Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – SUMMER 2025

Subject Code:3150615 Date:20-05-2025

Subject Name:Soil Mechanics

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.**

			MARKS
Q.1	**(a)**	List out the objectives of Soil Exploration.	**03**
	(b)	Explain the difference between finite and infinite slope.	**04**
	(c)	List out various boring method and Explain wash boring method with neat sketch in details.	**07**
Q.2	**(a)**	Define the term (i) Ultimate bearing capacity (ii) Net safe baring capacity	**03**
	(b)	Discuss various methods to improve the stability of slope.	**04**
	(c)	Explain in details Dynamic cone penetration test with neat sketch.	**07**
		OR	
	(c)	The field N-value of Fully submerged Fine sand is 35 at 8 m depth. The avg. Saturated unit weight of sand is 19.5 kN/m^3 Calculated Corrected N-Value as per IS 2131-1981.	**07**
Q.3	**(a)**	Draw a split spoon sampler with details.	**03**
	(b)	Write short note on Friction circle method.	**04**
	(c)	A strip footing of 3m wide and founded at 2.5m depth below GL, in a soil having cohesion is 35 kN/m^2 and angle of internal friction is 35^0. The water table is at a depth of 5m below GL. The moist weight of soil above water table is 18.00 kN/m^3. Determine Safe bearing capacity and safe load per m length. Take FOS= 3. Use terzaghi's theory and general shear failure. Take Nc=57.8, Nq= 41.4 and Nγ=42.4.	**07**
		OR	
Q.3	**(a)**	Write short note on Floating foundation.	**03**
	(b)	A pile is driven with a single acting steam hammer of weight 45 kN with a free fall of 1.5m. The average penetration of the last 20 blow is 30 mm. find the Safe load using ENR formula.	**04**
	(c)	A drop hammer weighing 40 kN and having free fall of 75 cm drives an RCC pile of 30 kN. The average settlement per blow was 1.5 cm. The total temporary elastic compression is 2.0 cm. Assuming coefficient of restitution as 0.25 and FOS is 2.5, Determine ultimate bearing capacity and allowable load on pile.	**07**
Q.4	**(a)**	Write advantages of Triaxial shear test.	**03**
	(b)	Discuss merits and demerits of Plate load test.	**04**
	(c)	Unconfined test is carried out on clay sample of 10 cm long and 5 cm in dia., fails under a load of 150 N at 10 % strain. Compute the shearing resistance also considers the effect of change in cross section of sample.	**07**

OR

Q.4	**(a)**	Explain the concept of pressure bulb.	**03**
	(b)	Explain merits and demerits of Box Shear test.	**04**
	(c)	An Road embankment is inclined on sides at angle of 30^0 to the horizontal. If the shear strength parameters are as c=20 kN/m^2 and $\phi=10^0$, Find factor of safety available against slope failure for 12m and 15m height . The unit weight of soil is 18 kN/m^3.Take Sn=0.07.	**07**
Q.5	**(a)**	Define (i) Free swell index (ii)Swelling pressure	**03**
	(b)	Write short note on Under reamed pile in expansive soil.	**04**
	(c)	Explain procedure of direct shear test. Also explain its limitations.	**07**

OR

Q.5	**(a)**	Enlist various application area of Geosynthetics.	**03**
	(b)	Write a short note on Newmark's influence chart.	**04**
	(c)	Derive the Equation for Vertical stress under a line load using Baussinesq theory.	**07**

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