R19

SIDDARTHA INSTITUTE OF SCIENCE & TECHNOLOGY:: PUTTUR
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: Geotechnical Engineering(19CE0117)	**Course & Branch**: B.Tech - CE
Year & Sem: III-B.Tech & I-Sem	**Regulation:** R19

UNIT –I
INTRODUCTION, PERMEABILITY &EFFECTIVE STRESS ANALYSIS

1	Explain the process of soil formation by weathering in details.	[L2][CO1]	[12M]
2	a) Classify various types of soil structures with neat sketch.	[L2][CO1]	[6M]
	b) Explain Clay mineralogy.	[L2][CO1]	[6M]
3	a) Using three phase diagram of soil, develop an expression for Void ratio, water content, water content, specific gravity and degree of saturation.	[L2][CO1]	[6M]
	b) The moist unit weight of soil sample is 19.2 kN/m^3 and has water content of 9.8%. The specific gravity of soil particles is 2.69. Determine dry unit weight, void ratio and porosity and degree of saturation.	[L3][CO1]	[6M]
4	a) Write short notes on Index Properties of soils.	[L1][CO1]	[6M]
	b) Explain in detail the laboratory method for particle size distribution of coarse grained soils by dry sieve analysis.	[L2][CO1]	[6M]
5	Explain in detail the Indian Standard classification System and list out group symbols in detail.	[L2][CO1]	[6M]
6	Define Atterberg Limits.Explain the procedure of Liquid limit of soil.	[L2][CO2]	[12M]
7	Define permeability. Explain various factors affecting permeability.	[L2][CO2]	[12M]
8	Determine the average coefficient of permeability in the horizontal and vertical direction for a deposit consisting of three layers of thickness 5m, 1m, and 2.5m and having the coefficient of permeability of 3 x10^{-2} mm/sec, 3x10^{-5}mm/sec and 4 x10^{-2}mm/sec respectively.	[L3][CO2]	[12M]
9	Explain the coefficient of permeability in laboratory by constant head method with neat sketch.	[L2][CO2]	[12M]
10	a) Explain Quick sand condition.	[L2][CO2]	[6M]
	b) Define flow net and various applications of flow net.	[L2][CO2]	[6M]

UNIT –II
COMPACTION AND CONSOLIDATION

1	Describe the Standard Proctor test and modified Proctor test to be conducted in the laboratory.	[L2][CO3]	[12M]
2	Define compaction and explain various factors effecting the compaction.	[L2][CO3]	[12M]
3	Write short notes on (i) Compaction phenomenon (ii) Method of compaction	[L1][CO3] [L1][CO3]	[6M] [6M]
4	Explain the procedure of Core Cutter method with neat sketch.	[L2][CO3]	[12M]
5	a) The Maximum dry density of a sample by the light compaction test is 1.78g/ml at an optimum water content of 15%. Find the air voids and degree of saturation G=2.67.What would be the corresponding value of dry density on the zero air voids at optimum moisture content. b) An earth embankment is compacted at a water content 18%.to a bulk density of 19.2 kN/m^3. If the specific gravity of the sand is 2.7 find the void ratio and the degree of saturation of compacted embankment.	[L3][CO3] [L3][CO3]	[6M] [6M]
6	Explain the procedure of Sand replacement method with neat sketch.	[L2][CO3]	[12M]
7	Define consolidation and various types of consolidations.	[L2][CO3]	[12M]
8	(a) Define preconsolidation pressure. (b) Draw the graph representing preconsolidation pressure.	[L2][CO3] [L2][CO3]	[6M] [6M]
9	Explain the procedure of consolidation test with neat sketch.	[L2][CO3]	[12M]
10	In a consolidation test the following results have been obtained. When the load was changed from 50 kN/m^2 to 100 kN/m^2, the void ratio changed from 0.70 to 0.65. Determine compression index, coefficient of volume change and coefficient of consolidation in mm^2/sec.	[L3][CO3]	[12M]

