

Civil Engg Department					
Sem -IV Lesson Plan					
Subject: SMFE					
** Work Load (Lecture/Practical) per week (in hours): Lectures-04, Practical - 02					
Month	Week	Lectures	Topic	Practicals	
MARCH	Week 1	1	1.1 Importance of Soil Studies in Civil Engineering 1.2 Geological origin of soils with special reference to soil profiles in India: residual and transported soil, alluvial deposits, lake deposits, local soil found in Punjab, dunes and loess, glacial deposits,		02 hrs To determine the moisture content of a given sample of soil
		2	black cotton soils, conditions in which above deposits are formed and their engineering characteristics. 1.3 Names of organizations dealing with soil engineering work in India, soil map of India		
		3	Physical Properties of Soils, 2.1 Constituents of soil and representation by a phase diagram		
		4	Definitions of void ratio, porosity, degree of saturation, water content, specific gravity, unit weight, bulk density/bulk unit weight, dry unit weight, saturated unit weight and submerged unit weight of soil grains and correlation between them		
	Week 2	1	Simple numerical problems with the help of		02 hrs Auger Boring and Standard Penetration Test a)
		2	Classification and Identification of Soils (04 Hours) 3.1. Particle size, shape and their effect on engineering properties of soil, particle size classification of soils		
		3	Gradation and its influence on engineering properties 3.3 Relative density and its use in describing cohesionless soil		
		4	Behaviour of cohesive soils with change in water content, Atterberg's limit - definitions, use and practical significance		
	Week 3	1	Field identification tests for soils 3.6 Soil classification system as per BIS 1498; basis, symbols, major divisions and sub divisions, groups, plasticity chart; procedure for classification of a given soil		02 hrs 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
		2	Flow of Water Through Soils: 4.1 Concept of permeability and its importance		
		3	Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability		
		4	Comparison of permeability of different soils as per BIS		
	Week 4	1	Measurement of permeability in the laboratory		
		2	revision		02 hrs Field Density Measurement (Sand Replacement and
		3	revision		
		4	revision		

APRIL	Week 1	1	revision			
		2	Sessional-1			
		3	Sessional-1			
		4	Sessional-1			
	Week 2	1	Sessional-1			
		2	Sessional-1			
		3	Effective Stress: (Concept only) (04 Hours) 5.1 Stresses in subsoil			
		4	Definition and meaning of total stress, effective stress and neutral stress			
	Week 3	1	Principle of effective stress	02 hrs	Liquid Limit and Plastic Limit Determination: a)	
		2	Importance of effective stress in engineering problems			
		3	Deformation of Soils (04 Hours) 6.1 Meaning, conditions/situations of occurrence with emphasis on practical significance of: a) Consolidation and settlement			
		4	Creep c) Plastic flow d) Heaving e) Lateral movement f) Freeze and thaw of soil			
	Week 4	1	Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation.	02 hrs	Mechanical Analysis a) Preparation of sample b) Conducting sieve analysis c) Computation of results d) Plotting the grain size distribution curve e)	
		2	Meaning of total settlement, uniform settlement and differential settlement; rate of settlement and their effects			
		3	Settlement due to construction operations and lowering of water table			
		4	Tolerable settlement for different structures as per BIS			
MAY	Week 1	1	Shear Strength of Soil: (09 Hours) 7.1. Concept and Significance of shear strength	02 hrs	Laboratory Compaction Tests (Standard Proctor test) a) Preparation of sample b) Conducting the test c) Observing soil behaviour during test d) Computation of	
		2	Factors contributing to shear strength of cohesive and cohesion less soils, Coulomb's law			
		3	Determination of shearing strength by direct shear test, unconfined compression test and vane shear test. Drainage conditions of test and their significance			
		4	Stress and strain curve, peak strength and ultimate strength, their significance			
	Week 2	1	Sessional-2			
		2	Sessional-2			
		3	Sessional-2			
		4	Sessional-2			
	Week 3	1	Sessional-2			
		2	Compaction: (4 Hours) 8.1 Definition and necessity of compaction 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	02 hrs	Direct Shear Test	
		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, jobs of an embankment supervisor in relation to compaction			
		4	Soil Exploration: (8 Hours) 9.1 Purpose and necessity of soil exploration			
	Week 4	1	Reconnaissance, methods of soil exploration, Trial pits, borings (auger, wash, rotary, percussion to be briefly dealt)			
		2	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.			
		3	Presentation of soil investigation results			
		4	Bearing Capacity of soil 10.1 Concept of bearing capacity	02 hrs		
	Week 5	1	Definition and significance of ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure		Permeability Test	
		2	Guidelines of BIS (IS 6403) for estimation of bearing capacity			
		3	Factors affecting bearing capacity 10.5 Concept of vertical stress distribution in soils due to foundation loads, pressure bulb			

JUNE	Week 1	1	Applications of SPT, unconfined compression test and direct shear test in estimation of bearing capacity 10.7 Plate load test (no procedure details) and its limitations 10.8 Improvement of bearing capacity by sand drain method, compaction, use of geo synthetics.		02 hrs	Demonstration of Unconfined Compression Test a) Specimen preparation b) Conducting the test c) Plotting the graph d) Interpretation of results and finding/bearing capacity
		2	Foundation Engineering: (10 Hours) Concept of shallow and deep foundation; types of shallow foundations: combined, isolated, strip, mat, and their suitability. Factors affecting the depth of shallow foundations, deep foundations, type of piles and their suitability; pile classification on the basis of material, pile group and pile cap.		02 hrs	Demonstration of Vane shear Tes
	Week 2	1	Sessional-3			
		2	Sessional-3			
		3	Sessional-3			
		4	Sessional-3			
	Week 3	1	Sessional-3			
		2	revision			
		3	revision			
		4	revision			
	Week 4	1	revision			
		2	revision			
		3	revision			
		4	revision			