| Roll No. | | | | | | | | | | | | |
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# PRESIDENCY UNIVERSITY

## BENGALURU

**Make Up Examinations – December 2025**

**Date:** 27 – 12- 2025 **Time:** 01:00pm – 04:00pm

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|---|---|---|
| **School:** SOE | **Program:** B. Tech | |
| **Course Code :**CIV214 | **Course Name :** Foundation Engineering | |
| **Semester**: MK | **Max Marks**: 100 | **Weightage**: 50% |

| CO - Levels | CO1 | CO2 | CO3 | CO4 | CO5 |
|---|---|---|---|---|---|
| Marks | 28 | 26 | 46 | | |

**Instructions:**

*(i) Read all questions carefully and answer accordingly.*

*(ii) Do not write anything on the question paper other than roll number.*

## Part A

**Answer ALL the Questions. Each question carries 2marks.** **10Q x 2M=20M**

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|---|---|---|---|---|
| **1** | List any four causes of slope failure. | **2 Marks** | **L1** | **CO1** |
| **2** | Explain the need for slope stability analysis. | **2 Marks** | **L1** | **CO1** |
| **3** | List any four assumptions made in Boussinesq's Formula for Point Loads. | **2 Marks** | **L1** | **CO1** |
| **4** | List the various factors of safety for slope stability analysis with formulas. | **2 Marks** | **L1** | **CO1** |
| **5** | Compute active earth pressure for a retaining wall of 5 m height for a cohesion less soil with angle of internal friction $\varphi=30^0$ and $\gamma=20$ kN/m$^3$. | **2 Marks** | **L3** | **CO2** |
| **6** | Compute passive earth pressure for a retaining wall of 10 m height for a cohesion less soil with angle of internal friction $\varphi=20^0$ and $\gamma=18$ kN/m$^3$. | **2 Marks** | **L3** | **CO2** |
| **7** | Explain the significance of finding the earth pressure of soil. | **2 Marks** | **L2** | **CO2** |
| **8** | Explain ultimate bearing capacity and net ultimate bearing capacity of soil. | **2 Marks** | **L1** | **CO3** |
| **9** | Explain the circumstances for choosing the pile foundations over shallow foundations. | **2 Marks** | **L2** | **CO3** |
| **10** | What are the disadvantages of timber piles? | **2 Marks** | **L1** | **CO3** |

## Part B

**Answer the Questions** **Total 80 Marks.**

| | | | | | |
|---|---|---|---|---|---|
| **11.** | **a.** | A 5 meter deep canal has side slopes of 1:1. The properties of soil are c=20kN/m$^2$, φ=10$^o$, e=0.8 and G=2.8. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion, when canal runs full. Also determine the factor of safety with respect to cohesion, for sudden drawdown condition with Taylor's stability number 0.137 for both the cases. | **10 Marks** | **L3** | **CO1** |
| | **b.** | A number of methods are available for stability analysis of finite slopes and Swedish circle method is one amongst them. With a neat sketch explain Swedish circle method for pure cohesive soil and both cohesive and frictional soils. | **10 Marks** | **L3** | **CO1** |

**or**

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|---|---|---|---|---|---|
| **12.** | **a.** | Isobars are the contours of stress distribution in soils. Draw the Isobar diagram for 0.1Q. | **10 Marks** | **L1** | **CO1** |
| | **b.** | Three parallel strip footings 3 m wide each and 5 m apart center to center transmit contact pressures of 200, 150 and 100 kN/m$^2$ respectively. Compute the vertical stress due to the combined loads beneath the centers of each footing at a depth of 3 m below the base. Assume the footings are placed at a depth of 2 m below the ground surface. Use Boussinesq's method for line loads. | **10 Marks** | **L3** | **CO1** |

