Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2150609 **Date:17/05/2016**

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.**

Q.1 **(a)** Discuss the effects of compaction on various soil properties. **07**

(b) How is a slope analyzed using a Swedish circle method (method of slices) ? Discuss the method and derive an expression for the factor of safety. **07**

Q.2 **(a)** Discuss the UU, CU, and CD triaxial shear test conditions, illustrating their use by at least one field example. **07**

(b) A series of direct shear tests were conducted on a soil, each test was carried out till the sample failed. The following results were obtained. **07**

Sample No.	Normal Stress (kN/m^2)	Shear Stress (kN/m^2)
1	15	18
2	30	25
3	45	32

Determine the Cohesion and Angle of shearing resistance for the soil.

OR

(b) The following results were obtained from a series of consolidated undrained (CU) shear tests on a soil, in which the pore water pressure was not determined. Determine the cohesion and the angle of shearing resistance. **07**

Sample No.	Confining pressure (kN/m^2)	Deviator Stress at failure (kN/m^2)
1	100	600
2	200	750
3	300	870

Q.3 **(a)** Define the following : **03**

(1) Coefficient of compressibility
(2) Coefficient of Volume change
(3) Compression Index

(b) Enlist various causes for Pre-consolidation of soils. Discuss the Casagrande's method to determine the pre-consolidation pressure from consolidation test data. **07**

(c) Discuss briefly, different types of slope failures. **04**

OR

Q.3 **(a)** Differentiate between normally consolidated and over-consolidated soils. **03**

(b) What is the coefficient of consolidation ? Discuss the Square root time fitting method to determine its value, step-by-step. **07**

	(c)	What are different factors of safety used in the stability of slopes ? Discuss briefly.	**04**
Q.4	**(a)**	What are different types of Earth Pressures ? Give examples.	**07**
	(b)	A retaining wall, 5 m. high, with vertical back, retains soil fill, the upper face of fill is horizontal. The back face of the wall is smooth. Determine the Rankine active earth pressure on the wall, (a) before the formation of crack and (b) after the formation of crack. Take C = 5 kN/m^2 , γ = 17.5 kN/m^3, and Angle of friction = 30°.	**07**

OR

Q.4	**(a)**	Define Earth pressure at Rest. Show the earth pressure distribution on a retaining wall, assuming that the soil fill is dry.	**07**
	(b)	A retaining wall, 6 m. high, retains dry sand with an angle of friction of 30°, and unit weight of 16.2 kN/m^3. Determine the earth pressure at rest. If the water table rises to the top of the wall, determine the increase in the thrust on the wall. Assume the submerged unit weight of sand as 10 kN/m^3.	**07**
Q.5	**(a)**	A concentrated load of 2000 kN is applied at the ground surface. Determine the vertical stress at a point P which is 6 m. directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6 m. but at a horizontal distance of 5 m. from the axis of load.	**07**
	(b)	Briefly discuss, the assumptions made in computing stresses below the ground surface due to a point load acting on it.	**04**
	(c)	Discuss briefly, the factors that affect the selection of type of foundation.	**03**

OR

Q.5	**(a)**	Calculate the vertical stress at a point P at a depth of 2.5 m. directly under the centre of the circular area of radius 2 m. and subjected to a load 100 kN/m^2. Also calculate the vertical stress at a point Q which is at the same depth of 2.5 m., but 2.5 m. away from the centre of the loaded area.	**07**
	(b)	What do you understand by Contact Pressure ? What are the factors that affect the contact pressure distribution ?	**04**
	(c)	Explain briefly, the step-by step procedure for selecting a proper, appropriate and final choice of foundation for a given structure.	**03**

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