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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER M. TECH DEGREE EXAMINATION
Civil Engineering
(Geomechanics & Structures)
04 CE 6305: Advanced Soil Mechanics

Max. Marks: 60   Duration: 3 Hours

PART A
Answer All Questions
Each question carries 3 marks
Assume missing data, if any

1. What is isomorphous substitution?
2. Find the capillarity rise in a soil of effective size 0.04 mm? Take surface tension of soil as 0.073 N/m?
3. Differentiate between normally consolidated clay and over consolidated clay.
4. What is effective stress path?
5. How the temperature affects the undrained shear strength of soil?
6. Explain the control measures to achieve the specified compaction in the field.
7. Differentiate between settlements in clayey soil and granular soil?
8. Give brief description of Skempton-Bjerrum modification for calculation of consolidation settlement for circular footing.

PART B
Each question carries 6 marks

9. List different soil classification systems. Explain Indian standard soil classification system in detail.

OR

10. Explain the reasons for the di-polar nature of clay minerals.

11. A drainage pipe beneath a dam is clogged with sand with k =20 m /day. Flow through the pipe is measured as 0.33 m^3/day, when there was 25.0 m difference between upstream and downstream. Diameter of pipe is 18 cm. How much length of pipe is clogged with sand?

OR

12. Ground water table is at a depth of 3.0 m below the ground surface in a sand layer. Above the water table, the sand is saturated with capillary water. Saturated unit weight of sand is 22 kN/m^3. Plot the variation of total stress, effective stress and pore pressure up to a depth of 10.0 m.

13. In an odeometer test on a normally consolidated clay, time required for completion of 90% consolidation for normal stress from 100 kPa to 200 kPa was observed as 100 minutes. Thickness of sample was 2.0 cm. Drainage of soil was allowed at top and bottom of the sample. Calculate the coefficient of permeability of soil. The final void ratio corresponding to a normal stress of 100 kPa and 200 kPa are 1.1 and 0.7, respectively.

OR

14. A uniform surcharge of 100 kN/m^2 is applied on the ground surface. The soil strata consist of 2.0 m

sand layer at the top followed by 4.0 m clay layer. Clay layer is followed by sand. The ground water table is 1.0 m below the ground level. Determine the initial excess pore water pressure in the clay layer and plot the excess pore pressure diagram in the clay layer for a time factor of 0.5.

15. Discuss about the stress path in loading and unloading in varying stress states

OR

16. A soil sample failed under a deviator stress of 400 kN/m^2 and confining pressure of 200 kPa. When confining, pressure is increased to 250 kPa, what will be the deviator stress at failure when case(i) soil is purely cohesive and case(ii) soil is cohesion less.

17. Explain the following in detail
    i)   Stress history
    ii)   Anisotropy of soil
    iii)   Creep of soil
    iv)   Thixotropy of soil

OR

18. Discuss about the effect of compaction on soil. What are the factors affecting the compaction?

19. Find the consolidation settlement of a circular water tank of 3.0 m diameter transferring a pressure of 100 kN/m^2. Clay layer has a thickness of 6.0 m with compression index value of 0.3. Initial void ration is 1.1. Pore pressure parameter is 0.6

OR

20. Explain how the stress path is used for calculating the settlement.