CE 705: ADVANCED GEOTECHNICAL ENGG (EP-I)
SEM VII, GUJARAT UNIVERSITY

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<tr><td>Q-1</td><td>Give assumptions made in coulomb's wedge theory.</td></tr>
<tr><td>Q-2</td><td>What do you mean by active and passive earth pressure. Derive the equation Ka = $\frac{1-sin\emptyset'}{1+sin\emptyset'}$ for Rankine's theory. Analytically derive that α_f = 45+Ø/2. Also check it graphically.</td></tr>
<tr><td>Q-3</td><td>Explain anchored sheet pile with free earth supports in cohesion less soils.</td></tr>
<tr><td>Q-4</td><td>Give assumptions made in Terzaghi's one dimensional consolidation theory and comment on it. Give limitations of consolidation theory.</td></tr>
<tr><td>Q-5</td><td>Enlist method to find coefficient of consolidation and explain all the methods in detail. Explain field consolidation curve. Describe secondary consolidation. Draw neat sketch of a fixed ring consolidation cell</td></tr>
<tr><td>Q-6</td><td>Explain types of sheet pile walls in detail.</td></tr>
<tr><td>Q-7</td><td>Describe Hvorslev's shear strength parameter.</td></tr>
<tr><td>Q-8</td><td>Explain tri-axial test under different drainage condition.</td></tr>
<tr><td>Q-9</td><td>Derive equation for Skempton's pore pressure parameters.</td></tr>
<tr><td>Q-10</td><td>Define stress path and explain different types of stress path.</td></tr>
<tr><td>Q-11</td><td>Write principles of design of reinforced earth wall.</td></tr>
<tr><td>Q-12</td><td>Describe elements of earth anchors.</td></tr>
<tr><td>Q-13</td><td>In a consolidation test when the load was changed from 50 kN/m2 to 100 kN/m2 the void ratio changes from 0.7 to 0.65. Determine coefficient of volume decrease and the compression index.</td></tr>
<tr><td>Q-14</td><td>Explain Rankine's theory for passive earth pressure on cohesionless backfill.</td></tr>
<tr><td>Q-15</td><td>Describe the conditions in which soil improvement is necessary.</td></tr>
<tr><td>Q-16</td><td>Enlist method of dynamic compaction for deep layer and explain any one of it.</td></tr>
<tr><td>Q-17</td><td>Explain sand compaction piles.</td></tr>
<tr><td>Q-18</td><td>Describe preloading and sand drains.</td></tr>
<tr><td>Q-19</td><td>Give the reasons for use of fly ash in ground improvement technique.</td></tr>
<tr><td>Q-20</td><td>Explain sensitivity, thixotropy and critical void ratio.</td></tr>
<tr><td>Q-21</td><td>Name the major types of geotextile material and explain its classification.</td></tr>
<tr><td>Q-22</td><td>Explain types and uses of geosynthetic.</td></tr>
<tr><td>Q-23</td><td>The following data relate to a tri axial compression tests performed on a soil sample
<table>
<tr><td>Sr. No.</td><td>Chamber pressure</td><td>Max deviator stress</td><td>Pore pressure deviator stress</td></tr>
<tr><td>1</td><td>80 kN/m2</td><td>175 kN/m2</td><td>45 kN/m2</td></tr>
<tr><td>2</td><td>150 kN/m2</td><td>240 kN/m2</td><td>50 kN/m2</td></tr>
<tr><td>3</td><td>210 kN/m2</td><td>300 kN/m2</td><td>60 kN/m2</td></tr>
</table>
Determine total and effective stress parameter of the soil.</td></tr>
<tr><td>Q-24</td><td>Differentiate general shear failure and local shear failure with neat sketch.</td></tr>
<tr><td>Q-25</td><td>Determine the allowable gross load and the net allowable load for a square footing of 2 m side and depth of foundation is 1 m. Use Terzaghi's theory and assume local shear failure. Take γ= 18kN/m2.and Ø=25 deg., Nc= 14.8, Nq= 5.6 and Nγ= 3.2.</td></tr>
<tr><td>Q-26</td><td>Estimate the immediate settlement of a concrete footing 1m x 2m size founded at the depth 1m in soil with E= 10^4 kN/m^2 & μ = 0.3. the footing is subjected to a pressure of 200 kN/m^2. Assume the footing to be rigid. Take influence factor 0.85.</td></tr>
<tr><td>Q-27</td><td>A compressible layer is expected to have total settlement of 20 cm under a given loading. If settles by 4 cm at the end of 3 months after application of load increment? How many months will be required to reach a settlement of 8.5 cm? What is the settlement in 18 months? The layer has double drainage.</td></tr>
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<tr><td>Q-28</td><td>A settlement analysis carried out for a proposed structure indicates that 10 cm of settlement wil occur in 5 years and the final settlement will be 50 cm based on douvle drainage condition. A detailed site investigation indicateds that only singal drainage exits. Estimate the settlement at the end of 5 years for the changed condition. Use T= πU^2 /4.</td></tr>
<tr><td>Q-29</td><td>In a consolidation test the void ratio of the specimen which was 1.07 under the effective pressure of 220 kN/m^2, changed to .99 when the pressure was increasd to 440 kN/m^2, calculate the coefficient of compressibility, compression index, coefficient of volume compressibility. Find the settlement of foundation resting on above type of clay if thickness of layer is 10 m and the increase in pressure is 15 kN/m^2.</td></tr>
<tr><td>Q-30</td><td>A wall with a smooth vertical back , 10 m high, supports a purely cohesive soil with c=9.91 kN/m² and γ = 17.66 kN/m^3. Determine
(i) total Rankine's active pressure against the wall.
