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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



V SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: GEOTECHNICAL ENGINEERING - I [CIE 301] REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ANY FIVE FULL the questions.

✤ Missing data may be suitable assumed.

1A.	Explain Honeycomb and flocculated structure of soils	4					
1B.	Using the basic definition of soil mass, obtain the relationship between bulk and dry unit weights of soil in terms of water content	3					
1C.	How many cubic meters of fill can be constructed at a void ratio of 0.6 from 1200 m ³ of borrow pit that has a void ratio of 1.35						
2A.	A sample of soil is coated with a thin layer of paraffin wax. The weight of paraffin wax is 7×10^{-2} N and the soil alone weights 5.8 N. When the sample is immersed in water it displaces 350 ml of water. The specific gravity of the soil solids is 2.65 and that of wax is 0.9. Determine i) voids ratio ii) degree of saturation and iii) percentage air voids of soil sample if water content is 16.4 %						
2B.	Explain the corrections for hydrometer reading	2					
2C.	Following results are obtained from a laboratory test on two types of soil samples. Classify the soils as per Indian soil classification systemSieve size (mm)4.75210.450.030.150.075CuCCWLWPPercentage passing9896909886843.81.22.415.2Percentage passing9896909886843.81.22.415.2Percentage passing9896909886843.81.22.2.415.2Percentage retained005162225303.81.212.84.3	4					
3A.	A soil profile consists of 2.4 m sand (G = 2.65, e = 0.7) over an layer of silty clay (G=2.67, e = 0. 6) which is 3 m thick. Below silty clay lies a 2 m clay ($w = 20\%$, G=2.7). Calculate the total, effective and pore pressure at 1.3 m and 6.5 m below ground level if the water table is at 1.5 m from surface and capillary rise above water table is 1 m. Soil is saturated 50% above capillary rise.	5					
3B.	 Soil is placed in a permeameter and water is allowed to flow under a constant head as shown in figure Fig. Q.3(b). The internal diameter of permeameter is 8 cm. Find the total head, pressure head and datum head at A,B,C and D seepage through the soil if its permeability is 2.8x10⁻³ m/sec height upto which the level of water in the pipe can be increased to cause piping. Take G=2.65 and e=0.65 	5					

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	Following are the observations obtained from standard Proctor test.									
	water content	10	12	14	16					
10	dry unit weight (kN/m ³)	16.8	17.2	18.64	17.4					
47.	Determine percentage air voids, degree of saturation and air content at optimum moisture									
	content and at 12 % water conten	t. What is	s theoretic	al maximu	ım dry uni	t weight at optimum				
	moisture content. Take G=2.7									
4R	4B. Flownet for the flow of water below the weir is shown in figure Fig. Q. 4(b). Determine i) seepage ii) hydrostatic pressure at A									
	A footing shown in figure Fig. Q	.4 (c) tra	nsmits a p	ressure as	s shown. C	Calculate the vertical				
4C.	stress at point P, 0.8 m depth from	i ground l	level.				4			
5.4	Differentiate between undrained, drained and consolidated undrained tests. How do you									
JA.	decide the type of test in the site									
	A specimen of soil was tested in a	triaxial	test with a	major pri	ncipal stre	ess of 500 kN/m ² but				
	the cell pressure could not be me	the cell pressure could not be measured. With the similar soil sample box shear test is also								
	conducted. Shear stresses at failur	e are 157	1.7 kN/m^2 ,	215.4 kN/	m^2 and 27	3.1 kN/m^2 at normal	E			
5B.	stress of 100 kN/m ² , 200 kN/m ² as	nd 300 kľ	1 300 kN/m ² . Using analytical and graphical methods find							
	i) the cell pressure in case of tria	ixial test								
	ii) the axial stress and the direction	on of failu	ire plane i	n the case	of unconf	ned compression				
	strength test									
	Obtain the relationship between a	ngle of in	nternal fric	tion and d	lirection o	f failure plane in the				
5C.	case of triaxial compression strength test.									
6.4	Explain the height of solids method to determine the voids ratio of the soil from laborator									
UA.	consolidation test									
6B.	Define the terms i) degree of consolidation ii) time factor iii) compression index									
	A 6 m thick soil stratum sandwich	ed betwe	en two sai	nd layers h	nas a comp	pression index of 0.3				
	and coefficient of permeability	and coefficient of permeability 4.6×10^{-10} m/sec. The voids ratio at a vertical stress of 250								
60	kN/m^2 is 1.2 compute						6			
00.	i) voids ratio when vertical stress	is increa	sed to 400	kN/m ²						
	ii) settlement due to above stress	increase								
	iii) How much settlement occurs	in 30 day	S							



