

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**FIRST SEMESTER M.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022
GEOMECHANICS AND STRUCTURES**

(2021 Scheme)

Course Code: 21GS104-A**Course Name: Soil Exploration and Field Testing****Duration: 3 Hours****Max. Marks: 60****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Compare rotary drilling and percussion drilling explaining the circumstances in which they are used.
2. The internal diameter of a sampler is 40mm and the external diameter is 42mm. Discuss the nature of sample obtained.
3. Explain limitations of plate load test.
4. Give the expressions for correlation of SPT and CPT values.
5. Explain soil profile and its difference with bore log.
6. Narrate the possible difficulties while performing under water sampling.
7. Explain most common causes of geotechnical failures.
8. Explain investigation using drillship.

PART B***(Answer one full question from each module, each question carries 6 marks)*****MODULE I**

9. a) Propose a comprehensive site investigation programme for a multistoried building complex. (4)
- b) Differentiate it from an earth dam project. (2)

OR

10. a) Discuss the codal provisions for selecting depth and lateral extent of exploration. (3)
- b) Explain stages of executing a soil exploration programme. (3)

MODULE II

11. a) Sampling in cohesionless soil is not as convenient as in the case of cohesive soil. Explain reasons, challenges and give solutions. (3)
- b) A soil sampler was pushed into the soil for a depth of 600mm and the length of the sample obtained was 590mm. Find the recovery ratio. Explain the nature of sample and suggest the steps to improve its quality. (3)

OR

12. Explain various types of samplers with figures. (6)

MODULE III

13. A concrete pile of 40cm diameter is driven into a homogeneous mass of cohesion less soil. The pile carries a safe load of 650kN. A static cone penetration test, conducted at the site, indicates an average value of $q_c = 40 \text{ kg/cm}^2$ along the pile and 120 kg/cm^2 below the pile tip. Compute the length of the pile with $FS = 2.5$. (6)

OR

14. a) Differentiate static and dynamic cone penetration tests. (2)
b) The sensitivity of clay from the vane shear test was 3.8. In its remoulded state, the clay gave shear strength of 4.5 kPa. Diameter of vane = 50mm and height of vane = 100mm. Calculate the natural shear strength of clay and the torque required to shear the soil in its natural and remoulded state. Also calculate sensitivity. (4)

MODULE IV

15. a) Discuss (i) Seismic cross hole test (ii) Block vibration test (4)
b) Narrate the correlation of N value with shear strength and relative density. (2)

OR

16. Explain various tests to determine dynamic properties of soil. (6)

MODULE V

17. a) Explain methodology of back-analysis for analyzing geotechnical failures. (3)
b) Explain bore log with figure. (3)

OR

18. a) Explain any method for the estimation of depth of water table. (2)
b) Discuss forensic analysis showing its limitations. (4)

MODULE VI

19. a) Explain the principal components of a typical offshore investigation. (3)
b) Compare on-shore and off-shore site investigations. (3)

OR

20. a) Explain Lidar investigation method with its advantages and limitations over other methods. (3)
b) Describe the investigation using echo sounder. (3)
