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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 Ist day = 0.95m, II day = 0.86m and III day = 0.78m. Use Hvorslev's method. (10 Marks)

- 2 a. Explain equivalent point load method of determining σ_z – 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 $\sigma_z = \frac{Q}{z^2} \cdot I_B$.

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)

Important Note : 1. On completing your answers, carefully draw diagonal cross lines on the remaining blank page.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

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/m^2 . The unit weight of soil is 16.5 kN/m^3 . 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/m^3 ; 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 $\phi = 38^\circ$. 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 1.8 meter thick. The natural water content is 45%. The saturated unit weight is 18 kN/m^3 . 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 9 kN/m^2 . 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)
