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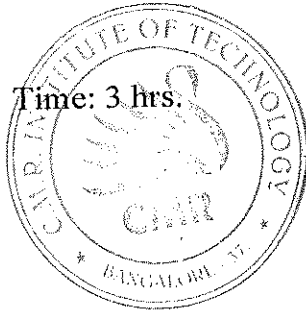
Sixth Semester B.E. Degree Examination, June/July 2016
Geotechnical Engineering – II

Time: 3 hrs.   Max. Marks: 100

Note: *1. Answer any FIVE full questions,*
selecting atleast two questions from each part.
2. Assume missing data, if any, suitably.

PART – A

1   a.   Describe standard penetration test as per IS:2131 guidelines. How to apply corrections to observed SPT-values?   (10 Marks)

   b.   Estimate the grand water table, given the following data. Depth upto which water is boiled out 18 meters. Water rise on I^{st} day = 0.95m, IIday = 0.86m and III day = 0.78m. Use Hvorselev's method.   (10 Marks)

2   a.   Explain equivalent point load method of determining σ_2 – at any point with in loaded area.   (08 Marks)

   b.   Point loads 64kN, 15kN and 21kN, 1.5m apart in a straight line at the surface of soil mass. Calculate the resultant stress produced by these loads on a horizontal plane one meter below the surface at points vertically below the loads and also half way (mid point) between them.

   The vertical pressure σ_z du to point load Q is given by Boussinesq's equation $\sigma_2 = \dfrac{Q}{z^2} \cdot I_B$.

   The value of I_B are as follows:

r/z	0	0.75	1.5	2.25	3.0
I_B	0.4775	0.1565	0.0251	0.053	0.0015

   Sketch the curve showing distribution of these resultant stresses at that level.   (12 Marks)

3   a.   Explain with a neat sketch a method of locating the phreatic line in a homogeneous earth dam with horizontal filter.   (10 Marks)

   b.   List the applications of flow net. Discuss about the validate of Darcy's law in determining quantity of seepage.   (08 Marks)

   c.   An earthen dam is built on a impervious foundation with a horizontal filter under the downstream slope. The horizontal and vertical permeability of the soil material in the dam are respectively 4×10^{-5} m/sec and 1×10^{-5} m/sec. Full reservoir level is 20 meters above downstream filter. Flow net consists of 4 flow channels and 15 equipotential drops. Estimate seepage loss per meter length of the dam.   (02 Marks)

4   a.   Distinguish between Coulomb's earth pressure theory and Rankine's earth pressure theory.   (04 Marks)

   b.   Describe Rebhann's graphical method of finding active earth pressure on a retaining wall.   (16 Marks)

PART – B

5   a. Obtain an expression for factor against sliding in C-ϕ soil by the method of slices. Explain determination of factor of safety by method of slices method.   **(14 Marks)**

     b. An embankment is inclined at an angle 38° and its height is 20 meters. The angle of shearing resistance is 15° and the cohesion intercept is 50 kN/m². The unit weight of soil is 16.5 kN/m³. Find the factor of safety with respect to cohesion. Consider Taylor's stability number = 0.08.   **(06 Marks)**

6   a. List the assumptions of Terzaghi's bearing capacity equation.   **(08 Marks)**

     b. Calculate the ultimate bearing capacity of a 2 meter wide square footing resting on a ground surface of a sand deposit with the following properties: i) Unit weight is 18.6 kN/m³; ii) Angle of internal friction = 38°. Also calculate ultimate bearing capacity of same footing when the footing is placed at depth of 1m below the ground surface. Take N_q = 41.4, N_r = 42.2 for ϕ = 38°. Adopt Terzaghi's equation. Also calculate percentage increase in bearing capacity with increase in depth from surface to 1 meter from natural ground level.   **(12 Marks)**

7   a. Discuss about the components of settlement.   **(08 Marks)**

     b. The soft normally consolidated clay layer is 18 meter thick. The natural water content is 45%. The saturated unit weight is 18 kN/m³. The grain specific gravity is 2.70 and the liquid limit = 63%. The vertical stress increment at the centre of the layer due to the foundation load is 9kN/m². The ground water level is at the surface of the clay layer. Determine the consolidation settlement of the foundation.   **(12 Marks)**

8   a. List and explain the classification of pile foundation base on function and material.   **(14 Marks)**

     b. Discuss about the factors governing minimum depth of foundation as per IS:1904 guidelines.   **(06 Marks)**

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