.Terzaghi's Model analogy of compression/springs showing the process of consolidation,Field implications |
| 9th | 25 | Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabiliza tion. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction |
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| | 27 | Necessity of site investigation and soil exploration: Types of exploration, criteria for decidingthe location and number of test pits and bores. Field identification of soil – dry |
| 10th | 28 | |
| | 29 | strength test, dilatancy test and toughness test. |
| | 30 | **Shear Strength of Soil:** Shear failure of soil-General, local and punching shear, concept of shear strength of soil. |
| 11th | 31 | |
| | 32 | Components of shearing resistance of soil – cohesion, internal friction. Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils. Direct shear, triaxial and vane shear test laboratory methods. |
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| 12th | 34 | |
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| 13th | 38 | **Bearing Capacity of Soil and Foundation:** Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity. |
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| 14th | 40 | Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 & IS:2131. |
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| | 42 | Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non- cohesive Soils. |
| 15th | 43 | |
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| | 45 | Type of foundations-shallow,deep foundation |