Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec– 2017**

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| **Code :** | **17CE3034** | **Duration :** | **3hrs** |
| **Sub. Name :** | **SHALLOW FOUNDATIONS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | | **Questions** | **Course Outcome** | **Marks** |
| 1. | a. | | Bring out the key steps to be performed by a foundation engineer in arriving at the most appropriate foundation for a given structure at a given site. | CO1 | 12 |
| b. | | Write a brief history of soil engineering. | CO3 | 8 |
|  | | (OR) | | | |
| 2. | a. | | List out the precautions to be taken while locating a footing i. on a slope and ii. adjacent to an existing structures. | CO3 | 10 |
| b. | | Discuss the historical development of foundation engineering. | CO1 | 10 |
| 3. | a. | | Derive the ultimate bearing capacity equation for the general shear failure of soil in Terzaghi's analysis for a square footing. | CO2 | 10 |
|  | b. | | Discuss the effect of shape, depth and inclination of load on bearing capacity of footings. | CO3 | 5 |
|  | c. | | A SPT was conducted in a dense sand deposit at a depth of 22 m, and a value of 48 was observed for N. the density of the sand was 15 kN/m2. What is the value of N, corrected for overburden pressure? | CO2 | 5 |
|  | | (OR) | | | |
| 4. | a. | | Mention the factors affecting the bearing capacity. | CO3 | 6 |
|  | b. | | Determine the ultimate bearing capacity of a strip footing, 1.5m wide, with its base at a depth of 1m, resting on a dry sand stratum. Take γ = 17kN/m3, φ=38°; Use IS method. For Nq = 48.9 and Nγ = 56.2. | CO2 | 7 |
|  | c. | | Analyze the Terzhagi’s equation for the strip footing. Also how the water table affects the Terzhagi’s bearing capacity equation at different levels. | CO2 | 7 |
| 5. | a. | | The following data was obtained from a plate load test carried out on a 60cm square test plate at a depth of 2.5m below the ground surface on a sandy soil which extends upto a large depth. Determine the settlement of a foundation 2.8m x 2.8m carrying a load of 1250kN and located at a depth of 2m below ground surface.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Load intensity, (kN/m2) | 25 | 20 | 75 | 100 | 125 | 150 | 175 | 200 | | Settlement (mm) | 1.0 | 2.0 | 3.5 | 5.0 | 8.2 | 12.5 | 18 | 25 | | CO4 | 10 |
|  | b. | | List the various methods of minimizing total and differential settlement. | CO4 | 5 |
|  | c. | | How would you estimate the settlements of a foundation on cohesion less soils? | CO4 | 5 |
|  | | (OR) | | | |
| 6. | a. | | Mention the loads to be considered for analysis of settlement. | CO4 | 5 |
|  | b. | | How would you predict the foundation settlement | CO4 | 5 |
|  | c. | | A square footing resting on a sand deposit. The pressure at the level of the foundation (q) is 200kN/m2. Determine the settlement of the foundation after 6 years of construction. Take the modulus of elasticity and influence factor at the depth of 1.5m, 2.5m, 3.5m, 4.5m, 5.5m are 1.8x104kN/m2, 1.9x104kN/m2, 2.0x104kN/m2, 2.1x104kN/m2, 2.2x104kN/m2 and 0.1, 0.42, 0.40, 0.267, 0.133. | CO4 | 10 |
| 7. | a. | | A RC column of size 300 x 500mm is subjected to a vertical load of 1100kN.Design the size of the isolated footing based on moment and shear criteria. Take safe bearing capacity of soil as 150kN/m2. Use M20 grade of concrete and Fe 500 steel. | CO5 | 15 |
|  | b. | | Explain the conventional method of proportioning of raft foundation. | CO5 | 2 |
|  | | (OR) | | | |
| 8. |  | | A trapezoidal footing is to be provided to support two square columns of 30cm and 50cm sides respectively Columns are 6m apart and the safe bearing capacity of the soil is 400kN/m2. The bigger column carries 5000kN and the smaller 3000kN. Design a suitable size of the footing so that it does not extend beyond the faces of the columns. | CO5 | 20 |
|  | | | **Compulsory**: |  |  |
| 9. |  | | List out the different types of floating foundation. List the problems that are encountered during executions. Also brief how they are managed. | CO6 | 20 |

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