

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2018

Subject Code:2150609

Date:04/12/2018

Subject Name:Soil Mechanics

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

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

		MARKS														
Q.1	(a) Write down short note on 'Earth Pressure at Rest'.	03														
	(b) Define Finite and Infinite Slopes.	04														
	(c) Explain point to be considered for foundation in black cotton soil.	07														
Q.2	(a) Differentiate active earth pressure and passive earth pressure.	03														
	(b) Explain Rankine theory for active earth pressure in cohesive soil.	04														
	(c) What are the graphical methods available for the determination of lateral earth pressure? Explain any one in detail.	07														
OR																
	(c) A retaining wall 8 m high, with vertical back supports cohesive soil backfill having unit weight 19 KN/m^3 and angle of internal friction as zero and $C = 20 \text{ KN/m}^2$. Calculate (i) Internal pressure intensity at top (ii) Depth of tension crack (iii) Lateral pressure intensity at base.	07														
Q.3	(a) Write down short note on Contact pressure.	03														
	(b) For a point load of 150 KN, compute the vertical stress at 2.0 m depth along the axis by using Boussinesq and Westergaard's theories. Consider Poisson's ratio as zero.	04														
	(c) Describe the various assumption made in the derivation of Boussinesq theory.	07														
OR																
Q.3	(a) Describe usefulness of Isobar.	03														
	(b) A raft of $4 \text{ m} \times 4 \text{ m}$ carries a load of 200 KN/m^2 . Determine vertical stress increment at a point 4 m below the centre of the loaded area using equivalent point load method.	04														
	(c) Derive an expression for vertical stress under a line load.	07														
Q.4	(a) Describe Zero air void line.	03														
	(b) Explain different types of slope failure.	04														
	(c) The following data were obtained from Standard proctor test on a sample of soil.	07														
<table><tr><td>Water content (%)</td><td>8</td><td>10.5</td><td>12</td><td>13.75</td><td>16</td><td>18</td></tr><tr><td>Wt of wet soil in (kg)</td><td>1.8</td><td>1.97</td><td>2.08</td><td>2</td><td>1.88</td><td>1.75</td></tr></table>			Water content (%)	8	10.5	12	13.75	16	18	Wt of wet soil in (kg)	1.8	1.97	2.08	2	1.88	1.75
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Wt of wet soil in (kg)	1.8	1.97	2.08	2	1.88	1.75										
The volume of mould is 1000 ml. Plot the compaction curve and calculate maximum dry density and optimum water content.																
OR																
Q.4	(a) Define compaction and its theory.	03														
	(b) A vertical cut is made in clay deposit having $C = 30 \text{ KN/m}^2$, $\phi = 0$, $\gamma = 16 \text{ KN/m}^3$. Determine the maximum depth of cut so that the cut is stable. Take $S_n = 0.261$.	04														
	(c) Describe laboratory compaction test with its specification.	07														
Q.5	(a) Define compressibility and consolidation.	03														

- (b) Write down merits and demerits of Vane shear test. **04**
- (c) In an unconfined compressive test, a sample of clay 8 cm long and 4 cm in diameter fails under a load of 120 N at 10% strain. Compute the shearing resistance taking into account the effect of change in cross section of the sample. **07**

OR

- Q.5**
- (a) Define (i) Time factor (ii) coefficient of consolidation (iii) Degree of consolidation. **03**
 - (b) Explain the phenomenon of consolidation of clay by Terzaghi's spring analogy. **04**
 - (c) During consolidation test, the void ratio decreases from 0.8 to 0.5 under the stress increment of 2 kg/cm² to 4 kg/cm². Compute coefficient of compressibility, coefficient of volume compressibility and compression index. **07**