UNIT –III
STRESS DISTRIBUTION IN SOILS AND SHEAR STRENGTH OF SOILS

1	Develop an expression for the vertical stress at a point due to a point load, using Boussinesq's theory.	**[L2][CO4]**	**[12M]**
2	Explain Newmaark's influence chart with neat sketch.	**[L2][CO4]**	**[12M]**
3	a) A concentrated load of 2000 kN acts vertically at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load.	**[L3][CO4]**	**[6M]**
	b) Determine the vertical stress at a point P which is 3m below and at a radial distance of 3m from the vertical load 100kN. Use westergaard's solution.	**[L3][CO4]**	**[6M]**
4	Explain vertical stress under line load, strip load, circular load and rectangular area with neat sketch.	**[L1][CO4]**	**[12M]**
5	(a) Explain the concept of 'Westergaards theory' in soils.	**[L2][CO4]**	**[6M]**
	(b) What do you understand by 'Pressure bulb'? Illustrate with sketches.	**[L2][CO4]**	**[6M]**
6	Write brief critical notes on:		
	(a) Mohr's Circle of stress.	**[L1][CO4]**	**[6M]**
	(b) Explain the Mohr-Coulomb strength theory.	**[L2][CO4]**	**[6M]**
7	a) Explain types of soils based on total strength.	**[L2][CO4]**	**[6M]**
	b) Explain types of shear strength based on drainage conditions.	**[L2][CO4]**	**[6M]**
8	Explain the principle of the direct shear test. What are the advantages of this test? What are its Limitations.	**[L2][CO4]**	**[12M]**
9	Describe the vane shear test with neat a sketch.	**[L2][CO4]**	**[12M]**
10	Explain the procedure of unconfined compression test with neat sketch.	**[L2][CO4]**	**[12M]**

UNIT –IV
EARTH SLOPE STABILITY

1	(a) Define earth slope.	[L1][CO5]	[6M]
	(b) Explain factor of safety with respect to shear strength, cohesion and friction.	[L2][CO5]	[6M]
2	(a) What are the factors causes the slope failures.	[L1][CO5]	[6M]
	(b) Explain different types of slope failures with neat sketches.	[L1][CO5]	[6M]
3	Derive the expression for stability analysis of infinite slope of cohesive soils.	[L2][CO5]	[12M]
4	Derive the expression for stability analysis of infinite slope of cohesion less soils	[L2][CO5]	[12M]
5	(a) Explain Taylor's stability number.	[L2][CO5]	[6M]
	(b) A vertical cut is made is made in a clay deposit (c=30 kN/m^2, $\Phi^{'} = 0^o$, γ=16 kN/m^2). Find the maximum height which can be temporarily supported. Take S_n=0.261.	[L3][CO5]	[6M]
6	With the help of a neat sketch explain in detail about friction circle method.	[L2][CO5]	[12M]
7	A canal is to be excavated through a soil with c = 15 kN/m^2, Φ = 20°, e = 0.9 and G = 2.67. The side slope is 1 in 1. The depth of the canal is 6 m. determine the factor of safety with respect to cohesion when the canal runs full. What will be the factor of safety if the canal is rapidly emptied.	[L3][CO5]	[12M]
8	Analyze the slope, if it is made of clay having c$^{'}$ = 30 kN/m^2, $\Phi^{'}$ = 20°, e = 0.65 and G = 2.67 and under the following conditions: (i) When the soil is dry (ii) When water seeps parallel to the surface of the slope (iii) When the slope is submerged slope angle = 25°	[L3][CO5]	[12M]
9	Give the step by step procedure of analyzing stability of a finite slope using Swedish circle method.	[L2[CO5]	[12M]
10	With the help of a neat sketch show various forces considered for the analysis of a finite slope using Bishop's simplified method. Mention the equation for factor of Safety given by this method.	[L2][CO5]	[12M]

UNIT –V
SOIL EXPLORATION

1	(a) What are the different stages in sub soil exploration?	[L1][CO6]	[6M]
	(b) Explain various uses of site investigations.	[L2][CO6]	[6M]
2	Describe with a neat sketch how will you carry out the wash boring method of soil exploration.	[L2][CO6]	[12M]
3	(a) Discuss various open excavation methods for conducting soil exploration.	[L2][CO6]	[6M]
	(b)Sketch scraper bucket sample and explain how an undisturbed soil sample is extracted using it.	[L2][CO6]	[6M]
4	(a) How boring operations are carried out using rotary auger boring and percussion drilling.	[L2][CO6]	[6M]
	(b) Describe the construct of a split spoon sampler. Explain how undisturbed soil sample is extracted using it.	[L2][CO6]	[6M]
5	(a) Explain various types of soil samples.	[L2][CO6]	[6M]
	(b) List out various design features affecting the sample disturbance.	[L1][CO6]	[6M]
6	Give a detailed account on how Standard Penetration Test is conducted. What are the relevant corrections applied to SPT number?	[L2][CO6]	[12M]
7	a) A SPT was conducted in fine sand below the water table and a value of 25 is obtained for N. What is the corrected value of N.	[L1][CO6]	[6M]
	b) A SPT was conducted in a dense sand deposit at a depth of 22m and a value of 48 was observed for N. The density of the sand was 15 kN/m^2 .What is the value of N corrected for over burden pressure.	[L1][CO6]	[6M]
8	Explain in detail how cone penetration test is conducted with neat sketch.	[L2][CO6]	[12M]
9	(a) Describe in detail execution of soil exploration program.	[L2][CO6]	[6M]
	(b) Explain various salient features of a soil exploration report	[L2][CO6]	[6M]
10	Explain in detail how plate load Test is conducted with neat sketch.	[L2][CO6]	[12M]

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