



Printed Pages : 4

CE – 022

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0033

Roll No.

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B. Tech.

(SEM. VIII) EXAMINATION, 2006-07

ADVANCED FOUNDATION DESIGN

Time : 3 Hours]

[Total Marks : 100

- Note :*
- (1) Attempt *all* questions.
 - (2) All questions carry *equal* marks.
 - (3) Assume *data* suitably.

1 Attempt any **two** parts of the following : **10×2=20**

- (a) How many types of foundation settlements you know? Compute the immediate settlement below the centre of a 5 m × 5m flexible footing resting at 0.5m depth and applying a stress of 100 kN/m² on the following soil deposits.
 - (i) Unsaturated clay of high plasticity with an average undrained strength of 150 kN/m² for a depth range of 0-25 below ground surface.
- (b) Explain Terzaghi's theory of failure of shallow foundations. On what factors does the bearing capacity depends.

- (c) A square footing located at a depth of 1.5m below the ground surface in cohesionless soil carries a column load of 1280 kN. The soil is submerged having effective unit wt. of 11.5 kN/m^3 and an angle of shearing resistances of 28° . Find the size of footing for factors of safety 3. Use general shear failure theory of Terzaghi.

2 Attempt any **two** parts of the following : **10×2=20**

- (a) Which parameters are determined during pile load test and what is their utility? Explain how load carrying capacity is found from the test.
- (b) Compute the pile group capacity of 16 pile group in square arrangement made up of 15m long piles of 600mm dia in soft clay having an average undrained strength of 50 kN/m^2 if the c/c. pile spacing is
- 2 times the pile dia
 - 3 times the pile dia.
- (c) A pile not resting on rock derives 60% of its ultimate axial capacity from skin friction and the balance 40% from end bearing. If a safe load of 33% of ultimate capacity is applied to the pile. Will it be resisted by skin friction or end bearing. Discuss - why?

3 Attempt any **one** part of the following : **20×1=20**

- (a) A foundation is to be constructed using 20 piles arranged in 5 columns at distance of 90 cm c/c. The dia and length of piles are 30 cms and 9 m respectively. The bottom of cap is located at depth of 2.0 m from ground wt is al. 4m depth. The properties of soil are given as :

Depth	Soil parameter
From	To
0	2 Silt saturated, $\gamma = 16 \text{ kN/m}^3$
2	4 Clay saturated, $\gamma = 19.2 \text{ kN/m}^3$
4	12 Clay saturated, $\gamma = 19.2 \text{ kN/m}^3$, $q_4 = 120 \text{ kN/m}^3$ $e_0 = 0.80, c_c = .23$

12 Rocky Strate

Complete the consolidation settlement of the total load, imposed on foundation is 2000 kN.

- (b) A concrete pile of 40 cm dia is required to be driven into homogenous mass of cohesionless soil. The pile is required to carry a safe load of 650 kN. The state lone penetrates test conducted at site indicate average value of $q_c = 40 \text{ kg/cm}^2$ along pile and 120 kg/cm below the tip level of the pile. Compute the length of pile with $F_c = 2.5$.

4 Attempt any **four** parts of the following : **5×4=20**

- (a) Explain various types of caissons and their suitability for various types of structures.
- (b) Derive the equation for determination of ultimate bearing capacity of using Terzghi theory.
- (c) Explain the terms :
- Well curb
 - Cutting edge
 - Steining Types
 - Bottom Plug
 - Well Sinking.
- (d) Name the parameters designed in analysis of well foundation.

- (e) How the thickness of sleining is decreased. ?
Give these parameters.
- (f) What are the prevention taken to avoid tilt in well foundation ?

5 Attempt any **four** parts of the following : **5×4=20**

- (a) What is difference between a bulkhead and cofferdam
 - (b) Write notes on different types of cofferdams with their suitability in different situations.
 - (c) Discuss soil pressure in braced coffer dam.
 - (d) An anchored sheet pile is to support a mass of cohesionless soil upto ht of 6m above G.L. with horizontal anchors spaced at 1m intervals and located at 1.0 m below ground surface. If the unit wt. of soil is 21 kN/m^3 and angle of internal friction is 28° , determine minimum depth of embedment of sheet pile for stability.
 - (e) Explain the difference between diaphragm and circular type of cofferdam with sketch.
 - (f) What are parameters for designing of cellular coffer dams.
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