C **102B4** **Total pages: 2**

Register No: …… Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

EIGHTH SEMESTER B.TECH. DEGREE EXAMINATION(R), MAY 2024

Civil Engineering

(2020 SCHEME)

Course Code : 20CET424

Course Name : Advanced Foundation Design

Max. Marks : 100 **Duration:3 Hours**

Scientific calculator and statistical table is allowed in the examination hall.

Use of IS codes 2911, 6403 and Brom's charts are permitted

PART A

(Answer all questions. Each question carries 3 marks)

1. Discuss any three types of shallow foundation.
2. Summarize the geotechnical design of piles from CPT values.
3. Explain uplift capacity of pile in clay.
4. Explain the settlement of pile groups in sand by Skemptons method.
5. Briefly discuss the design considerations of under reamed pile as per IS code.
6. Summarize the vertical load transfer mechanism in a drilled pier.
7. Explain the IS code method to determine the lateral strength of a pile.
8. Explain the design of piles in cohessive and cohesionless soil using Brom's method.
9. Differentiate free earth support and fixed earth support analysis.
10. Enumerate the different types of sheet piles walls.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Explain the effect of water table on the bearing capacity of a shallow footing. 14

OR

12. Explain the effects of eccentricity in loading on the bearing pressure of shallow foundations. 14

MODULE II

13. A square group of 20 piles each of 0.5 m dia are installed at 1.0 m c/c , in uniform clay stratum of 15 m depth, underlain by rock. The depth of piles extends to 12 m below the surface . The average unconfined compressive strength of clay is 75 kN/m^2 .The clay may be assumed to have normal sensitivity, and normally loaded with liquid limit of 55%. Compute the allowable load with FOS of 3 against shear failure. 14

OR

14. Explain the procedure to conduct SPT . 14

MODULE III

15. A single under reamed pile is installed in a soft clay deposit. The centre of under reamed pile is located at 15 m from ground surface. The diameter of pile shaft and bulb are 1 m and 2.5 m respectively. Determine the allowable load with FOS as 2.5 .The undrained shear strength of soil obtained from vane shear test is given by C_u =65+7D kN/m^2, D in m . Assume adhesion factor as 1 and cohesion around the bulb as 0.9 C_u. 14

OR

16. Briefly expalin the vertical bearing capacity and uplift capacity of belled pier. 14

MODULE IV

17. Discuss the behavior of vertical piles under lateral loading. 14

OR

18. Discusss Brom's method to estimte the lateral strength of short and long piles in granular and clayey soils. 14

MODULE V

19. Explain the methods to determine the parameters m, k and C of machine foundation system. 14

OR

20. Briefly explain the following 14
a. Degree of freedom of a block foundation
b.Determination of natural freequency of block fouundation
c.Damping
d. Free vibration with and without damping

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