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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester, M. Tech - Civil Engineering (MCAD)
Semester End Examination; May/June - 2018
Advanced Foundation Design

Time: 3 hrs *Max. Marks: 100*

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
ii) Necessary tables are permitted. iii) Assume missing data, if any.

UNIT - I

1 a. Explain Generalized bearing capacity and various terms involved. 8

b. Design a strip footing placed at a distance 1.5 m from the edge of a slope making an angle 30° with horizontal. The footing is subjected to a load intensity of 300 kN/m^2. The slope consists of silty soils with C = 0, ϕ = 35°, γ_t = 17 kN/m^3. Standard penetration tests were performed at the site. An average corrected value of standard penetration resistance was found as 17. Adopt the permissible value of settlements as 60 mm. 12

2 a. How do you compute?
 i) Immediate Settlement
 ii) Consolidation settlement
 iii) Secondary settlement 9

b. Design an isolated footing for a column of 500 mm x 500 mm size subjected to a vertical load of 2400 kN, moment of 400 kN.m and shear load of 360 kN.
Take C = 6 kN/m^2, ϕ = 39°, γ_t = 18 kN/m^3. 11

UNIT - II

3. Three columns 500 mm x 500 mm size is placed 5.5 m centre to centre in one line. The length of footing is not to exceed in one line. The length of footing is not to exceed 11.5 m. The column loads are 1400 kN for side columns and 900 kN for centre. The bearing capacity of soil is 60 kN/m^2. K-values at centre and corner are 0.05 N/mm^3 and 0.015 N/mm^3 respectively. Determine the design moments by soil line method. 20

4. A building consist of 12 columns 400 mm x 400 mm sizes are arranged in three rows of four each as shown in Fig. Q(4). The distance between the columns in 5.0 m each. The load carried by four corner columns in 500 kN each, that by exterior columns is 550 kN each and that carried by interior column is 900 kN each. Design raft foundation. 20
Take allowable soil pressure as 50 kN/m^2. (Design only slab and secondary beam)
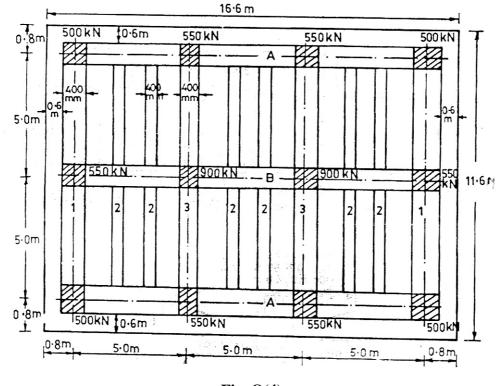
Fig. Q(4)

UNIT - III

5 a. Discuss the classification of pile foundation based on function. 10

b. A square group of 9 piles was driven soft clay extending to large depth. The diameter and length of piles were 30 cm and 9 cm respectively. If the unconfined compressive strength of clay is 90 kN/m^2 and the pile spacing is 90 cm centre to centre. What is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75. 10

6 a. List the situations under which pile foundation becomes essential. 10

b. Explain the method of separating skin frictional component from end bearing component using cyclic pile load test. 10

UNIT - IV

7 a. Explain the necessary information required in the design of foundations of transmission line towers. 10

b. Explain the behavior of pad and chimney foundations. 10

8 a. Explain how the safety of tower foundation is checked against uplift and overturning? 10

b. Discuss the critical forces acting on the foundation of transmission line tower. 10

UNIT - V

9 a. Define natural frequency of a vibrating system. Explain Barkan's method of determining the natural frequency of foundation soil system. 10

b. Explain with neat sketches types of motion of rigid foundation. 10

10 a. Explaiin the steps involved in the design procedure of the block foundation. 10

b. Write the equation involved in motion isolation system and briefly explain. 10

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