PVP 19

Code: 19CE3403

II B.Tech - II Semester – Regular Examinations – AUGUST 2021

GEOTECHNICAL ENGINEERING
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each question carries 12 marks.
4. All parts of Question paper must be answered in one place

PART – A

1. a) Mention various Physical, Index and Engineering properties of soils.
   b) What are the limitations of Darcy's law?
   c) Write Westergards equation to find vertical stress at a depth under point load.
   d) Explain about Normally Consolidated, Over Consolidated and Under Consolidated clayey deposits.
   e) Define Critical void ratio, Thixotrophy & Dilatancy.

PART – B

UNIT – I

2. a) Derive the following (i) Relation between e and n (ii) Relation between e, w, G and S 6 M
   Where, e = void ratio, w = water content, G = specific gravity of soil, S = degree of saturation.

b) Differentiate between 6 M

(i) Liquidity index and consistency limits

(ii) Flow Index and toughness index

(iii) Plasticity and consistency

(iv) Activity and sensitivity

OR

3. a) Differentiate between 6 M

(i) Percentage air voids and air content

(ii) Void ratio and porosity

(iii) Saturated density and bulk density

b) What are the main index properties of a fine-grained soil? How are these determined in a laboratory? 6 M

UNIT – II

4. a) What is the use of classification of soils? Discuss Indian Standard Classification system. 6 M

b) Explain briefly about the factors affecting permeability with the help of neat sketch if required. 6 M

OR

5. a) What is the difference between the classification based on particle size and the textural classification? Discuss the limitations of the two systems. 6 M

b) What are the different methods for determination of the coefficient of permeability in a laboratory? Discuss their limitations. 6 M

UNIT-III

6. a) What do you understand by contact pressure? What are the factors that affect the contact pressure distribution? Draw the contact pressure distribution diagram for rigid footings on sand and clayey soils. 6 M

   b) Derive an expression for the vertical stress at a point due to a point load, using Boussinesq's theory. 6 M

OR

7. a) Describe the method of calculating the stress at a point below the corner of a rectangular load. How is this method used for finding the stress at points other than that below the corner? 6 M

   b) Discuss various approximate methods for the determination of the vertical stress at a point. What are their limitations? 6 M

UNIT – IV

8. a) What is coefficient of consolidation? How many days would be required by a clay stratum of 5 m thick, draining at both ends with coefficient of consolidation = 50×10^{-4} cm^2/sec to attain 50% of its settlement? (use $T_{50} = 0.197$) 6 M

   b) What are the objectives of compaction? Explain the term optimum moisture content and how it is influencing the compaction 6 M

OR

9. a) Explain how the consolidation is happening and explain the Oedometer test? 6 M

b) What is a compaction curve? Give its salient features. What is a zero-air void line? 6 M

UNIT – V

10. a) Determine the axial stress at failure for a dry dense sand in triaxial loading if minor principle stress is 300 kN/m^2. A previous test has given minor and principle stress values as 150 kN/m^2 and 735 kN/m^2 at failure. 6 M

b) In a consolidated drained triaxial test (CD) test a specimen of saturated sand failed under a deviator stress of 220 kPa when the cell pressure was 100 kPa determine the shear strength parameters, the shear strength and maximum shear stress. 6 M

OR

11. a) In an unconfined compression test a sample of 7.5 cm long and 3.5 cm diameter fails under a load of 90 N at 10 % strain. Compute unconfined compressive strength and shear strength of soil. 6 M

b) What are shear strength parameters how are they determined? In unconfined compression test a soil sample fails at 160 kN/m^2 stress. The failure plane makes an angle of 50^o with the horizontal. Calculate the values of cohesion and angle of internal friction of the soil. 6 M