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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, M. Tech. - Civil Engineering (MCAD)

Semester End Examination; Dec. - 2015

Computer Aided Design of Sub-Structures

Time: 3 hrs *Max. Marks: 100*

Note: i) *Answer **FIVE** full questions selecting **ONE** full question from each **unit**.*

ii) Assume missing data if any suitably, Use of IS456-2000 is permitted.

UNIT - I

1 a. List the factors influencing the selection of depth of foundation. Explain any two of them. 8

b. Three columns 400 mm x 400 mm size are placed 5m center to center in one line. The length of footing should not exceed 10.4 m. End columns carry loads of 1200 kN and central column carries 800 kN. The bearing capacity of soil is 80 kN/m^2. The modulii of sub grade reaction at center and ends are respectively 50 MN/m^3 and 20 MN/m^3. Determine the design moment by soil line method. 12

2 a. Explain 'Beam on elastic foundation' as a tool for foundation analysis. 6

b. A combined footing 6 m long carries point loads 800 kN and 400 kN at 0.5 m from either end. The modulus of sub grade reaction is 40 MN/m^3 and footing modulus is 20 GPa. Footing is 1.5 m wide and 0.5 m depth. Dividing the footing into 3 equal parts find the bending moment distribution along the length using finite difference approach. 14

UNIT - II

3. Proportion a strap footing for two columns spaced 5 m center to center. The columns are 400 mm x 400 mm in size carrying loads of 1000 kN and 600 kN. The lighter column is at the edge of property line length wise. Take allowable bearing pressure of soil as 150 kN/m^2. Draw BMD and SFD for the footing. 20

4. A multi – storeyed structure consists of 25 columns 300 x 300 mm in size carrying 800 kN load each. The columns are spaced 4m center to center both ways. Design a raft foundation taking allowable bearing pressure of 60 kN/m^2. 20

UNIT - III

5 a. With neat sketches, discuss the classification of pile foundation based on function. 8

b. Explain the method of evaluation of pile capacity from pile load test. 6

c. List the disadvantages of determining pile capacity from dynamic formula. 6

6 a. List the situations under which pile foundation becomes essential. 8

Contd…2

b. A 300 mm diameter concrete pile 20 m long is driven into two layers soil. Top soil 8 m thick has cohesion, friction angle and unit weight of 20 kN/m^2, 30º and 16 kN/m^3 respectively and lower layer has cohesion and unit weight of 50 kN/m^2 and 18 kN/m^3. Find the pile capacity. 12

UNIT - IV

7. A pile foundation system is proposed at a site to carry a load of 6000 kN. The soil consists of saturated clay 16 m thick below which exists hard rock. The following are the properties of clay. Initial void ratio = 1, Initial dry density = 14 kN/m^3, Water content = 30%. Liquid limit = 50%, permissible settlement = 250 mm. Design the pile foundation system and structural design of RC pile. 20

8 a. Discuss the method of separating skin friction from base resistance in Pile load test. 10

b. Discuss the method of analysis of laterally loaded piles by Reese and Matlock approach. 10

UNIT - V

9 a. Explain the type of foundation for transmission line tower. What factors are considered in choice of the foundation? 8

b. How is the safety of tower foundation checked against uplift, over tuning and lateral thrust? 12

10a. List the general criteria for the design of machine foundation. 8

b. Write short notes on:
(i) Foundation Isolation and (ii) Forced vibration. 12

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