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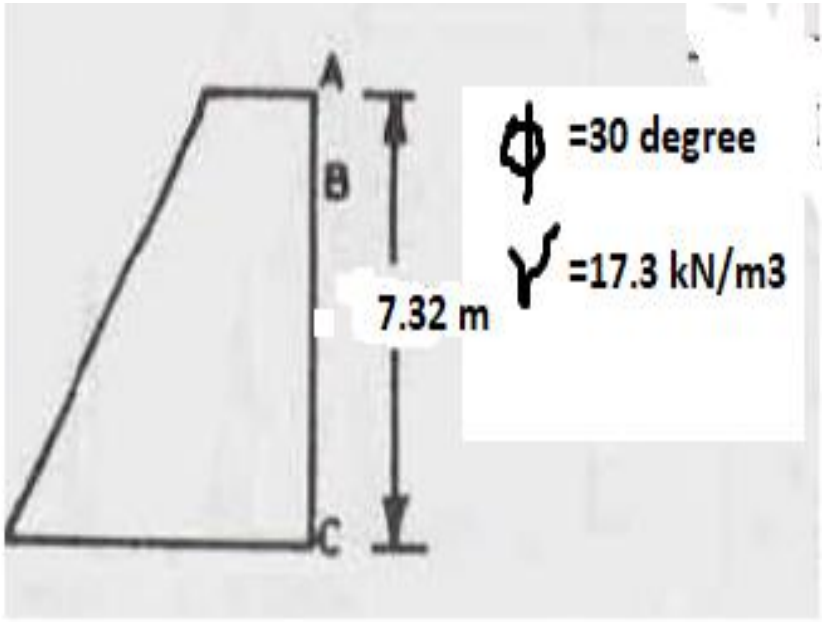
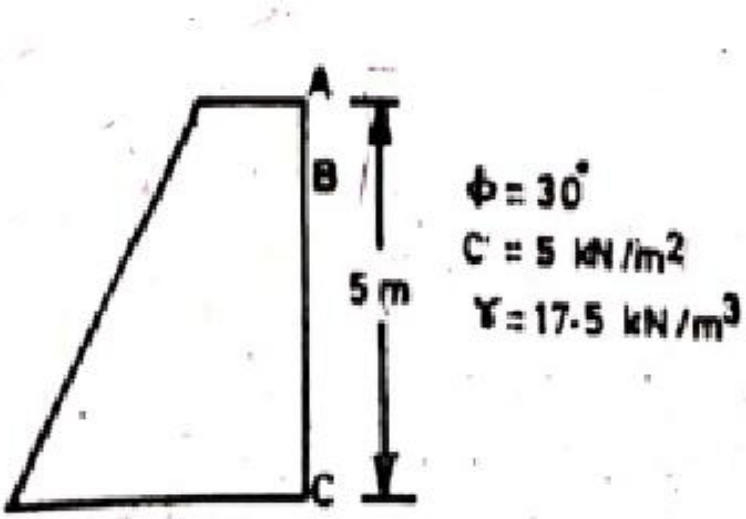
| **13.** | **a.** | Develop the expression for Rankine's earth pressure theory for cohesion less soil for active case. | **10 Marks** | **L1** | **CO2** |
| | **b.** | Determine the active and passive earth pressure for the retaining wall shown below. Height of the retaining wall is 7.32 m, φ=30 degree and γ=17.3 kN/m$^3$.   | **10 Marks** | **L3** | **CO2** |

**or**

| | | | | | |
|---|---|---|---|---|---|
| **14.** | **a.** | A 5 m high retaining wall is shown in Figure. Determine the Rankine's active earth pressure on the wall. a) Before the formation of tension crack and b) after the formation of tension crack.<br>  <br> | **10 Marks** | **L3** | **CO2** |
| | **b.** | Retaining walls are constructed to retain the backfill soil. The backfill soil exerts pressure on the retaining wall. There are various types of earth pressure such as active earth pressure, passive earth pressure and earth pressure at rest condition. Explain them with a neat diagram. | **10 Marks** | **L1** | **CO2** |

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| **15.** | | A Pile foundation, a kind of deep foundation, can be defined as a slender column or long cylinder which are used to support the structure and transfer the load at desired depth either by end bearing or skin friction. Explain the various classifications of pile foundations. | **20 Marks** | **L1** | **CO3** |

