LESSON PLAN				
Name of the Faculty		**Mr. Sandeep Biban**		
Discipline		**Civil Engineering**		
Semester		**4th Semester**		
Subject		**Soil Mechanics & Foundation Engineering**		
Lesson Plan Duration		**16 week, (Lecture- 03, Practical-02) (Feb. 2024 – June 2024)**		
Week	**Lecture Day**	**Theory** **Topic (Including Assignments and Test)**	**Lecture Day**	**Practical Topic**
1	**1**	**UNIT I-**1. Introduction: 1.1 Importance of soil studies in Civil Engineering, Scope of Soil Mechanices in Civil Engg.	1 (G1)	To determine the moisture content of given soil sample
	2	1.2 Geological origin of soils, soil profiles in India: residual and transported soil,alluvial deposits, lake deposits, local soil found in J&K, dunes and loess, glacial which above deposits are formed.		
	3	1.3 Names of organizations dealing with soil engineering work in India, soil map of India, classification of Soil as per major deposits in India	2 (G2)	
2	**4**	2. Physical Properties of Soils: 2.1 Constituents of soil and representation by a phase diagram	1 (G1)	Mechanical Analysis a) Preparation of sample b) Conducting sieve analysis c) Computation of results d) Plotting the grain size distribution curve e) Interpretation of the curve
	5	2.2 Definitions of void ratio, porosity, degree of saturation, water content, specific gravity, unit weight,		
	6	bulk density/bulk unit weight, dry unit weight, saturated unit weight and submerged unit weight of soil grains.	2 (G2)	
3	**7**	**UNIT II-** 3. Classification and Identification of Soils: 3.1. Particle size, shape, and their effect on engineering properties of soil, particle size classification of soils	1 (G1)	Liquid Limit and Plastic Limit Determination: a) Identifying various grooving tools b) Preparation of sample c) Conducting the test d) Observing soil behaviour during tests e) Computation, plotting and interpretation of results
	8	3.2. Gradation and its influence on engineering properties		
	9	3.3 Relative density and its use in describing cohesionless soils, 3.4 Behaviour of cohesive soils with change in water content, Atterberg's limit - definitions, use and practical significance	2 (G2)	
4	**10**	3.5 Field identification tests for soils	1 (G1)	Field Density Measurement (Sand Replacement and Core Cutter Method)a) Calibration of sand b) Conducting field density test at a given location c) Determination of water content d) Computation and interpretation of results
	11	Revision		
	12	Assignment Discussion	2 (G2)	
5	**13**	4. Flow of Water Through Soils: 4.1 Concept of permeability and its importance	1 (G1)	Revision/Discussion
	14	4.2 Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability		
	15	4.3 Comparison of permeability of different soils as per BIS	2 (G2)	
6	**16**	4.4 Measurement of permeability in the laboratory	1 (G1)	Laboratory Compaction Tests (Standard Proctor test) a) Preparation of sample b) Conducting the test c) Observing soil behaviour during test d) Computation of results and plotting e) Determination of optimum moisture and maximum dry density
	17	**UNIT III-**5. Effective Stress: (Concept only): 5.1 Stresses in subsoil		
	18	5.2 Definition and meaning of total stress, effective stress and neutral stress	2 (G2)	
7	**19**	5.3 Principle of effective stress	1 (G1)	Permeability Test
	20	5.4 Importance of effective stress in engineering problems		
	21	6. Deformation of Soils	2 (G2)	
8	**22**	6.1 Meaning, conditions/situations of occurrence with emphasis on practical significance of:	1 (G1)	Direct Shear Test
	23	a) Consolidation and settlement b) Creep c) Plastic flow		
	24	d) Heaving e) Lateral movement f) Freeze and thaw of soil	2 (G2)	
9	**25**	6.2 Meaning of total settlement, uniform settlement, and differential settlement; rate of settlement and their effects.	1 (G1)	Demonstration of Unconfined Compression Test a) Specimen preparation b) Conducting the test c) Plotting the graph d) Interpretation of results and finding/bearing capacity
	26	6.3 Settlement due to construction operations and lowering of water table		
	27	6.4 Tolerable settlement for different structures as per BIS	2 (G2)	
10	**28**	**UNIT IV-** 7. Shear Strength of Soil: 7.1. Concept and Significance of shear strength	1 (G1)	Revision/Discussion
	29	7.2 Factors contributing to shear strength of cohesive and cohesion less soils, Coulomb's law		
	30	Revision/ Assignment Discussion	2 (G2)	
11	**31**	8. Compaction: 8.1 Definition and necessity of compaction	1 (G1)	Demonstration of Vane shear Test
	32	8.2 Laboratory compaction test (standard and modified proctor test as per IS) definition and importance of optimum water content, maximum dry density; moisture dry density relationship for typical soils with different compactive efforts		
	33	8.3. Compaction control; Density control, measurement of field density by core cutter method and sand replacement method, moisture control, Proctor's needle and its use, thickness control	2 (G2)	
12	**34**	9. Soil Exploration: 9.1 Purpose and necessity of soil exploration	1 (G1)	Auger Boring and Standard Penetration Test a) Identifying the equipment and accessories b)Conducting boring and SPT at a given location c) Collecting soil samples and their identificationd) Preparation of boring log and SPT graphs e) Interpretation oftest results
	35	9.2 Reconnaissance, methods of soil exploration, Trial pits, borings (auger, wash, rotary, percussion to be briefly dealt)		
	36	9.3 Sampling; undisturbed, disturbed, and representative samples; selection of type of sample; thin wall and piston samples; area ratio, recovery ratio of samples and their significance, number, and quantity of samples, resetting, sealing and preservation of samples.	2 (G2)	
13	**37**	9.4 Presentation of soil investigation results	1 (G1)	Extraction of Disturbed and Undisturbed Samples a) Extracting a block sample b) Extracting a tube sample c) Extracting a disturbed samples for mechanical analysis. d) Field identification of samples
	38	**UNIT V-** 10 Bearing Capacity of soil: 10.1 Concept of bearing capacity		
	39	10.2 Definition and significance of ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure	2 (G2)	
14	**40**	10.3 Factors affecting bearing capacity	1 (G1)	Revision/Discussion
	41	10.4 Improvement of bearing capacity by sand drain method, compaction, use of geo-synthetics.		
	42	11. Foundation Engineering: 11.1 Concept of shallow and deep foundation.	2 (G2)	
15	**43**	11.2 types of shallow foundations: combined, isolated, strip, mat, and their suitability.	1 (G1)	Revision/Discussion
	44	11.3 Factors affecting the depth of shallow foundations, deep foundations,		
	45	11.4 type of piles and their suitability; pile classification based on material, pile group and pile cap.	2 (G2)	
16	**46**	Revision/Assignment Discussion	1 (G1)	Revision/Discussion
	47	Revision		
	48	Revision	2 (G2)	