Register No.: ……………………….…… Name: …………………………………………………………..

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH DEGREE EXAMINATION (S), MAY 2022

CIVIL ENGINEERING (GEOMECHANICS)

(2021 Scheme)

Course Code :   **21GS103**

Course Name: **Advanced Soil Mechanics**

Max. Marks :   **60**   **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. What is transported soil?
2. Find the capillarity rise of sand having 10 % finer =0.09 mm.
3. Differentiate between normally consolidated clay, under consolidated clay and over consolidated clay.
4. What is stress path?
5. Explain creep of soil.
6. Differentiate between compaction and consolidation.
7. Why pre-loading is done on clayey soil?
8. How the immediate settlement in sand can be found out?

PART B

(Answer one full question from each module, each question carries 6 marks)

MODULE I

9. Name different soil classification systems. Explain two classification systems in detail.   (6)

OR

10. Bring out the role of diffused double layer in the behaviour of clayey soil.   (6)

MODULE II

11. A sandy soil deposit has 10.0 m depth, which is lying over a rock layer. Ground water table is 6.0 m below the ground surface. Soil deposit has a capillary rise zone of 1.5 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.   (6)

OR

12. List the factors affecting permeability of soils. Discuss any four factors which you understand to be important.   (6)

MODULE III

13. Derive one dimensional consolidation equation bringing out the assumptions. (6)

OR

14. Consolidation test conducted on a clay sample collected from the field, coefficient of consolidation of clay was observed as 6.0×10^{-8} mm²/s. The clay layer of 3.0 m thickness is sandwiched between sand layer at top and rock layer at bottom. A uniform surcharge of 100 kPa has to be applied. Total consolidation settlement of the soil is estimated as 300 mm. Find the time required for 100 mm and 250 mm settlement. (6)

MODULE IV

15. An undrained triaxial shear test was conducted on clay. Following observations were taken. Find the pore pressure coefficients. Consolidation is done by applying cell pressure from up to 100 kPa. The pore pressure increased from -50 kPa to 40 kPa. After that shearing is done by deviator stress of 400 kPa till failure. Pore pressure recorded at failure is -60 kPa. Find pore pressure parameters. (6)

OR

16. Explain the shear behavior of loose sand, medium sand, and dense sand under drained conditions in direct shear test? (6)

MODULE V

17. Explain the effect of compaction on soil. What are the factors affecting the compaction? (6)

OR

18. Explain the following in detail

   i) Anisotropy of soil
   ii) Thixotropy
   iii) Temperature effect on soil

   (3x2)

MODULE VI

19. A normally consolidated clay layer is 4.0 m thick is sandwiched between sand layers. Top sand layer has a thickness of 3.0 m. The natural water content of clay layer is 42 %. The saturated unit weight of clay and sand are 15.81 kN/m³ and 20.31 kN/m³, respectively. Specific gravity of clay is 2.56 and the liquid limit is 48 %. The ground water level is at ground surface. Determine the consolidation settlement of clay layer due to a strip footing of size 2.0 m width, resting at 1.0 m depth transferring a load of 240 kN per running length. (6)

OR

20. Explain the Skempton -Bjerrum modification for calculation of consolidation settlement. (6)

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