

Code No: 115EQ

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year I Semester Examinations, November - 2015****GEOTECHNICAL ENGINEERING****(Common to CE, CEE)****Time: 3 hours****Max. Marks: 75****Note:** This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

**PART - A (25 Marks)**

- 1.a) Define liquid limit and plastic limit. [2]
- b) Write about soil formation. [3]
- c) Define total stress and effective stress. [2]
- d) Write short notes on capillary rise. [3]
- e) Write about isobar and pressure bulb diagrams. [2]
- f) Write assumptions of Boussinesq's theory. [3]
- g) Define normally consolidated and over consolidated soils. [2]
- h) Write about stress history of clay using  $e-\sigma$  curves. [3]
- i) Define dilatancy and critical void ratio. [2]
- j) Write about demerits of direct shear test. [3]

**PART - B (50 Marks)**

- 2.a) Derive the relation between dry density, bulk density and water content.
- b) A soil sample has a liquid limit of 70% and its plasticity index is 50 with a natural water content of 20%. Determine its liquidity index and describe its consistency. [5+5]

**OR**

- 3.a) Explain step by step procedure to classify fine grained soils.
- b) A partially saturated sample has a moisture content of 15% and bulk unit weight of  $21.5 \text{ kN/m}^3$ . The specific gravity of solids is 2.67. Determine dry unit weight, and saturated unit weight. [5+5]

- 4.a) Explain the laboratory procedure to determine coefficient of permeability by variable head method.
- b) Determine the effective stress at a depth of 8 m below the ground level. The water table is at 3m below ground surface. The water content of the soil above water table is 10%. Take  $G=2.68$ ,  $e = 0.6$ . Neglect capillary flow. [5+5]

**OR**

- 5.a) Write about properties and uses of flownets.
- b) In a laboratory permeability test, the discharge of water collected from a constant head permeameter in a period of 10 minutes is 200ml. The internal diameter of the permeameter is 6cm and the measured difference in head between two gauging points 15 cm vertically apart is 100cm. Calculate the coefficient of permeability. [5+5]

- 6.a) Explain the factors effecting compaction on soil properties.  
b) A circular area of radius 2m carries a uniformly distributed load of  $90\text{kN/m}^2$ . Determine the intensity of vertical pressure at 4m beneath the centre of the circle using Boussinesq's theory. [5+5]

OR

- 7.a) Write briefly about Newmark's Influence chart.  
b) Using Boussinesq's theory, determine the vertical stress at a depth of 3m directly under the point load of 500kN acting at the surface of a soil mass and also at a horizontal distance of 4m. [5+5]
- 8.a) Explain Casagrande's logarithm of time fitting method to determine coefficient of consolidation.  
b) A 20mm thick consolidometer clay sample reached 50% consolidation in 35minutes with double drainage. How long would it take for the clay layer from which this sample was obtained to reach 50% consolidation? The clay layer of 6m has single drainage. [5+5]

OR

- 9.a) Explain about preconsolidation pressure and its determination by Casagrande's method.  
b) A clay layer of 5m thick has a settlement of 20mm when the stress was increased from  $50\text{kN/m}^2$  to  $100\text{kN/m}^2$ . What will be the settlement if the stress is increased from  $100\text{kN/m}^2$  to  $150\text{kN/m}^2$  for the same clay layer. [5+5]
- 10.a) Explain about drainage conditions in Triaxial tests.  
b) Write briefly about Mohr-Coulomb failure theory. [5+5]

OR

- 11.a) Discuss about shear strength of sands.  
b) In an unconfined compression test, a sample of 7.5cm long and 3.5cm in diameter fails under a load of 90N at 10% strain. Compute the unconfined compressive strength and shear strength of the sample. [5+5]

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