

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- V(OLD) EXAMINATION – SUMMER 2019

Subject Code:150604
Date:20/06/2019
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) Discuss briefly the scope of geotechnical engineering in relation to civil engineering. **07**

(b) Derive relation, $\gamma_b = \frac{(G+e S_r) \gamma_w}{1+e}$ **07**

Q.2 (a) Explain the grain size distribution by using sieve analysis method. **07**

(b) A soil sample has a liquid limit of 30 %, plastic Limit 17% and flow index of 13 %. Natural water content of soil is 19% so determine (i) Plasticity index. (ii) Liquidity index (iii) Consistency Index. (iv) Toughness index. **07**

OR

(b) Described liquid limit by Casagrande method with neat sketch. **07**

Q.3 (a) What is capillary water? Discuss capillary rise in soil. **07**

(b) Calculate the height of capillary fringe in a soil with effective size of 0.05 mm and void ratio 0.40. Take $C = 20 \text{ mm}^2$. **07**

OR

Q.3 (a) Give effect of void ratio and compaction energy on the compaction. **07**

(b) The following are the observation of compaction test hence volume of compaction mould is 950 cc. take $G = 2.65$. Draw compaction curve. Report maximum dry unit and optimum moisture content (OMC). Draw 100 % saturation line. **07**

Weight (%)	7.7	11.5	14.6	17.5	19.5	21.2
Weight (N)	16.67	18.54	19.92	19.52	19.23	18.83

Q.4 (a) Write a short note on light compaction test and heavy compaction test. **07**

(b) A highway embankment is to be compacted to 95 % of the standard proctor density. Dry density of a borrow material exactly adjacent to the site is 18.4 kN/m^3 at 100 % compaction. $G_s = 2.65$. How much borrow soil in cu. M. will be to compact 1 cu m. of embankment. **07**

OR

Q.4 (a) Explain mohr's failure criterion Explain Mohr's Columb failure theory. **07**

(b) In Try Axial test a soil specimen has major and minor principle stresses 250 KPa. And 60 kPa. Respectively. If the soil is fully saturated clay. **07**

Q.5 (a) Explain direct shear test with neat sketch. **07**

(b) A course grained soil has a void ratio of 0.78 and specific gravity as 2.65. calculate the critical gradient at which quick sand condition. **07**

OR

Q.5 (a) Explain theory of spring analogy for primary consolidation. **07**

(b) What is consolidation of soil mass? Explain procedure for determine pre-consolidation pressure with graph. **07**
