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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SECOND SEMESTER M.TECH DEGREE EXAMINATION (Regular), MAY 2023

GEOMECHANICS AND STRUCTURES

(2021 Scheme)

Course Code: 21GS201

Course Name: Design of Reinforced Concrete Foundations

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

Use of IS 456, SP 16 are permitted

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain the significance providing pedestals. Briefly explain the design principles.
2. Discuss the basic design principle of strap footing.
3. Briefly explain the stability checks to be considered during the design of a retaining wall.
4. Explain the IS classification of structure based on rigidity.
5. Briefly explain the different types of steel column bases.
6. Draw and mark the components of well foundations.
7. List the advantages and disadvantages of shell foundations.
8. Explain the various forces developed in conical shell foundations.

PART B

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

MODULE I

9. Design a square footing for a axially loaded column of size 450 x 450 mm, load on column is 900 kN. Safe bearing capacity of soil is 180 kN/m^2 .Use M20 concrete and Fe 415 steel. (6)

OR

10. Design a rectangular footing for a axially loaded column of size 250 × 500 mm, load on column is 1000 kN. Safe bearing capacity of soil is 200 kN/m^2 .Use M25 concrete and Fe 415 steel. (6)

MODULE II

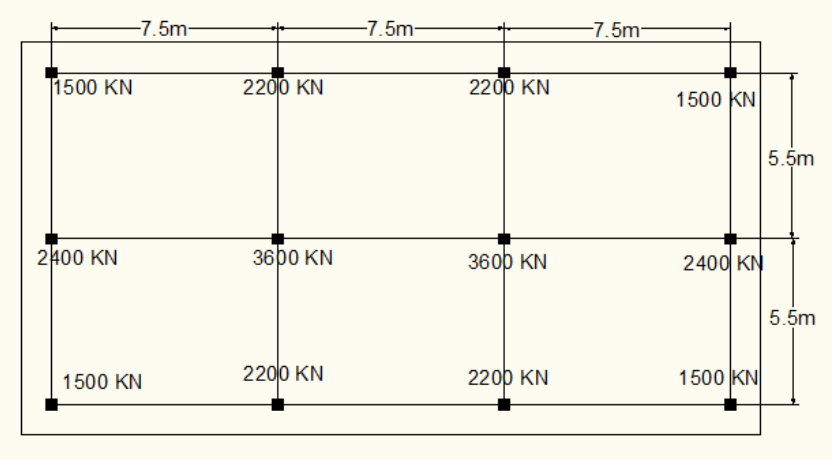
11. Explain the design principles of a combined trapezoidal footing. (6)

OR

12. Two columns 400 mm x 400 mm are spaced at 3.0 m carrying a load of 1000 kN each. If the width restriction is 2m and SBC of soil is 200 kN/m^2, Design a combined footing, assume M 25 concrete & Fe 415 steel. (6)

MODULE III

13. The columns layout and loading of a multi-storied building is as shown in figure below. Design a suitable beam slab raft if SBC of soil is 100 kN/m^2 . Assume column size as 300 mm x 500 mm, use M20 concrete and Fe 415 steel. (6)



OR

14. Design a cantilever retaining wall to retain earth embankment 4.5 m high above ground level. The density of earth is 18 kN/m^3 and angle of repose is 30^0. Safe bearing capacity of soil may be taken as 200 kN/m^2 and the coefficient of friction between soil and concrete is 0.5. Assume the embankment is horizontal at its top, adopt M20 concrete and Fe 415 steel. (6)

MODULE IV

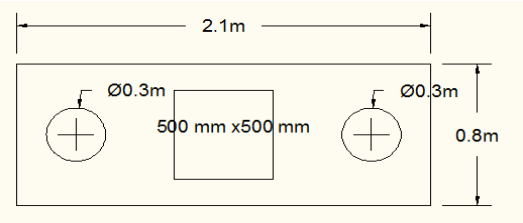
15. Explain the flexible approach to analysis of foundation system using theory of sub grade reaction with neat sketch. (6)

OR

16. Discuss ACI method of analysis of beams on elastic foundation. (6)

MODULE V

17. Design a pile cap for a group of 2 piles spaced at 1.5 meter apart. Piles are 300 mm in diameter. Size of the column is 500 mm x 500 mm and transmits a factored load of 1000 kN. Adopt M20 concrete and Fe 415 steel. (6)



OR

18. The foundation for a structure consists of 10 piles to carry a load of 6000 kN. The piles are spaced 1.5 m centers. They are driven through a hard stratum available at a depth of 6 m. Design one of the piles and sketch the details of reinforcements. Adopt M-20 concrete and Fe-415 HYSD bars. (6)

MODULE VI

19. A Circular water tank is supported by 6 columns resting on annular raft Total load from tank is 36000 kN. Design the ring beam assuming mean radius from centers of column line is 8.0 m. adopt M20 concrete and Fe 415 steel. (6)

OR

20. Explain the design procedure of a conical shell foundation. (6)

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