

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2021****Subject Code:3130606****Date:17-02-2022****Subject Name:Geotechnical Engineering****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.
4. Simple and non-programmable scientific calculators are allowed.

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| <b>Q.1</b> | (a) Explain the purposes of the soil classification  | <b>03</b>    |
|            | (b) What is the scope of geotechnical engineering in the various domain of civil Engineering?  | <b>04</b>    |
|            | (c) Explain three phase of soil. Also write note on soil formation in Geological cycle. (with sketch)  | <b>07</b>    |
| <b>Q.2</b> | (a) Explain particle size distribution and its application.  | <b>03</b>    |
|            | (b) Define the following terms: (i) water content (ii) void ratio (iii) porosity (iv) degree of saturation (v) specific gravity  | <b>04</b>    |
|            | (c) Define consistency of soil? Explain with sketch various methods to determine it.   | <b>07</b>    |
| <b>OR</b>  |  |              |
|            | (c) An undisturbed soil sample has total weight of 2060 gm, volume of 1200 cc, water content = 11% and specific gravity $G = 2.68$ . Compute (i) void ratio (ii) porosity (iii) degree of saturation (iv) water content to make sample fully saturated and (v) effective unit weight of the soil sample. | <b>07</b>    |
| <b>Q.3</b> | (a) Distinguish between free water and held water.   | <b>03</b>    |
|            | (b) Differentiate between light compaction test and heavy compaction test.   | <b>04</b>    |
|            | (c) The following results were obtained in a standard compaction test on a soil sample.  | <b>07</b>    |

Water content %	5	10	20	14	25
Bulk unit weight $\text{kN/m}^3$	17.7	19.8	21.0	21.8	21.6

Determine the OMC and MDD of this soil. Also calculate water necessary to completely saturate the sample at its maximum dry unit weight assuming no change in volume take  $G = 2.7$

**OR**

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|------------|---|-----------|
| <b>Q.3</b> | (a) Difference between shallow and deep foundation                        | <b>03</b> |
|            | (b) Explain briefly each factor affecting permeability of soils.          | <b>04</b> |
|            | (c) Define with sketch Flow net. Its characteristics and its application. | <b>07</b> |

- Q.4** (a) Discuss briefly, different types of slope failures. **03**  
 (b) Enlist factor affecting the bearing capacity and explain any two in detail **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**
- OR**
- Q.4** (a) Define Coefficient of compressibility, Coefficient of Volume change, Compression Index. **03**  
 (b) Differentiate between the process of consolidation and compaction. **04**  
 (c) Enlist the three standard triaxial shear tests with respect to drainage conditions? Explain with reasons the situations for which each test is to be preferred. **07**
- Q.5** (a) Differentiate between active and passive earth pressure with relevant examples. **03**  
 (b) Explain Modified Mohr Coulomb failure theory for shear strength? Sketch typical strength envelop for different type of soil. **04**  
 (c) Explain plate load test with neat sketches. It's application. **07**
- OR**
- Q.5** (a) Explain with neat sketch working principle of Vane shear test. **03**  
 (b) Differentiate between General shear failure and Local shear failure with neat sketch **04**  
 (c) Explain Newmark's Chart and its application. **07**

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