

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020

Subject Code:3150615

Date:03/02/2021

Subject Name:Soil Mechanics

Time:10:30 AM TO 12:30 PM

Total Marks: 56

Instructions:

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

	Marks
Q.1 (a) Discuss various types of slope failures	03
(b) Differentiate the Infinite and finite slope.	04
(c) Explain Swedish circle method of stability. analysis	07
Q.2 (a) Write and explain Boussinesque's equation.	03
(b) Explain contact pressure.	04
(c) Write short note on "New-mark's Influence Chart".	07
Q.3 (a) Enlist factor affecting the bearing capacity and explain any one in detail.	03
(b) Define:	04
1. Gross pressure intensity	
2. Ultimate bearing capacity	
3. Safe bearing Capacity	
4. Allowable bearing Capacity	
(c) Describe plate load test with neat sketch.	07
Q.4 (a) Explain a types of pavements.	03
(b) Differentiate between General shear failure and Local shear failure with neat sketch.	04
(c) A square footing 2.5 m by 2.5 m is built in a homogeneous bed of sand of unit weight 20kN/m^3 and having an angle of shearing resistance of 36° . The depth of the base of footing is 1.5 m below the ground surface. Calculate the safe load that can be carried by a footing with a factor of safety of 3 against complete shear failure. Use Terzaghi's analysis. Take $N_c = 65.4$, $N_q = 49.4$ and $N_\gamma = 54$.	07
Q.5 (a) Write the basic principles involved in the geophysical methods of subsurface soil exploration	03
(b) Explain Bore log in detail.	04
(c) What are the methods available for sub surface exploration? Explain any one in detail.	07
Q.6 (a) Name and explain the shear tests which may be performed based on the different drainage conditions.	03
(b) Explain importance of 'Unconfined Compression Test' & 'Laboratory Vane Shear Test'.	04

- (c) A standard specimen of cohesionless sand was tested in triaxial compression and the sample failed at a deviator stress of 482 kN/m^2 , when the cell pressure was 100 kN/m^2 , under drained condition. Find the effective angle of shearing resistance of sand. What would be the deviator stress and the minor principal stress at failure for another identical specimen of sand if it is tested under a cell pressure of 200 kN/m^2 ? **07**
- Q.7** (a) Enlist a different types of Geosynthetics **03**
(b) Explain functions of Geosynthetics. **04**
(c) In a 16 pile group, the pile diameter is 45 cm and center to center spacing of the square group is 1.5 m. If $c = 50 \text{ kN/m}^2$, determine whether the failure would occur with the pile acting individually, or as a group? Neglect bearing at the tip of the pile. All piles are 10 m long. Take $m = 0.7$ for shear mobilization around each pile. **07**
- Q.8** (a) Explain in detail “Under Reamed Pile Foundation”. **03**
(b) How do you estimate the group capacity of piles in sand? **04**
(c) What is negative skin friction? What is its effect on the pile? **07**
