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. Classify the soil as per Indian standards

Sample	< 2 microns	< 75 microns	< 4.75 mm	>4.75 mm	Liquidity index (%)	Plasticity index (%)
1	82	18	0	0	46	21
2	4	6	36	54	-	-

2. What is quick sand condition?
3. Differentiate between primary consolidation and secondary consolidation?
4. What is total stress path?
5. Explain the effect of creep in soil.
6. Explain compaction control in the field.
7. What is pre-compression?
8. Give brief description of Skempton - Bjerrum modification for calculation of consolidation settlement for circular footing.

PART B

Each question carries 6 marks

9. What are the two basic structural units of clay minerals? Explain the details of these two structural units.

OR

10. What is diffused double layer? How it affects the soil properties?

11. A permeameter of diameter 10 cm contains fine sand column of 25 cm height. Rate of flow of water at constant head is 240 ml/min. The head loss between top and bottom is 36 cm in falling head test. Calculate the time taken for dropping the water level from 1.7 m to 1.2 m in a standpipe of 20 mm diameter.

OR

12. A granular soil deposit has 9.0 m depth, which is lying over a rock layer. Ground water table is 5.0 m below the ground surface. Soil deposit has a capillary rise zone of 2.0 m. Plot the variation of total

stress, effective stress and pore pressure. Soil has a specific gravity of 2.65 and voids ratio of 0.8. Soil is 80 % saturated in capillary zone.

13. Derive one dimensional consolidation equation bringing out assumptions involved.

OR

14. A clay layer of 5.0 m. thick, sand-witched between top sand layer and bottom rock layer whose total settlement under a loading is expected to be 40 cm, settles 8 cm at the end of 1st month after the start of application of load. How many months are required for reaching 90 % settlement? How much settlement will occur in one year?

15. Explain the shear behavior of loose sand, medium sand and dense sand under drained conditions in direct shear test?

OR

16. A normally consolidated soil sample is subjected to consolidated undrained test. Soil failed at a confining pressure of 100 kN/m^2 and deviator stress of 240 kN/m^2. Pore pressure at failure was 60 kPa. Determine the effective angle of internal friction and total angle of internal friction.

17. What is pre-consolidation pressure? Bring out its significance. Explain one method to find out pre-consolidation pressure.

OR

18. Explain the following in details
    i) Stress history
    ii) Anisotropy of soil
    iii) Thixotropy
    iv) Temperature effect on soil

19. Find the consolidation settlement of a circular water tank of 4.0 m diameter transferring a pressure of 120 kN/m^2. Clay layer has a thickness of 5.0 m with compression index value of 0.36. Initial void ration is 1.2. Pore pressure parameter is 0.6.

OR

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