Lesson Planning (Theory)

Branch : **Civil Engineering** Semester : **3rd**

Subject : **Geotechnical Engineering** Session : **August-December 2026**

Teacher: **Er. Saibal Bharti** Class Room : **A-202**

S.No.	No. of WEEKS	Chapter Unit Description	Detail of Contents	Reference Resources	Remarks
1	3 WEEKS	**Unit – I Overview of Geology and Geotechnical Engineering**	Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, Definition of a rock: Classification based on their genesis (mode of origin), formation, Classification, and engineering uses of igneous, sedimentary, and metamorphic rocks. • Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. • Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam.	R1,R2	
2	3 WEEKS	**Unit– II 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. 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, • Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index. • Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.	R1,R2	
3	3 WEEKS	**Unit– III Permeability and Shear Strength of Soil**	• 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, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (No numerical problems). • Shear failure of soil, concept of shear strength of soil. 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 and vane shear test – laboratory methods.	R1,R2	
4	3 WEEKS	**Unit– IV**	• Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable	R1,R2	

		Bearing Capacity of Soil **Unit– V Compaction and stabilization of soil**	bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity. • Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 & IS:2131. • Definition of earth pressure, Active and Passive earth pressure for no surcharge condition, coefficient of earth pressure. • 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. Suitability of various compaction equipment -smooth wheel roller, sheep foot roller, pneumatic tyre roller, Rammer and Vibrator, Difference between compaction and consolidation.		
5	**2 WEEKS**	**Unit– V Compaction and stabilization of soil**	• Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabilization. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction • Necessity of site investigation and soil exploration: Types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test.	R1,R2	

REFERENCE RESOURCES

- Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.
- Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.

Signature of Teacher Signature of H.O.D/OIC