

Lesson Plan

Name of the Faculty:

Discipline: Civil Engineering

Semester: 5th sem

Subject: SOIL AND FOUNDATION ENGINEERING

Work Load (Lecture/Practical) per week (in hours): Lectures- , Practicals-

Week	Theory		Practical	
	Lecture day	Topic (including assignment/test)	Practical day	Topic
1 st	1 st	Introduction: Importance of soil studies in Civil Engineering	1 st	To determine the moisture content of a given sample of soil
	2 nd	Geological origin of soils with special reference to soil profiles in India: residual and transported soil, alluvial deposits, lake deposits, local soil found in J&K, dunes and loess, glacial deposits,		
	3 rd	black cotton soils, conditions in which above deposits are formed and their engineering characteristics		
	4 th	Names of organizations dealing with soil engineering work in India, soil map of India		
2 nd	5 th	Physical Properties of Soils: Constituents of soil and representation by a phase diagram	2 nd	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 identification d) Preparation of boring log and SPT graphs e) Interpretation of test results
	6 th	Definitions of void ratio, porosity, water content, degree of saturation, 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		
	7 th	Simple numerical problems with the help of phase diagrams		

	8 th	Classification and Identification of Soils, Particle size, shape and their effect on engineering properties of soil, particle size classification of soils		
3 rd	9 th	Gradation and its influence on engineering properties, Relative density and its use in describing cohesionless soils	3 rd	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
	10 th	Behaviour of cohesive soils with change in water content, Atterberg's limit - definitions, use and practical significance		
	11 th	Field identification tests for soils, Soil classification system as per BIS 1498; basis, symbols, major divisions and sub divisions, groups, plasticity chart; procedure for classification of a given soil		
	12 th	Flow of Water Through Soils: Concept of permeability and its importance, Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability		
4 th	13 th	Comparison of permeability of different soils as per BIS	4 th	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
	14 th	Measurement of permeability in the laboratory		
	15 th	Assignment-I		
	16 th	UNIT TEST- I		
5 th	17 th	Effective Stress: (Concept only)Stresses in subsoil, Definition and meaning of total stress, effective stress and neutral stress	5 th	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
	18 th	Principle of effective stress, Importance of effective stress in engineering problems		
	19 th	Deformation of Soils, Meaning, conditions/situations of occurrence with emphasis on		

		<p>practical significance of: a) Consolidation and settlement b) Creep c) Plastic flow d) Heaving e) Lateral movement f) Freeze and thaw of soil</p>		
	20 th	<p>Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation. Meaning of total settlement, uniform settlement and differential settlement; rate of settlement and their effects</p>		
6 th	21 st	<p>Settlement due to construction operations and lowering of water table Tolerable settlement for different structures as per BIS</p>	6 th	<p>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</p>
	22 nd	<p>Shear Strength Characteristics of Soils: Concept and Significance of shear strength</p>		
	23 rd	<p>Factors contributing to shear strength of cohesive and cohesion less soils, Coulomb's law, Examples of shear failure in soils</p>		
	24 th	<p>Assignment- II</p>		
7 th	25 th	<p>UNIT TEST-II</p>	7 th	<p>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 content and maximum dry density</p>
	26 th	<p>Compaction: Definition and necessity of compaction, Laboratory compaction test (standard and modified proctor test as per BIS) definition and importance of optimum water content,</p>		
	27 th	<p>maximum dry density; moisture dry density relationship for typical soils with different compactive efforts</p>		
	28 th	<p>Compaction control; Density control, measurement of field density by core cutter method and sand replacement method, moisture control,</p>		

8 th	29 th	Proctor's needle and its use, thickness control, jobs of an embankment supervisor in relation to compaction	8 th	Demonstration of Unconfined Compression Test a) Specimen preparation b) Conducting the test c) Plotting the graph d) Interpretation of results and finding/bearing capacity
	30 th	Soil Exploration: Purpose and necessity of soil exploration		
	31 st	Reconnaissance, methods of soil exploration, Trial pits, borings (auger, wash, rotary, percussion to be briefly dealt		
	32 nd	Sampling; undisturbed, disturbed and representative samples; selection of type of sample; thin wall and piston samples;		
9 th	33 rd	area ratio, recovery ratio of 128 samples and their significance, number and quantity of samples, resetting,	9 th	Demonstration of: a) Direct Shear and Vane Shear Test on sandy soil samples b) Permeability test apparatus
	34 th	sealing and preservation of samples		
	35 th	Presentation of soil investigation results		
	36 th	Assignment-III		
10 th	37 th	Bearing Capacity of soil, Concept of bearing capacity	10 th	
	38 th	Definition and significance of ultimate bearing capacity,		
	39 th	net safe bearing capacity and allowable bearing pressure		
	40 th	Guidelines of BIS (IS 6403) for estimation of bearing capacity of soil		
11 th	41 st	, Factors affecting bearing capacity	11 th	
	42 nd	Concept of vertical stress distribution in soils due to foundation loads, pressure bulb		
	43 rd	Applications of SPT, unconfined compression test		
	44 th	direct shear test in		

		estimation of bearing capacity		
12th	45th	Plate load test (no procedure details) and its limitations	12th	
	46th	Improvement of bearing capacity by sand drain method, compaction, use of geo-synthetics		
	47th	Foundation Engineering: Concept of shallow and deep foundation		
	48th	types of shallow foundations: isolated, combined, strip, mat, and their suitability.		
13th	49th	Factors affecting the depth of shallow foundations	13th	
	50th	deep foundations		
	51st	type of piles and their suitability		
	52nd	Types of mat and raft		
14th	53rd	pile classification on the basis of material	IV	
	54th	pile group and pile cap		
	55th	Assignment-IV,		
	56th	UNIT TEST -III		
15th	57th	REVISION UNIT -I	15th	
	58th	REVISION UNIT -II		
	59th	REVISION UNIT -III		
	60th	REVISION UNIT -IV		