

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022****Subject Code:3130606****Date:11-07-2022****Subject Name:Geotechnical Engineering****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.
4. Simple and non-programmable scientific calculators are allowed.

	<b>Marks</b>
<b>Q.1</b> (a) Explain briefly with diagram Geological Cycle	<b>03</b>
(b) Differentiate between flocculated and honey comb structure.	<b>04</b>
(c) Describe the method of liquid limit of soil by Casagrande method.	<b>07</b>
<b>Q.2</b> (a) Distinguish between light compaction and heavy compaction.	<b>03</b>
(b) Explain the various factors affecting compaction.	<b>04</b>
(c) Enlist and explain any one method of compaction.	<b>07</b>
<b>OR</b>	
(c) What is particle size distribution curve? What is its use in soil engineering?	
<b>Q.3</b> (a) Explain briefly each factor affecting permeability of soils	<b>03</b>
(b) Explain in detail the construction of Newmark's influence chart	<b>04</b>
(c) Define with sketch Flow net. Its characteristics and its application.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Define finite and infinite slopes with example.	<b>03</b>
(b) Discuss briefly, different types of slope failures.	<b>04</b>
(c) Derive an expression for the factor of safety of an infinite slope in a cohesionless soil. What is the effect of steady seepage parallel to the slope on a stability?	<b>07</b>
<b>Q.4</b> (a) What is Mohr's strength theory for soils? Sketch typical strength envelop for a clean sand.	<b>03</b>
(b) Draw Coulomb's failure envelop for sandy soil, clay soil and mix soil.	<b>04</b>
(c) Describe direct shear test. What are the advantages of this test? What are its limitations?	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) Distinguish between 'active' and 'passive' earth pressure.	<b>03</b>
(b) A retaining wall 6m height with vertical back supports cohesive soil backfill having unit weight 20 kN/m <sup>3</sup> and angle of internal friction as zero. Calculate	<b>04</b>
i) Internal Pressure intensity at top	
ii) Depth of tension crack	
iii) Lateral pressure intensity at the base.	
(c) Explain Culmann's graphical methods for active earth pressure.	<b>07</b>
<b>Q.5</b> (a) Define consolidation. What are its causes?	<b>03</b>
(b) Define the terms:	<b>04</b>
i) Compression index	
ii) Coefficient of volume change	
iii) Coefficient of compressibility	
Also indicate their units and symbols	

- (c) In a laboratory a 2 cm thick soil sample takes 25 minutes to reach 30% degree of consolidation. Find the time required for a 5 m thick clay layer in the field to reach 40 % consolidation. Assume double drainage in both the cases. **07**

**OR**

- Q.5** (a) Enlist factor affecting the bearing capacity and explain any two in detail. **03**  
(b) Explain type of shear failure of soil with net sketch. **04**  
(c) Define Safe, Allowable and Ultimate bearing capacity of soil. Write down Terzaghi's bearing capacity equation, its assumption and limitation of analysis. **07**

\*\*\*\*\*