Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – WINTER 2015

Subject Code: 150604 **Date:05/12/2015**

Subject Name: Geotechnical Engineering I

Time: 10:30am to 1:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain the three phase diagram of soil with proper nomenclature?	**07**
	(b)	Describe various soils with respect to weathering conditions?	**07**
Q.2	**(a)**	Derive the relation with usual notations $\gamma_b = {\gamma_w (G-1)}/{1+e}$	**07**
	(b)	Describe the method for determination of specific gravity of soil in laboratory?	**07**
		OR	
	(b)	The moisture content of an undisturbed sample of clay is 265% at full saturation. The specific gravity of the soil is 2.5 and it has a dry unit weight of 3.3kN/m^3, determine (i) saturated unit weight (ii) submerged unit weight (iii) void ratio for the specimen.	**07**
Q.3	**(a)**	Define "Placement water content". Discuss effect of placement of water content of compaction of soil?	**07**
	(b)	Explain soil classification as per I. S. method?	**07**
		OR	
Q.3	**(a)**	Explain the different types of rollers used for compaction on field?	**07**
	(b)	Following observations were recorded for a sand replacement test performed for finding field density of natural soil: Bulk density of sand used = 1.4g/cc, Mass of soil excavated = 950gm, mass of sand for filling pit = 700gm, w (%) of natural soil = 15%, G = 2.7. Determine (i) bulk density (ii) dry density (iii) void ratio and (iv) degree of saturation	**07**
Q.4	**(a)**	Explain test method for finding permeability of soil using constant head test with the help of a neat sketch?	**07**
	(b)	Explain primary and secondary consolidation. Describe any one method for determination of coefficient of consolidation?	**07**
		OR	
Q.4	**(a)**	Enumerate and describe the assumption adopted for Terzaghi's one dimensional consolidation theory?	**07**
	(b)	A falling head permeability test is carried out in the lab on a soil sample having sample diameter of 6 cm and height 15cm. The initial head of water applied is 45cm which falls to 30cm in time duration of 2 minutes. If the diameter of the stand pipe is 2cm, determine the coefficient of permeability in m/day.	**07**
Q.5	**(a)**	Define shear strength of soil? Describe the various types of triaxial test on basis of drainage conditions with appropriate equations?	**07**
	(b)	A consolidation test performed on 2cm thick clay gives 50% consolidation in 5 minutes. How long will a 3.7m thick layer in field take to consolidate to the same value if drainage condition in both cases is double drainage.	**07**
		OR	
Q.5	**(a)**	Explain the importance of gradation of soil. Describe the method for gradation analysis of soil with help of neat sketch?	**07**
	(b)	What is Coulomb's equation for shear strength of soil? Discuss the factors which affect the shear strength parameters of soil?	**07**

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