Code: 9A01703 **R09**

B.Tech IV Year I Semester (R09) Regular & Supplementary Examinations December 2015

GEOTECHNICAL ENGINEERING - II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) What is the necessity of soil exploration for any civil engineering project?
(b) Explain with a neat sketch the standard penetration test.
(c) What is the number and depth of boreholes required for the following:
(i) For a commercial complex in 100 m x 80 m site. (ii) For a 4-lane highway.

2 (a) What are the causes of failure of finite slopes in an earth-quake proof region?
(b) An embankment is 6 m high with side slopes of 1.5H:1V is constructed with a soil having $\gamma = 16\ kN/m^3, C = 18\ kN/m^2\ and\ \phi = 25°$. The critical slip circle passes through the toe of the slope and its centre lies 4 m vertically above the top edge of the slope. Calculate the factor of safety against slope failure.

3 (a) Explain with a neat sketch the Rebhann's graphical method to determine the total active earth pressure acting on a retaining wall with a sloping back surface which is rough.
(b) Calculate the total active earth pressure acting on a 6.4 m high retaining wall with a vertical and smooth back surface, using Rankine's theory. The backfill soil has $\gamma = 16\ kN/m^3$ and $\phi = 25°$ for the bottom 2.4 m, above which is another soil with$\gamma = 17\ kN/m^3, C = 10\ kN/m^2\ and\ \phi = 6°$.

4 (a) List the various types of retaining walls. Which type is used for basement constructions in multi-storied buildings?
(b) Check the stability of a gravity retaining wall of 9 m height with water up to 6 m in front and compacted soil on the back up to a height of 8 m. The backfill has $\gamma = 18\ kN/m^3$, $C = 0\ and\ \phi = 35°$. The retaining wall has a base width of 4 m and top width of 0.5 m. The back of wall is vertical and smooth.

5 (a) What are the various types of shallow foundations? Explain briefly, when you use each one.
(b) Design a square footing for a column carrying 1600 kN. The soil in the site has C = 20 kPa, $\phi = 0°$, $\gamma = 17\ kN/m^3$. Assume the depth of foundation as 1.5 m and factor of safety as 2.5.

6 (a) What are the corrections to be applied to the N-value obtained from the field before it is used for estimating the SBC of a soil? Explain briefly with the formulae used and their limits.
(b) Calculate the allowable bearing pressure on a square footing of sides 2 m which is at a depth of 1.5 m below ground level. The field N-value at 1.5 m depth is 14. Use a factor of safety = 2 against shear failure and a permissible settlement of 40 mm.

7 (a) With a neat sketch, explain briefly the static pile load test.
(b) Calculate the safe load that can be supported by a pile 400 mm in diameter, 10 m in length driven into a soil which has C = 70 kPa, $\phi = 0°$, $\gamma = 15\ kN/m^3$ and $\alpha = 0.7$. Use F = 3 for end bearing & 2.5 for skin friction.

8 (a) Draw a neat sketch & name the various elements/parts of a well foundation.
(b) In what circumstances do you use well foundations? What are the problems encountered while sinking a well?
(c) How do you calculate the bearing capacity of a well foundation in sands?

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