Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–IV • EXAMINATION – WINTER 2013

Subject Code: X40603 **Date: 07-12-2013**

Subject Name: Soil Engineering

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

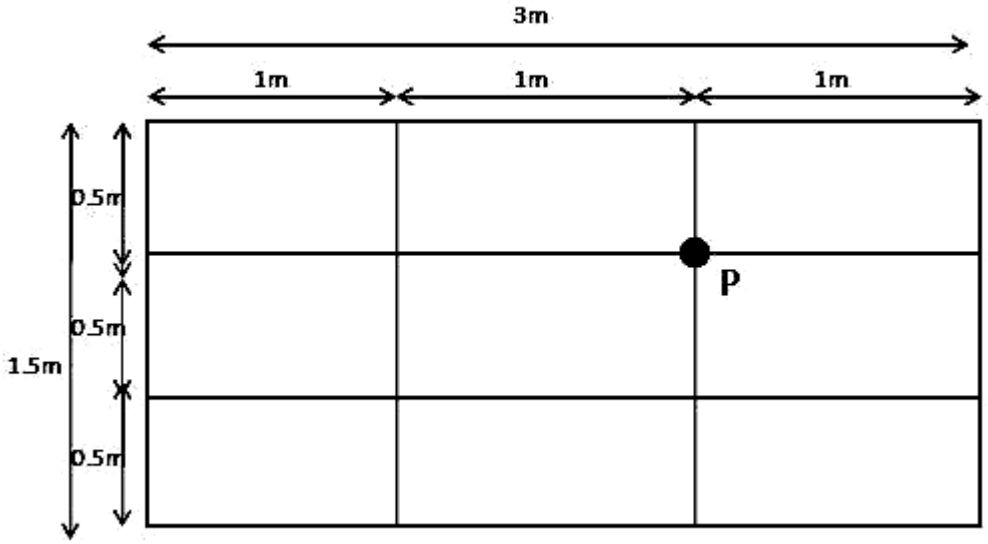
(1)All questions are compulsory.
(2)Figures to the right indicates the marks.
(3)Use of Programmable calculator is strictly prohibited.
(4)Draw neat sketch wherever necessary.
(5)Write your seat no and enrolment no in space provided on the question paper.

Q.1(a)	Using Boussinesq's theory, derive an expression for the vertical stress at a point due to a point load.	07
(b)	Differentiate between consolidation and Compaction with examples.	07
Q.2 (a)	What is the effect of compaction on the engineering properties of the soil?	07
(b)	Discuss shear tests based on different drainage conditions.	07
	OR	
(b)	Calculate the vertical stress at a point P at a depth 2.5 m directly under the center 0f the circular area of radius 2m and subjected to a load 100 kN/m^2. Also calculate the vertical stress at point Q which is at the same depth of 2.5m away from the centre of the loaded area.	07
Q.3 (a)	Derive an expression for active pressure when the ground surface in inclined.	07
(b)	A retaining wall has a vertical back and is 8m high. The back force of the wall is smooth and the upper surface of the fill is horizontal. Determine the thrust on the wall per unit length. Take c = 10 kN/m^2, γ=19 kN/m^3 and Φ=20°.	07
	OR	
Q.3 (a)	Discuss the limitation of Terzaghi's theory of consolidation.	07
(b)	A stratum of clay is 2m thick and has an initial overburden pressure of 50 kN/m^2 at its middle. Determine the final settlement due to an increase in pressure of 40 kN/m^2 at the middle of the clay layer. The clay is over-consolidated, with a preconsolidation pressure of 75 kN/m^2 . the values of the coefficient of recompression and compression index are 0.05 and 0.25, respectively. Take initial void ratio as 1.40.	07
Q.4 (a)	Differentiate critically between Rankine and Coulomb theories of earth pressure.	07
(b)	Explain Square root of time methods to determine coefficient of consolidation.	07
	OR	
Q.4	A rectangular foundation 3.0 × 1.50 m carries a uniform load of 40 kN/m^2, determine the vertical the stress at P which is 3m below the ground surface (as shown in fig). use equivalent point load method.	14
Q.5 (a)	Write a short note on Stability analysis of infinite slopes for c-Φ soils.	07
(b)	A consolidated undrained triaxial test was conducted on normally consolidated clay yielding the following data: σ_3= 250 kN/m^2 ; $(\sigma_d)_f$ = 275 kN/m^2 Determine (i) the angle of friction (ii) angle which the failure plane makes with the major principal plane and (iii) normal stress and shear stress on the failure plane.	07

OR

Q.5 (a) What are the assumptions that are generally made in the analysis of the stability of slopes? Discuss briefly their validity. 07

(b) A new canal is excavated to a depth of 5m below ground level. Through a soil having the following characteristics: c=14 kN/m^2 Φ= 15° ; e = 0.8 and G= 2.70. the slopes of banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly and completely emptied what will be the factor of safety? 07



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