**Or**

| | | | | | |
|---|---|---|---|---|---|
| **16.** | **a.** | A square footing located at a depth of 1.3 m below the ground has to carry a safe load of 800 kN. Find the size of the footing if the desired factor of safety is 3, c=8 kPa, γ=18.64 kN/cubic meter, Nc=37.2, Nγ=19.7 and Nq=22.5 | **10 Marks** | **L3** | **CO3** |
| | **b.** | Investigations were made at three sites of an office building to determine the type of bearing capacity failure. The bearing capacity of the soil was not adequate. The analysis were carried out to find that the failure is due to general shear failure, punching shear failure and local shear failure. Explain these failures with a neat sketch. | **10 Marks** | **L1** | **CO3** |

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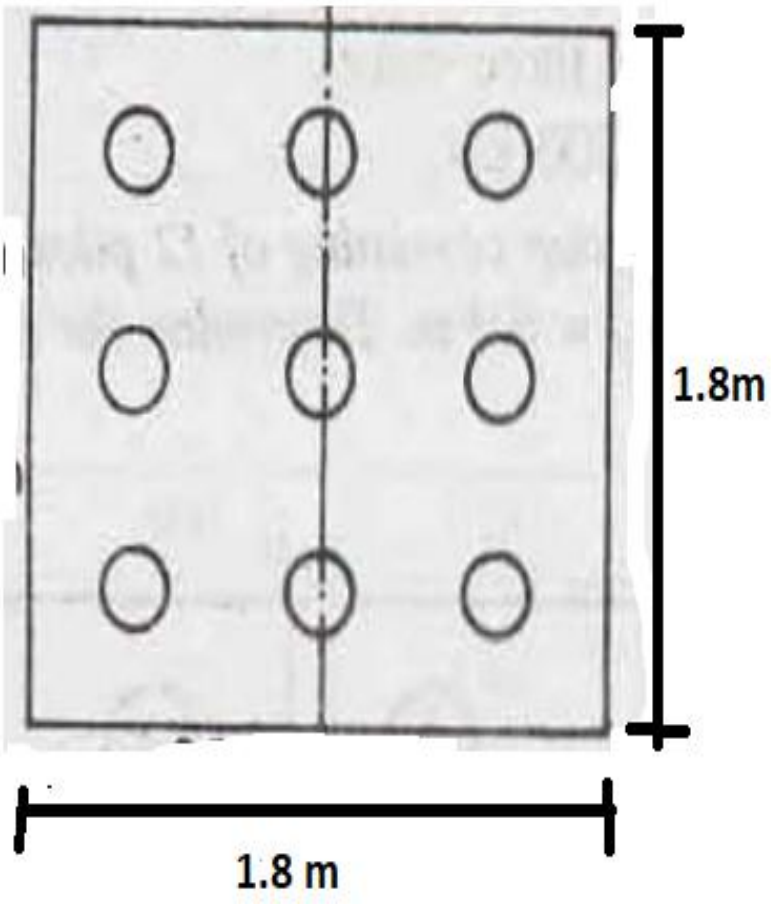
| **17.** | **a.** | Negative skin friction occurs in friction piles and are also called as floating piles. Explain with a neat sketch friction piles. | **10 Marks** | **L1** | **CO3** |
| | **b.** | A 30 cm diameter concrete pile is driven into a homogeneous consolidated clay deposit with cohesion 40 kN/m2, with adhesion factor α=0.7. If the embedded length is 10 m, Estimate safe load of the pile with Factor of safety=2.5. | **10 Marks** | **L3** | **CO3** |
| | | **Or** | | | |
| **18.** | **a.** | A. pile group consists of 9 friction piles of 30 cm diameter and 10 m length driven in clay as shown in Fig. (Cu= 100 kN/m2 and γ=20kN/$m^3$. Determine the safe load for the group. Factor of Safety =3 and α=0.6 (adhesion factor) as shown in Fig. Determine the safe load for the group.   | **15 Marks** | **L3** | **CO3** |
| | **b.** | Tezaghi's analysis were made to analyze the bearing capacity failure. Various assumptions were made to determine the ultimate bearing capacity of the soil. List the assumptions made in the Terzghi's analysis. | **5 Marks** | **L1** | **CO3** |

******* BEST WISHES *******