Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V- EXAMINATION – SUMMER 2016

Subject Code: 150604 **Date: 06/05/2016**

Subject Name: Geotechnical Engineering - I

Time: 02:30 PM to 05:00 PM **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 terms: Sensitivity, Thixotropy, Flocculated structure, Honey combed Structure, Consolidation, Isobar	**07**
	(b)	Define phase diagram and draw phase diagram in terms of void ratio 'e' and porosity 'n'. Derive the relationship between dry density and bulk density in terms of water content.	**07**
Q.2	**(a)**	How do you distinguish between silt and clay in the field? List any three soil classification systems and describe one in detail	**07**
	(b)	An undisturbed soil sample has total weight 2100 gm ,volume of 1250cc, water content =13%, specific gravity = 2.7, compute void ratio, degree of saturation , water content to make sample fully saturated , effective unit weight of soil sample	**07**
		OR	
	(b)	The mass of chunk of moist soil is 20 kg and its volume is 0.011m3. After drying in oven the mass reduced to 16.5 kg. Determine water content , the density of moist soil, dry density ,void ratio, porosity and degree of saturation , take G= 2.7	**07**
Q.3	**(a)**	State Darcy's law. Obtain the relationship between seepage velocity and Darcy's velocity. What is 'Quick sand' condition?	**07**
	(b)	Sketch typical dry density- water content plot. Show maximum dry density and optimum moisture content on it. Also show and explain Zero air void line. Show the type of soil structure at dry of OMC, at OMC and at wet of OMC.	**07**
		OR	
Q.3	**(a)**	Describe in brief field compaction methods. State the suitability of field compaction equipments with respect to soil type.	**07**
	(b)	Calculate coefficient of permeability of soil sample 6cm in height and 50 cm2 in cross sectional area, if a quantity of water equal to 430 cc passed down in 10 minutes under an effective head of 40 cm. On oven drying the test specimen weighed 4.98 N. Taking G=2.65, calculate the seepage velocity of water during the test	**07**
Q.4	**(a)**	State the principle of operation of following tests: Direct Shear box test, Triaxial compression test. Show that cohesion is half the unconfined compressive strength in pure clay.	**07**

(b) The following table gives data obtained from Triaxial compression test conducted on two specimens of sandy clay soil samples : **07**

Specimen No.	1	2
Cell pressure (kN/m2	100	200
Deviator stress at failure(kN/m2)	470.1	630.2

Find shear strength parameters analytically or Graphically

OR

Q.4 (a) Enumerate the limitations of Direct shear box test. Sketch and explain vane shear test **07**

(b) The following are the results as obtained from direct shear box test on sandy clay sample of area 36 cm2. **07**

Normal load (N)	Peak(maximum) shear force, N
100	110
200	152
300	193

Plot the graph &obtain the shear strength parameters.

Q.5 (a) Explain the following terms : Isochrones, Secondary compression, Coefficient of consolidation, Time factor **07**

(b) A 6m thick bed of clay is overlain by 9m thick layer of sand with water table at 4m below ground surface. The clay has eo=1.01 & Cc=0.315. For the sand layer the bulk densities above & below water table are18 kN/m3 and 20.5kN/m3 respectively. Determine the settlement of the building constructed on sand layer if it causes an increase in effective vertical stress of 100kN/m2 at the middle of clay layer **07**

OR

Q.5 (a) Define the terms consolidation, Explain the same with the help of Terzaghi's Spring analogy concept **07**

(b) During consolidation test , the void ratio is found to reduce from 0.9 to 0.50 under the stress increment of 100 kPa to 200 kPa, compute coefficient of compressibility, coefficient of volume change, compression index **07**