



B.Tech V Semester Supplementary Examinations, July 2024
Soil Mechanics
 (Civil Engineering)

Maximum Marks: 70

Date: 26.07.2024 Duration: 3 hours

- Note:**
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

| Part-A | | CO | Bloom Tx |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------|
| All the following questions carry equal marks (10x2M=20 Marks) | | | |
| 1 | Define sieve analysis. Give its necessity. | CO1 | I |
| 2 | A sample of saturated clay from a consolidometer test has a total mass of 1.526 kg and dry mass of 1.053 kg. The specific gravity of the solid particles is 2.7. For this sample, determine the water content, void ratio. | CO1 | III |
| 3 | Give the various lab tests used to determine the coefficient of permeability of soils. | CO2 | I |
| 4 | Define quick sand condition. Under what circumstances can it occur? | CO2 | I |
| 5 | Give the Westergard's formula for point loads. | CO3 | II |
| 6 | What is compaction? | CO3 | I |
| 7 | Define Coefficient of consolidation. | CO4 | I |
| 8 | Write down the assumptions made in Terzaghi's one dimensional consolidation theory. | CO4 | I |
| 9 | Mention the limitations of coulomb's theory. | CO5 | II |
| 10 | At a depth of 6 m below the ground surface at site vane shear test gave a torque value of 6040 N-cm. the vane was 10 cm high and 7 cm across the blades. Estimate the shear strength of the soil. | CO5 | III |
| Part-B | | | Bloom Tx level |
| Answer All the following questions. (5X10M=50Marks) | | | |
| 11 | A. A moist soil sample weighs 3.52 N. After drying in an oven, its weight is reduced to 2.9 N. The specific gravity of solids and mass specific gravity are 2.65 and 1.85 respectively. Determine the water content, void ratio, porosity and the degree of saturation. Take $\gamma_w = 10 \text{ KN/m}^3$ (7) B. Write short notes on Sieve analysis of soil. (3) | CO2 | IV |
| OR | | | |
| 12 | A. Explain the BIS classification of soil system. (5) B. Give a brief note on the Liquid limit and plastic limit. (5) | CO1 | III |
| 13 | A. Describe flow net and properties of flow net with figure. (7) B. Give a note on Darcy's law. (3) | CO2 | III |

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| | OR | | |
| 14 | A sand sample of 35 cm ² cross-sectional area & 20 cm long was tested in a constant head permeameter. Under a head of 60 cm, the discharge was 120ml in 6 minutes. The dry weight of sand used for the test was 1120 g and $G=2.68$. Determine (a) the co-efficient of permeability in cm/s (b) discharge velocity and (c) seepage velocity. (10) | CO2 | IV |
| 15 | A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7.5 m. The ring foundation transmits uniform load intensity of 160 kN/m ² . Compute the vertical stress induced at depth of 4 m, below the centre of ring foundation using (a) Boussinesque analysis and (b) Westergaard's analysis, taking $\mu = 0$. (10) | CO3 | V |
| | OR | | |
| 16 | Explain factors affecting compaction and effects of compaction on soil properties. (10) | CO3 | II |
| 17 | Explain in detail the laboratory determination of co-efficient of consolidation. (10) | CO4 | III |
| | OR | | |
| 18 | A clay layer 5 m thick is subjected to a pressure of 60 kN/m ² . If the layer has a double drainage and undergoes 50% consolidation in one year, determine the coefficient of consolidation. Take time factor as 0.19. If the coefficient of permeability is 0.02 m/yr, find the settlement in one year and the rate of flow of water per unit area in one year. (10) | CO4 | IV |
| 19 | A. Describe Mohr-Coulomb failure theory. (5) B. What is UCC? How it is done in laboratory? (5) | CO5 | II |
| | OR | | |
| 20 | A direct shear test was performed on a 60 mm x 60 mm sample of dry sand. The normal load was 340 N. The failure occurred at a shear load of 190 N. Plot the Mohr strength envelope, and determine ϕ . Assume $c = 0$. Also determine principal stresses at failure. (10) | CO5 | V |