Ref. No. EX/CON/PC/B/T/313/2024

B. E. CONSTRUCTION ENGINEERING 3RD YEAR 1ST SEMESTER EXAMINATION - 2024

SUBJECT: SOIL MECHANICS - II

Time : Three hours *(50 Marks for each Part)* **Full Marks : 100**

Part I
(50 Marks)

<table>
<tr><th></th><th>Question No.</th><th></th><th>Marks</th></tr>
<tr><td>COI [25]</td><td></td><td>Answer Q1 and any two from Q2, Q3 and Q4.</td><td></td></tr>
<tr><td></td><td>Q1.</td><td>Standard penetration test was carried out at a particular site at a depth 8.0m below ground level in a cohesion less soil. The related information are Bulk density of the soil = 1.870t/m³. Ground water table = 1.50m below ground level.
The number of blows corresponding to 6 successive 7.5cm penetration are as follows.
<table>
<tr><th>Depth of successive penetration (cm)</th><th>No of blows</th></tr>
<tr><td>7.5</td><td>6</td></tr>
<tr><td>7.5</td><td>8</td></tr>
<tr><td>7.5</td><td>10</td></tr>
<tr><td>7.5</td><td>14</td></tr>
<tr><td>7.5</td><td>17</td></tr>
<tr><td>7.5</td><td>20</td></tr>
</table>
Find out the corrected N value applying overburden and dilatancy correction.</td><td>09</td></tr>
<tr><td></td><td>Q2.</td><td>Describe wash boring method. Also state its advantages and disadvantages</td><td>08</td></tr>
<tr><td></td><td>Q3.</td><td>Explain how the depth and number of bore holes are decided for a project.</td><td>08</td></tr>
<tr><td></td><td>Q4.</td><td>Write a short note on thin walled tube sampling.</td><td>08</td></tr>
<tr><td>CO2 [25]</td><td></td><td>Answer Q7 and any one from Q5 and Q6.</td><td></td></tr>
<tr><td></td><td>Q5.</td><td>A slope is 10m high and the slope angle is $\beta=45^0$. The properties of the soil slope are c=3.0t/m², $\phi=15^0$, $\gamma=1.850$t/m³. Determine the factor of safety with respect to shear strength.
Assume Taylor's stability number S_n as follows
For $\beta=45^0$ and $\phi=10^0$, $S_n = 0.108$
For $\beta = 45^0$ and $\phi=15^0$, $S_n = 0.083$
For intermediate values linear interpolation may be carried out.</td><td>05</td></tr>
<tr><td></td><td>Q6a.</td><td>The cohesion (c), angle of internal friction (ϕ) and unit weight (γ) of a soil are 1.5 t/m², 20^0 and 1.75t/m³ respectively. What will be the maximum depth of unsupported excavation in the soil ?</td><td>02</td></tr>
</table>

[Turn over

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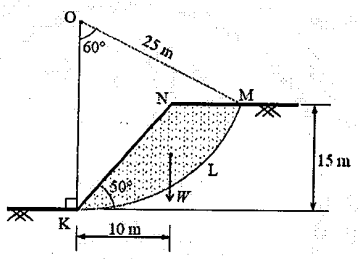
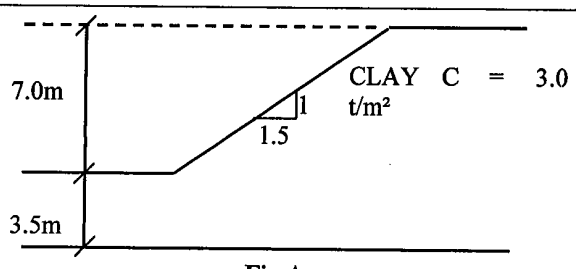
Time : Three hours **Full Marks : 100**

Part I

	Question No.		Marks
	Q6b.	An unsupported slope of height 15m is shown in the figure (not to scale), in which the slope face makes an angle 50^0 with the horizontal. The slope material comprise of purely cohesive soil having undrained cohesion 7.5 t/m^2. A trial slip circle KLM, with a radius 25m, passes through the crest and toe of the slope and it subtends an angle 60^0 at its center O. The weight of the active soil mass (w, bounded by KLMN) is 250 t/m, which is acting at a horizontal distance of 10m from the toe of the slope. Consider the water table to be present at a very large depth from the ground surface.  Considering the trial slip circle KLM, what is the factor of safety against the failure of the slope under untrained condition ?	03
	Q7.	Fig. A gives the details of an embankment made of cohesive soils. Determine the factor of safety against base failure by midpoint circle method with radius R = 13.50 m.	20
		 **Fig.A**	

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BE Construction Engineering 4th yr 1st Semester examination 2024

SOIL MECHANICS-II

Time : Three hours | Full Marks : 100

(50 Marks for each Part)

Part-II **(50 Marks)**

Answer any two questions .

Assume relevant data if required.

Q-1 (a) A 8 m high retaining wall retains a horizontal sandy backfill with $\phi = 30^0$, γ_{sat} = 1.88 t/m^3 carrying a surcharge of 3 t/m^2 with a standing water table at 4m below ground level. Draw the earth pressure diagram with neat sketch. Estimate the active earth pressure on the wall and the point of application of such force. (18)

(b) Explain the difference between Columb's and Rankine's approach for estimation of lateral earth pressure. (7)

Q-2 (a) Draw the force polygon for a retaining wall with horizontal backfill when that is subjected under earthquake forces. (7)

(b) Explain how seepage flow can be estimated using flownet. (8)

(c) If a 7m high retaining wall retains a horizontal backfill [$\phi = 28^0$, γ_{sat} = 1.83 t/m^3] carries a point load of 8.2 ton at a distance of 5 m away from the face of the wall , then determine the lateral earth pressure at half of the wall depth. (10)

Q-3 (a) Explain changes in flownet If the soil is anisotrpic. (6)

(b) Explain the reasons of constructing a flownet with square grid. (7)

© Explain significance of Phreatic line through earth dam. (5)

(d) Describe requirements of filter for erosion control in hydraulic structure. (7)