

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-V (OLD) - EXAMINATION – SUMMER 2017****Subject Code: 150604****Date: 27/04/2017****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)** Define (i) Plastic Limit (ii) Shrinkage Limit (iii) Activity (iv) Sensitivity (v) Relative Density (vi) Phase Diagram & (vii) Specific Gravity **07**

**(b)** Define the term 'soil structure' and explain about commonly observed soil structures. **07**

**Q.2 (a)** Write a short note on 'soil water'. **07**

**(b)** An undisturbed soil sample has total weight of 2050 gm, volume of 1250cc, water content = 10 % and specific gravity  $G = 2.68$ . Compute (i) void ratio (ii) porosity (iii) degree of saturation (iv) water content to make sample fully saturated & (v) effective unit weight of the soil sample. **07**

**OR**

**(b)** Sieve analysis results of a sandy soil sample is given below. Classify the sample:- **07**

% N	:	10	20	30	60	90	100
D (mm):		0.95	1.68	2.35	4.15	4.82	5.05

**Q.3 (a)** Explain the factors affecting permeability of soils. **07**

**(b)** The following are the result of the standard compaction test:- **07**

Water content (%):	05	10	14	20	25
Bulk density ( $\text{kN/m}^3$ ):	17.5	19.8	21.0	21.8	21.6

Plot the MDD-OMC curve and obtain the optimum water content and maximum dry density.

**OR**

**Q.3 (a)** Explain the factors affecting compaction. **07**

**(b)** A Falling Head permeameter accommodates a soil sample 10 cm high and  $50\text{cm}^2$  in cross sectional area. The permeability of the sample is expected to be  $1 \times 10^{-4}$  cm/sec. If it is desired that the head in the Stand pipe should fall from 81 cm to 50 cm in 50 minutes, determine the size of the standpipe which should be used. **07**

**Q.4 (a)** Compare merits and demerits of 'Direct Shear Test' and 'Triaxial Compression Test'. **07**

**(b)** Determine the shearing strength parameters from the Direct Shear Test results given below. The proving ring constant is 0.55 kg/Div. **07**

Sr. No.	Normal Stress ( $\text{kg/cm}^2$ )	Shear Force (Div)
1.	1.0	110
2.	2.0	150
3.	3.0	200

**OR**

- Q.4** (a) What do you mean by shearing strength of soils? Briefly explain about the different shear failure theories. **07**
- (b) Name and briefly explain the Triaxial tests which may be performed based on the different drainage conditions. **07**
- Q.5** (a) Define the term 'Consolidation' and explain the same with the help of Terzaghi's Spring Analogy concept. **07**
- (b) During consolidation test, the void ratio is determined to decrease from 0.80 to 0.40 under the stress increment of 100 kPa to 250 kPa. Compute coefficient of compressibility, coefficient of volume compressibility & compression index. **07**

**OR**

- Q.5** (a) Define the term 'pre-consolidation pressure' and briefly explain the method for determination of the same. **07**
- (b) Define the term 'coefficient of consolidation' and explain square time fitting method for determining the same. **07**

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