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. Following are the laboratory test results of two soil samples. Classify the soil as per Indian standards

Sample	< 2 microns	< 75 microns	< 4.75 mm	>4.75 mm	Liquidity Limit (%)	Plasticity index (%)
1	70	98	2	0	55	25
2	0	6	70	24	-	-

2. What is shrinkage of soil?
3. What is secondary consolidation?
4. What is total stress path?
5. Differentiate between total and effective shear parameters.
6. Why soils are compacted in the field and how the degree of compaction ensured in the field?
7. What is pre-compression?
8. What are the different types of settlement in clayey soil?

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. Differentiate between soil structure and soil fabric.

11. Bring out the difference between quick sand condition and liquefaction of soil. What are the effects?

OR

12. A granular soil deposit has 9.0 m depth, which is lying over an impermeable soil 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 saturated up to 90 % in capillary zone.

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

OR

14. A clay layer of 4.0m. thick, sand-witched between two sand layer at top and bottom whose total settlement under a loading is expected to be 40 cm, settles 10 cm at the end of 1st month after the start of application of load. How many month is required for reaching 90 % settlement? How much settlement will occur in a year?

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

OR

16. An undrained triaxial shear test was conducted on clay. Following observations were taken. Find the pore pressure coefficients. Consolidation is by done by applying cell pressure from up to 90 kPa. The pore pressure increased from -50 kPa to 20 kPa. After that shearing is done by deviator stress of 400 kPa till failure. Pore pressure recorded at failure is -70 kPa. Find pore pressure parameters.

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

OR

18. Discuss the effect of compaction on various properties of soil.

19. A rectangular footing 2.0 m x 3.0 m transmits a load of 1200 kN on a cohesive soil. Modulus of elasticity of soil is 55000 kPa and Poisson's ratio is 0.4. Calculate the settlement of soil if the footing is (i) flexible and (ii) rigid.

OR

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