

SAI INSTITUTE OF TECHNOLOGICAL SCIENCE

Name of Faculty: M. NAYAK Discipline:

Civil Engg.

SEM: 3rd

Subject: GEOTECH ENGINEERING

Lesson Plan duration: 15 Weeks (01.08.2023 to 23.11.2023)

Week	Theory	
	Lecture day	
1	1	Introduction: Importance of soil studies in Civil Engineering
	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 J&K
	3	dunes and loess, glacial deposits, black cotton soils, conditions in which above deposits are formed and their engineering characteristics.
	4	Names of organizations dealing with soil engineering work in India, soil map of India
2	5	Revision
	6	Assignment
	7	Constituents of soil and representation by a phased diagram
	8	Definitions of void ratio, porosity, water content, degree of saturation, specific gravity, unit weight,
3	9	bulk density/bulk unit weight,
	10	dry unit weight
	11	saturated unit weight and submerged unit weight of soil grains and correlation between them
	12	Simple numerical problems with the help of phased diagrams
4	13	Particle size, shape and their effect on engineering properties of soil, particle size classification of soils
	14	Gradation and its influence on engineering properties

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	15	Relative density and its use in describing cohesionless soils
	16	Behaviour of cohesive soils with change in water content,
5	17	Atterberg's limit-definitions, use and practical significance
	18	Field identification tests for soils
	19	Soil classification system as per BIS 1498; basis, symbols,
	20	major divisions and sub divisions, groups, plasticity chart; procedure for classification of a given soil
6	21	Assignment
	22	Revision
	23	Concept of permeability and its importance
	24	Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability
7	25	Comparison of permeability of different soils as per BIS
	26	Measurement of permeability in the laboratory
	27	Stresses in subsoil
	28	Definition and meaning of total stress, effective stress and neutral stress
	30	Importance of effective stress in engineering problems
	31	Assignment
	32	Revision
9	33	Meaning, conditions/situations of occurrence with emphasis on practical significance of: a) Consolidation and settlement
	32	Revision

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		b) Creep c) Plastic flow
	34	d) Heaving e) Lateral movement f) Freeze and thaw of soil
	35	Definition and practical significance of compression index, coefficient of consolidation, degree of consolidation.
	36	Meaning of total settlement, uniform settlement and differential settlement; rate of settlement and their effects
10	37	Settlement due to construction operations and lowering of water table
	38	Tolerable settlement for different structures as per BIS
	39	Concept and Significance of shear strength
	40	Factors contributing to shear strength of cohesive and cohesionless soils, Coulomb's law
11	41	Examples of shear failure in soils
	42	Numerical of Above topics
	43	Assignment
	44	Definition and necessity of compaction
12	45	Laboratory compaction test (standard and modified proctor test as per BIS) definition and importance of optimum water content,
	46	maximum dry density; moisture dry density relationship for typical soils with different compactive efforts
	47	Compaction control; Density control, measurement of field density by core cutter method and sand replacement method
	48	moisture control, Proctor's needle and its use, thickness control,
13	49	job of an embankment supervisor in relation to compaction
	50	Assignment
	51	Revision

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	52	Purpose and necessity of soil exploration
14	53	Reconnaissance, methods of soil exploration,
	54	Trial pits, borings (auger, wash, rotary, percussion to be briefly dealt)
	55	Sampling; undisturbed, disturbed and representative samples;
	56	selection of type of sample;
15	57	thin wall and piston samples; area ratio, recovery ratio of 128
	58	samples and their significance,
	59	number and quantity of samples, resetting,
	60	sealing and preservation of samples
13	61	Presentation of soil investigation results
	62	Concept of bearing capacity
	63	Assignment
	64	Revision
	65	Definition and significance of ultimate bearing capacity,
14	66	net safe bearing capacity and allowable bearing pressure
	67	Guidelines of BIS (IS 6403) for estimation of bearing capacity of soil
	68	Factors affecting bearing capacity
	69	Concept of vertical stress distribution in soils due to foundation loads, pressure bulb
	70	Applications of SPT, unconfined compression test and direct shear test in estimation of bearing capacity
15	71	late load test (no procedure details) and its limitations

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	72	Improvement of bearing capacity by sand drain method,
	73	compaction, use of geo-synthetics.
	74	Assignment
	75	Revision