

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III (NEW) EXAMINATION – WINTER 2020****Subject Code:3130606****Date:09/03/2021****Subject Name:Geotechnical Engineering****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.

- Q.1** (a) What are the three phase of soil? **03**
 (b) What is the scope of geotechnical engineering in the field of civil engineering **04**
 (c) Derive the following relationship: $Y_d = G Y_w / 1 + e$. **07**
- Q.2** (a) Explain grain size distribution by sieve analysis. **03**
 (b) Define: 1.Toughness Index, 2.Thixotrophy. **04**
 (c) What are different types of soil structure which can occur in nature? Describe in brief. **07**
- Q.3** (a) What is negative skin friction ? What is its effect on the pile ? **03**
 (b) Discuss the IS classification system of soil. **04**
 (c) What is quick sand condition ? How would you calculate the hydraulic gradient required to create quick sand conditions in a sample of sand? **07**
- Q.4** (a) What are the different methods of compaction adopted in the field? **03**
 (b) Describe the spring analogy for primary consolidation **04**
 (c) Differentiate between compaction and consolidation. **07**
- Q.5** (a) Write different Shear tests based on Drainage conditions. **03**
 (b) Explain Modified Mohr-Coulomb theory. **04**
 (c) Explain in detail the construction of Newmark's influence chart. How is it used ? **07**
- Q.6** (a) Distinguish between active earth pressure and passive earth pressure. **03**
 (b) Determine the factor of safety against sliding for slip surface passing through the toe of a finite slope of height of 11m and slope angle 1V:1H has $c = 15\text{kPa}$, $\phi = 32^\circ$, $\gamma_t = 18\text{ kN/m}^3$. The radius and the central angle of slip circle is 17.4m and 87° respectively. Take $\Sigma N = 1902.74\text{kN}$ and $\Sigma T = 941.15\text{ kN}$. Use Swedish circle method. **04**
 (c) Explain Rankine theory for active earth pressure in cohesive soil. **07**
- Q.7** (a) What are different types of slope failures? **03**
 (b) Write short note on Swedish circle method. **04**
 (c) A retaining wall of height 8.0m has a horizontal sandy soil as a backfill ($C = 0.0$, $\phi = 30^\circ$, $\gamma_t = 18\text{kN/m}^3$) A surcharge of 50 kPa is acting over the backfill. Draw the active pressure distribution and calculate the total active thrust acting on the wall. **07**
- Q.8** (a) State different types of shallow foundation. **03**

- (b) Enumerate the factors affecting bearing capacity and explain in detail.
- (c) Describe plate load test with neat sketches.

04
07



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