Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–IV • EXAMINATION – SUMMER 2013

Subject Code: X40603 **Date: 10-06-2013**

Subject Name: Soil Engineering

Time: 10.30 am - 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.**

Q.1 (a) Enlist assumption made in Boussinesq's theory of stress distribution. **07**

(b) Differentiate between standard proctor test and Modified proctor test. **07**

Q.2 (a) Explain about vertical stress distribution, on horizontal plane and on vertical line. **07**

(b) A concentrated load of 22.5 kN acts on a surface of a homogeneous soil mass of large extent. Find a stress intensity at a depth of 15 m (i) directly under the load and (ii) at a horizontal distance of 7.5 m. Use Boussinesq's equation. **07**

OR

(b) A raft of size 4 m x 4 m carries a uniform load of 220 kN/m^2. Using the point load approximation with four equivalent point loads, calculate the stress increment at a point in the soil which is 4 m below the centre of the loaded area. **07**

Q.3 (a) Derive the equation of K_A for Rankine's theory. **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**

OR

Q.3 (a) Describe the wedge theory to determining the active earth pressure and also discuss the advantages of it. **07**

(b) Describe the Culmann's graphical method to evaluate active thrust. **07**

Q.4 (a) The following data have been obtained in a standard laboratory proctor compaction test on glacial till **07**

Water content %	5.02	8.81	11.25	13.05	14.40	19.25
Wt. of container with compacted soil (N)	35.8	37.3	39.32	40.00	40.07	39.07

The specific gravity of soil particle is 2.77. The container is 9.44 cm^3 in volume and its weight is 19.78 N. Plot the compaction curve and find out OMC and MDD.

(b) Write short note on Compaction needle. **07**

OR

Q.4 (a) Explain any method to determine coefficient of consolidation. **07**

(b) In a consolidation test following result have been obtained when the load was changed from 50 kN/m^2 to 100 kN/m^2, void ratio changed from 0.7 to 0.65. Determine the coefficient of volume decrease (m_v) and compression index (C_c). **07**

Q.5 (a) Write a short note on stability analysis of Infinite slopes for c-Φ soils. **07**

(b) An embankment is inclined at angle 35° and its height is 15 m. The angle of shearing resistance is 15° and cohesion intercept is 200 kN/m^2. the unit weight of soil is 18 kN/m^3. If the Taylor's stability number is 0.06 , find the factor of safety with respect to cohesion. **07**

OR

Q.5 **(a)** A series of shear test were performed on a soil. Each test was carried out until the sample sheared and principal stresses for each test were **07**

Sample No	Normal stress (kN/m^2	Shear stress (kN/m^2
1	200	600
2	300	900
3	400	1200

Plot the failure envelop and find out shear parameters.

(b) Explain Modified Mohr-coulomb theory. **07**

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