

(Please write your Exam Roll No.)

Exam Roll No.

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2015

Paper Code: ETCE-210

Subject: Soil Mechanics

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.
Select one question from each unit.

- Q1 (a) List out the methods used for water content determination. Briefly explain any one method of them. (5)
- (b) Define flow net. List out properties of flow net. (5)
- (c) State and discuss different factors influencing compaction of soil in the field. (5)
- (d) Briefly explain Vane shear test of Soil. (5)
- (e) Discuss the importance of Atterberg's limit in soil Engineering. (5)

Unit-I

- Q2 (a) A partially saturated sample from borrow pit has a natural moisture content of 15 percent and bulk unit weight 1.9g/cc. The specific gravity of solid is 2.7. Determine the degree of saturation and void ratio. What will be the unit weight of soil on saturation? (8.5)
- (b) Define the term Activity and Thixotropy. (4)
- Q3 (a) What is the use of classification of Soil? Briefly discuss Indian standard Classification system. (6.5)
- (b) Define the term Plasticity Index, Flow index, and explain their engineering significance. (6)

Unit-II

- Q4 (a) Describe the pumping out methods for the determination of coefficient of Permeability in field? Discuss their advantages and disadvantage? What are Dupuis Assumption. (8)
- (b) Discuss the basis of construction of Newmarks influence chart. How it is used? (4.5)
- Q5 (a) A concentrated load of 40 kN acts on the surface of soil. Determine the vertical stress increment at point directly beneath the load up to depth of 10 m and draw a plot. (3)
- (b) Determine the average coefficient of Permeability in the horizontal and vertical directions for a deposit consisting of three layer of thickness 5m, 1m and 2.5m and having the coefficient of permeability of 3×10^{-2} mm/sec, 3×10^{-5} mm/sec and 4×10^{-2} mm/sec respectively. (4.5)
- (c) Define quick sand condition in soil, and develop the expression for critical hydraulic gradient. (5)

Unit-III

- Q6 (a) In a laboratory consolidometer test on a 20 mm thick sample of saturated clay taken from a site, 50 percent consolidation point was reached in 10 min. Estimate the time required for the clay layer of 5m thickness at the site for 50 percent compression, if there is drainage

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ETCE-2010

P/12

[-2 -]

only towards top. Assume that the laboratory sample and clay layer at site are both same increase in stress. How much time is required for the clay layer to reach 90 percent consolidation? What is the time required for the clay layer to reach 50 percent consolidation if the layer has double drainage instead of single drainage? (8.5)

(b) What are the major difference between Compaction and consolidation? (4)

Q7 (a) What is time factor? How it relate to average degree of consolidation. (4.5)

(b) Describe Standard proctor test and modified Proctor test. How you decide the type of test to be conducted in the laboratory. (8)

Unit-IV

Q8 (a) Determine the shear strength in terms of effective stress on a plane with in a saturated soil mass at a point where the total normal stress is 200 kN/m^2 and pore water pressure is 80 kN/m^2 . The effective stress strength parameters for soil are: $C' = 16 \text{ kN/m}^2$ and $\phi' = 30^\circ$. (4.5)

(b) What is Mohr's circle? Discuss its important characteristics. (8)

Q9 (a) A sample of dry sand was subjected to a triaxial test, with a confining pressure of 250 kN/m^2 . The angle of shearing resistance is found to be 36° . At what value of major principal stress, the sample is likely to fail. (4.5)

(b) What is unconfined compression test? Sketch apparatus used. What is its advantage over a triaxial test? (8)

ETCE-210

P. 12