



B.E DEGREE EXAMINATIONS – MAY 2015

(Regulation 2013)

Fourth Semester

CIVIL ENGINEERING

U13CET404 : Geotechnical Engineering – I

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The Ratio of the volume of voids to the total value of soil is
 - a) Voids Ratio
 - b) Degree of Saturation
 - c) Air Content
 - d) Porosity
2. For a well graded sand ,the coefficient of curvature should be _____
3. Capillary rise in a small tube is due to
 - a) Cohesion
 - b) adhesion
 - c) Both a and b
 - d) Neither a or b
4. A constant head permeameter is used for _____
5. The westergarrd analysis is used for
 - a) Homogeneous Soil
 - b) Sandy Soil
 - c) Cohesive Soil
 - d) Stratified Soil
6. Newmarks influence chart can be used for the determination of vertical stress under _____ area
7. When the drainage is permitted throughout the triaxial test the test is known as
 - a) Quick test
 - b) Drained test
 - c) consolidated undrained test
 - d) consolidated test
8. Coulomb 's equation for shear strength can be represented as _____
9. when consolidation of a saturated soil sample occurs, the degree of saturation
 - a) increases
 - b) decreases
 - c) remains constant
 - d) may increase or decrease
10. Compression of a saturated soil under a steady static pressure is called _____

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. List the various Soil Classification System
12. Give reasons why classification of soils is required?
13. Define Soil Water
14. List out the methods of drawing flownet
15. Define compaction
16. What is Newmark's influence chart?
17. Define shear strength of soils
18. What are the Shear Strength parameters?
19. State the Components of Settlement
20. What are the commonly used methods to determine the coefficient of consolidation?

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. (i) A wet sample of mass 1.9 Kg has volume of 945cm³ after over drying its mass reduced to 1.7kg. The specific gravity of solids was found to be 2.7 determine
(a) Moisture content (b) bulk density (c) dry density (d) void ratio (e) porosity
(f) degree of saturation (7)
 - (ii) Derive the relationship between $\gamma_d = \gamma / (1+w)$ from fundamental principle (7)
 22. a) A sand deposit is 10 m thick and overlies a bed of soft clay. The ground water table is 3 m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%, plot the diagram showing the variation of total stress, pore water pressure and the effective stress. The void ratio of the sand is 0.70. Take $G=2.65$.
- (OR)**
22. b) Calculate the coefficient of permeability of soil sample 60mm in height and cross sectional area 5000 mm². If the quantity of water equal to 450cc passed down in 10 minutes under an effective constant head of 400mm. On oven drying, the test specimen had a mass of 495 g. Take specific gravity of solids as 2.65. Calculate the seepage velocity of water during the test.
 23. a) With neat sketches explain the procedure of determination of effective stress by Newmark's chart method

(OR)

- 23 b) (i) A concentrated load of 800 kN acts at the ground surface, compute the vertical stress at 8m depth and 2m away from the axis. Use westergaard analysis. Take $\mu=0.25$ (7)
- (ii) An annular ring of external and internal radii of 8m and 4m respectively transmits a pressure of 100kN/m^2 . Compute the vertical stress at a depth of 2m below the centre (7)
- 24 a) Two identical specimens of a soil were tested in a triaxial apparatus, first specimen failed at a deviator stress of 870kpa when cell pressure was 300 kpa, while the second specimen failed at deviator stress of 1400 kpa under a cell pressure of 500kpa. Determine the shear strength parameters. Also find the deviator stress at failure when the cell pressure was 700kpa

(OR)

- 24 b) Explain in detail the different shear tests based on drainage conditions
- 25 a) Derive one dimensional Consolidation equation and also state the assumptions made in it

(OR)

- 25 b) A saturated soil has a compression index of 0.25. Its void ratio at a stress of 10 kN/m^2 is 2.02 and its permeability is $3.4 \times 10^{-7}\text{ mm/s}$. Compute: (i) Change in void ratio if the stress is increased to 19 kN/m^2 (ii) settlement in if the soil stratum is 5m thick and (iii) time required for 40% consolidation if drainage is one way.

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