Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2020

Subject Code: 3130606 **Date:27/10/2020**

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.**

Q.1	**(a)**	Explain briefly with diagram Geological Cycle.	03
	(b)	What is the scope of geotechnical engineering in the field of civil Engineering?	04
	(c)	Define the following terms: (i) water content (ii) void ratio (iii) porosity (iv) Unit weight of solids (v) Air content (vi) Bulk Unit weight (vii)Specific gravity	07
Q.2	**(a)**	What are the purposes of the soil classification?	03
	(b)	Explain the various factors affecting compaction.	04
	(c)	A soil sample has a porosity of percent. The specific gravity of solids is 2.65. Calculate (a) void ratio, (b) dry density, (c) unit weight if the soil is 60% saturated and (d) unit weight if the soil is completely saturated.	07
		OR	
	(c)	The following are the result of the standard compaction test: - Water content (%): 05 ,10, 15, 20, 25 Bulk density (kN/m^3): 16.5, 20.5, 21, 22, 21.8 Plot the MDD-OMC curve and obtain the optimum water content and maximum dry density.	07
Q.3	**(a)**	Explain briefly each factor affecting permeability of soils.	03
	(b)	Define term consolidation Explain with sketch Terzaghi's One Dimensional Consolidation using Spring Analogy	04
	(c)	Define with sketch Flow net. Its characteristics and its application.	07
		OR	
Q.3	**(a)**	Differentiate between standard proctor and modified proctor test.	03
	(b)	Differentiate between the process of consolidation and compaction.	04
	(c)	Define Coefficient of compressibility, Coefficient of Volume change, Compression Index. During consolidation test, the void ratio is determined to decrease from 0.60 to 0.20 under the stress increment of 200 kPa to 350 kPa. Compute coefficient of compressibility, coefficient of volume compressibility & compression index.	07
Q.4	**(a)**	Differentiate between active and passive earth pressure with relevant examples.	03
	(b)	Explain Rankine's earth pressure theory for determination of lateral earth pressure under different conditions?	04
	(c)	Explain Newmark's Chart and its application.	07
		OR	
Q.4	**(a)**	Differentiate between General shear failure and Local shear failure with neat sketch.	03

	(b)	Differentiate between Direct Shear Box and Triaxial Test.	04
	(c)	Write a short note on 'soil water' and 'soil structure'. Also explain about commonly observed soil structures.	07
Q.5	**(a)**	Enlist factor affecting the bearing capacity and explain any two in detail.	03
	(b)	Explain Modified Mohr Coulomb failure theory for shear strength? Sketch typical strength envelop for different type of soil.	04
	(c)	What are 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

OR

Q.5	**(a)**	What are different factors of safety used in the stability of slopes? Discuss briefly.	03
	(b)	Discuss briefly, different types of slope failures.	04
	(c)	Define Safe, Allowable and Ultimate bearing capacity of soil. Write down Taraghi's bearing capacity equation, its assumption and limitation of analysis.	07

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