(ii) Position of zero pressure.
(iii) distance of the centre of pressure above the base.</td></tr>
<tr><td>Q-31</td><td>A 12 m high retaining wall with a smooth vertical back retains a mass of moist cohesionless sand with a horizontal surface. The sand weighs 15 kN/m^3 and has an angle of internal friction equal to 34°.
(i) Compute the total lateral earth pressure at rest, and its location.
(ii) If subsequently the water-table rises to the ground surface, determine the increase in earth pressure at rest. Assume K_R =0.5.</td></tr>
<tr><td>Q-32</td><td>A triaxial test performed on a cohesive soil with a cell pressure Ps. Failure of the specimen occurred under total pressure of 40 kN/cm^2. With same soil, direct shear test was also done. Shearing force at failure were 460N and 340N under normal loads of 1000N and 500N respectively. The sectional area shear box was 36cm^2. Find the cell pressure Ps at failure.</td></tr>
<tr><td>Q-33</td><td>What is active and passive earth pressure? Derive the formula Ka.</td></tr>
<tr><td>Q-34</td><td>A retaining wall 8m high retains sand with Ø=30 deg, and unit weight 24 kN/m^3 up to a depth of 4m from the top. From 4m to 8m, the material is a cohesive soil with C= 20 kN/m^2 and Ø=20 deg. Unit weight of cohesive soil is 18 kN/m^3. A uniform surcharge of 100 kN/m^2 acts on the top of soil. Determine the total lateral pressure acting on the wall and its point of application.</td></tr>
<tr><td>Q-35</td><td>Following are the results of undrained triaxial compression test on two identical soil specimen at failure:
<table>
<tr><td>Lateral pressure σ3(kN/m^2)</td><td>120</td><td>320</td></tr>
<tr><td>Total vertical pressureσ1(kN/m^2)</td><td>460</td><td>780</td></tr>
<tr><td>Pore water pressure u(kN/m^2)</td><td>-25</td><td>60</td></tr>
</table>
Determine the cohesion and angle of shearing resistance
(1.) referred to total stress
(2.) referred to effective stress.</td></tr>
<tr><td>Q-36</td><td>9m high non cohesive backfill retained by a counterfort retaining wall 0.81 and 30 deg are the void ratio and angle of internal friction value respectively in loose state and 0.46 and 36 deg in the dense state. Calculate and compare active and passive earth pressure in both cases taking G=2.67.</td></tr>
<tr><td>Q-38</td><td>A canal is excavated to a depth of 6 m below ground level through a soil having the following characteristics. C= 15 kN/m^2, Ø'=16 deg, E = 0.82, G= 2-.7. the slope of the banks is 1:1. Calculate the factor of safety with respect to cohesion when canal runs full. If it is suddenly and completely emptied , what will be the factor if safety?</td></tr>
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Q-39	Compute the active earth pressure at a depth of 4.5 m in a sand whose angle of friction is 37° and density of 1.56 gm/cc in dry state. Also compute the active earth pressure if the water-table is located at a depth of 1.5 m below the ground surface. Assume submerged density of soil as 0.985 gm/cc.
Q-40	A vertical wall 5.0 m high, above the water-table, retains a 20° soil slope. The retained soil has a unit weight of 18 kN/m^3, and its shear strength parameters are c=0 and Φ =40°. Compute the total active thrust on the wall, and directions of the two set of failure planes relative to the horizontal. Use graphical method. Check the thrust amount by analytical method.