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



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14CE2012** | **Duration :** | **3hrs** |
| **Sub. Name :** | **FOUNDATION ENGINEERING** | **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. | 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? | CO1 | 5 |
| b. | Compute the area ratio of a thin walled tube sampler having an external diameter of 6 cmand a wall thickness of 2.25 mm. Do you recommend the sample for obtaining undisturbed soil samples? Why? | CO1 | 5 |
| c. | Illustrate the conditions where a pile foundation is more suitable than a shallow foundation. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | Briefly explain about the various types of soil samplers for obtaining the disturbed and undisturbed samples. | CO1 | 10 |
| b. | How would you decide the depth of exploration and the lateral extent of the investigations? | CO1 | 5 |
| c. | Reason out the purpose of collecting the undisturbed sample. | CO1 | 5 |
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| 3. | a. | Describe the various types of pile foundation. | CO1 | 10 |
| b. | What are the factors governing the selection of foundation? | CO1 | 5 |
| c. | Explain in detail about the different types of shear failure with neat sketch. | CO1 | 5 |
| **(OR)** | | | | |
| 4. | a. | Determine the inside clearance of the sampler tube having the inner dimension of the sample tube and driving shoe as 100mm and 98mm respectively. | CO2 | 4 |
| b. | Briefly explain about the various geophysical methods with neat sketches. | CO2 | 8 |
| c. | Compute the safe bearing capacity of a square footing 1.5 m x1.5m, located at a depth of 1 m below the ground level in a soil of average density 20 kN/ m3. ф = 20° , NC=17.7, Nq= 7.4 and Nγ =5.0. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of footing if water table rises to the ground level. | CO2 | 8 |
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| 5. | a. | Determine the ultimate bearing capacity of a strip footing, 1.25 m wide with its base at a depth of 1.35 m resting on a dry sand stratum. Water table is very deep. {γ = 17.8 kN/m3, φ = 380 } | CO2 | 8 |
| b. | Quantify the intensity of vertical stress using Rankine’s theory when the backfill is inclined. | CO2 | 6 |
| c. | Write the three forces acting in the sliding wedge according to Coulomb’s wedge theory. | CO2 | 6 |
| **(OR)** | | | | |
| 6. | a. | Determine the earth pressure at rest and location of line of action when   1. No Surcharge load and No water table. 2. Surcharge load is acting at the surface of the soil. 3. Surcharge load and the presence of water table. | CO4 | 10 |
| b. | Derive an expression for Rankine’s active and passive earth pressure coefficient with neat sketches, assuming the soil is Cohesive. | CO4 | 10 |
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| 7. | a. | Estimate the active earth pressure on a retaining wall of height 4m retaining a leveled backfill. The angle of internal friction of the soil is 30°. In the first 2m from ground level the unit weight of the soil is 18kN/m3and for the next 2m, the unit weight of saturated soil is 20kN/m3. Draw the pressure distribution diagram. Calculate the resultant pressure and its position. | CO4 | 10 |
| b. | Compare Rankine’s theory with Columb’s theory of earth pressure. | CO4 | 10 |
| **(OR)** | | | | |
| 8. | a. | A retaining wall with a smooth vertical back retains a purely cohesive fill. Height of wall is 12m, unit weight of fill is 20 kN/m3, C = 1 N / cm2. What is the total active Rankine thrust on the wall? At what depth is the intensity of pressure is zero and where does the resultant thrust act? | CO4 | 8 |
| b. | Discuss the procedure for proportioning of footings for equal settlement. | CO3 | 4 |
| c. | Design a strip footing which is placed at a distance of 1.2m and it is subjected to a load intensity of 150kN/m2. The thickness of the concrete wall is 300mm. | CO3 | 8 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Define negative skin friction. What is its effect on the pile? | CO3 | 4 |
| b. | Briefly explain the different types of pile foundation based on transfer of loads and installation. | CO3 | 8 |
| c. | A square group of 9 piles was driven into a soft clay extending to a large depth. The diameter and length of the piles were 30 cm and  9 m respectively. If the unconfined compression strength of the clay is 90 kN/m2, and the pile spacing is 90 cm center to center, what is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75. | CO3 | 8 |