

R09

Code: 9A01803

B.Tech IV Year II Semester (R09) Advanced Supplementary Examinations, July 2013

ADVANCED FOUNDATION ENGINEERING

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Differentiate between local shear failure and general shear failure with neat sketches.
(b) Design a square footing for a load of 1200 kN, with a factor of safety = 2, at a depth of 1.5 m below GL in a soil whose properties are $C = 10$ KPa, $\phi = 30^\circ$, $\gamma = 17$ kN/m³. Water table is at a depth of 2 m below GL. Use Terzaghi's equation.
- 2 (a) Calculate the safety of a rectangular footing 1.5 m × 2 m which has to support a load of 800 kN and a moment of 80 kN-m in 2 m direction. Depth of footing is 1.2 m in a clayey soil with $C = 30$ KPa, $\phi = 10^\circ$, $\gamma = 16$ kN/m³, $F = 2.5$.
(b) Calculate the S.B.C. of a circular footing of 1.5 m diameter at a depth of 1 m below GL. The soil profile has 1.5 m top soil layer with $C = 12$ KPa, $\phi = 0^\circ$, $\gamma = 16$ kN/m³, underlain by 2 m deep soil has $C = 5$ KPa, $\phi = 20^\circ$, $\gamma = 17$ kN/m³.
- 3 Design a combined footing using M20 concrete and Fe 415 steel for two columns:
(i) 300 × 250 carrying a load of 600 kN and
(ii) 400 × 250 column carrying a load of 800 kN. The columns are 3.5 m centre-to-centre. The allowable bearing pressure of soil is 140 KPa.
- 4 (a) With a neat sketch, explain briefly the static pile load test.
(b) Calculate the safe load that can be supported by a pile 300 mm diameter, 9 m long in a soil which has $C = 10$ KPa, $\phi = 20^\circ$, $\gamma = 14$ kN/m³. Use $F = 3$ for end bearing and 2.5 for skin friction.
- 5 (a) Write a neat sketch and name the various elements of a well foundation.
(b) What are the various forces to be considered while designing a well foundation?

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- 6 (a) In what circumstances do you use sheet pile walls?
(b) Determine the depth of embedment required for a sheet pile wall to support a backfill of 6 m height above the dredge line. Water table is at 3 m above dredge line and the backfill has $C = 0$, $\phi = 30^\circ$, $\gamma_d = 15 \text{ kN/m}^3$, $\gamma_{sat} = 19 \text{ kN/m}^3$. The soil below the dredge line has $C = 20 \text{ KPa}$, $\phi = 0^\circ$, $\gamma = 17 \text{ kN/m}^3$.
- 7 (a) What are the problems faced in foundations on black cotton soils?
(b) What is lime column technique? Explain briefly.
- 8 (a) Explain with a neat sketch the basic elements of an under-reamed pile with two bulbs.
(b) Calculate the safe load that can be supported by an under-reamed pile of 400 mm stem diameter and 4.5 m long in a clay soil which has $C = 20 \text{ KPa}$, $\phi = 0^\circ$, $\gamma = 15 \text{ kN/m}^3$. Use $\alpha = 0.5$ and $F = 2.5$.
