Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2024

Subject Code:3130606 Date:21-11-2024

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.**

			MARKS
Q.1	**(a)**	Define the term "Soil" and "Geotechnical Engineering".	**03**
	(b)	Differentiate between coarse grained and fine grained soil.	**04**
	(c)	List out various method of Water content determination and explain any one in details.	**07**
Q.2	**(a)**	Explain Darcy's law with its limitations.	**03**
	(b)	Differentiate between Compaction and consolidation.	**04**
	(c)	A soil sample has a porosity of 35 %. The specific gravity of solids is 2.7 . Calculate (i) Void ratio (ii) dry density (iii) unit weight of soil when 45% saturated and (iv) unit weight when completely saturated.	**07**
		OR	
	(c)	List out various soil classification systems and explain textural classification in details.	**07**
Q.3	**(a)**	How we will determine the pre-consolidation pressure? Explain it.	**03**
	(b)	Explain Max. Dry density and Optimum moisture content.	**04**
	(c)	Two identical specimen 38mm dia. and 76mm height were tested in tri-axial test under undrained condition. Determine the value of c and ϕ.	**07**

Failed at	Axial load in kg	Cell pressure in kg/cm2
Specimen-1	80	1.5
Specimen-2	100	2

		OR	
Q.3	**(a)**	Define (i) Compression index, (ii) Coefficient of volume change.	**03**
	(b)	Describe the assumptions of Rankine's theory.	**04**
	(c)	Write the procedure of Box shear test with neat sketch.	**07**
Q.4	**(a)**	Describe various factor of safety in respect to slope.	**03**
	(b)	Differentiate between active and passive earth pressure.	**04**
	(c)	A sample of clay is tested in consolidation test. the void ratio changes from 0.85 to 0.60 when load was increased from 70 kN/m^2 to 140 kN/m^2. Determine coefficient of volume change, coefficient of Compressibility and Compression index.	**07**
		OR	
Q.4	**(a)**	Write a short note on Newmark's influence chart.	**03**
	(b)	Define Taylor's stability number and its uses.	**04**
	(c)	An Embankment is compacted at a water content of 15%. The bulk density is 18 kN/m^3. Determine the void ratio and degree of saturation of compacted soil if the specific gravity of soil is 2.75. What would be the theoretical dry unit weight?	**07**

Q.5	**(a)**	Describe various drainage conditions under which shear tests are performed.	**03**
	(b)	For a point load of 100 kN at ground level, compute vertical stress on a horizontal plane located 1.5m depth at radial distance of 2m. Use Boussinesq's theory.	**04**
	(c)	A retaining wall of height 10m with a horizontal sandy backfill of ($\phi=32^0$ and $\gamma= 18$ kN/m^3) and a surcharge of 40 kPa acting over backfill. Draw active earth pressure diagram and Calculate total active thrust acting on wall.	**07**

OR

Q.5	**(a)**	Give the application of flow net.	**03**
	(b)	Explain Factors affecting Selection of type of foundation.	**04**
	(c)	Describe plate load test with neat sketch.	**07**

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