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| **20CE405**  **Hall Ticket Number:**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |      |  |  |  | | --- | --- | --- | | **II/IV B.Tech (Regular) DEGREE EXAMINATION** | | | | **August, 2022** | **Civil Engineering** | | | **Fourth Semester** | **Soil Mechanics** | | | **Time: Three Hours** | | **Maximum:70 Marks** | |  |
| |  |  | | --- | --- | | ***Answer question 1 compulsory.*** | **(14X1 = 14 Marks)** | | ***Answer one question from each unit.*** | **(4X14=56 Marks)** | |  |

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| 1. | a) | What is meant by weathering? | CO1 |  |
|  | b) | Define consistency index. | CO1 |  |
|  | c) | How many groups of soils ate there in Indian Standard Classification System. | CO1 |  |
|  | d) | State Darcy’s Law. | CO2 |  |
|  | e) | Define permeability of a soil mass. | CO2 |  |
|  | f) | What is the role of effective stress in soil mechanics? | CO2 |  |
|  | g) | Write any three clay minerals. | CO2 |  |
|  | h) | What are the assumptions made in Boussinesq theory for stress distribution in soils? | CO3 |  |
|  | i) | What is importance of Newmarks influence chart | CO3 |  |
|  | j) | Draw Sample compaction curve. | CO3 |  |
|  | k) | Differentiate between primary consolidation and secondary consolidation. | CO4 |  |
|  | l) | Differentiate between consolidation and compaction. | CO4 |  |
|  | m) | How soils attain their shear strength | CO4 |  |
|  | n) | Name different laboratory shear tests on soils? | CO4 |  |
| **Unit –I** | | | | |
| 2. | a) | Derive a relationship between water content, void ration, degree of saturation and specific gravity of soil solids. | CO1 | 7M |
|  | b) | In a field exploration, a soil sample was collected in a sampling tube of internal diameter 5.0 cm below the ground water table. The length of the extracted sample was 10.2 cm and its mass was 387 g. If G = 2.7, and the mass of the dried sample is 313 g. Find the porosity, void ratio, degree of saturation, and the dry density of the sample. | CO1 | 7M |
| **(OR)** | | | | |
| 3. | a) | A Sieve analysis test is conducted on a soil sample weighing 500 g. The results are given below.    Plot the grain size analysis curve and compute Cu and Cc and classify the soil. | CO1 | 7M |
|  | b) | What is plasticity chart? Explain its use in soil classification. | CO1 | 7M |
| **Unit –II** | | | | |
| 4. | a) | Explain Flow nets, their characteristics and uses. | CO2 | 7M |
|  | b) | A vertical sheet pile penetrates 8 m into a uniform sand stratum, 15 m thick, overlying an impervious layer. It retains water for 6 m above G.L. Draw the flow net and determine the seepage under the pile. Take K = 4 x 10-2 m/sec. | CO2 | 7M |
| **(OR)** | | | | |
| 5. | a) | What is quick sand? Derive an expression for critical hydraulic gradient. Why is quick sand condition more common in sandy soils? | CO2 | 7M |
|  | b) | A falling head test was performed on a soil specimen having a diameter of 100 mm and height 120 mm. The stand pipe had a diameter of 12 mm and the water level in it dropped from 550 mm to 410 mm in 2 hours. Determine the time required for the water level in the stand pipe to come down to 200 mm. Also determine the height of water level in the stand pipe after a period of 24 hours from the beginning of the test. | CO2 | 7M |
| **Unit –III** | | | | |
| 6. | a) | A point load of 1000kN is applied at the ground level. Calculate the vertical stress below the point of application of the load at a depth of 5meters and also calculate the stress at the same depth but at a radial distance of 6 meters. Adopt Boussinesq’s approach | CO3 | 7M |
|  | b) | Explain Newmark’s influence chart preparation and usage. | CO3 | 7M |
| **P.T.O**    **20CE405**  **(OR)** | | | | |
| 7. | a) | Explain the difference between IS light and heavy compactions. | CO3 | 7M |
|  | b) | Explain about various factors those affect compaction? | CO3 | 7M |
| **Unit –IV** | | | | |
| 8. | a) | Obtain the differential equation defining the one-dimensional consolidation as given by Terzaghi. | CO4 | 7M |
|  | b) | Representative sample of a layer of Silty Clay,5m thick,were tested in a consolidometer and the following results were obtained  Initial Void Ratio e0=0.90,Preconsolidation pressure σc =120kN/m2,Recompression Index Cr=0.03,Compression Index Cc=0.27.Estimate the consolidation settlement if the present average over burden stress of the layer σ0 is 70kN/m2 and the increase in average stress in the layer is 80kN/m2. | CO4 | 7M |
| **(OR)** | | | | |
| 9. | a) | Explain different drainage conditions for shear testing of soils. | CO4 | 7M |
|  | b) | An unconfined compression test was conducted on an undisturbed sample of clay .The sample had a diameter of 37.5mm and was 80mm long. The load at failure measured by the Proving ring was 28N and the axial deformation of the sample at failure was 13mm.Determine the Unconfined compressive strength and the undrained shear strength of the clay. | CO4 | 7M |

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