



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (CE-NEW)/SEM-8/CE-801/4/2011

2011

ADVANCED FOUNDATION ENGINEERING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

$$10 \times 1 = 10$$

i) The value of passive earth pressure per unit length against a retaining height of 3m with backfill of unit weight 1.8 t/m^3 and angle of internal friction 30° will be

- a) 21.2 t/m
- b) 22.8 t/m
- c) 24.3 t/m
- d) 26.5 t/m .

- 2



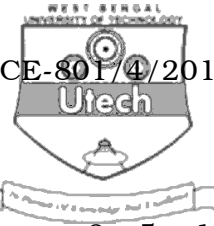
- v) A plate load test was conducted in sand on a 300 mm dia plate. If the plate settlement was 5 mm at a pressure of 100 kPa, the settlement (in mm) of a 5 m \times 8 m rectangular footing at the same pressure will be
- a) 9.4 mm b) 18.6 mm
- c) 12.7 mm d) 17.8 mm.
- vi) The maximum depth of a pneumatic Caisson is usually limited to
- a) 10 m b) 20 m
- c) 40 m d) 80 m.
- vii) The adhesion factor for drilled piers on clay is usually taken as
- a) 0.40 b) 0.60
- c) 0.80 d) 1.0.
- viii) The co-efficient of sub-grade reaction depends upon
- a) the shape of footing
- b) the size of footing
- c) the depth of footing
- d) all of these.



ix) For convention design of a rigid combined footing λL should be

- a) less than 0.6
 - b) more than 3.0
 - c) between 0.3 & 0.6
 - d) none of these.
- x) The allowable bearing capacity at allowable settlement of 25 mm for a footing is 15 t/m^2 . The allowable bearing capacity for the same footing permitting a settlement of 40 mm is
- a) 24 t/m^2
 - b) 30 t/m^2
 - c) 35 t/m^2
 - d) 40 t/m^2 .
- xi) A Cast in situ bored pile of 0.5 m dia and 10 m deep is placed in a purely cohesive soil. If cohesion of the soil is 6 t/m^2 and adhesion between the pile and the soil is half value of cohesion, the ultimate bearing capacity of pile is

- a) $56 \pi/8$
- b) $127 \pi/8$
- c) $133 \pi/8$
- d) $107 \pi/8$.



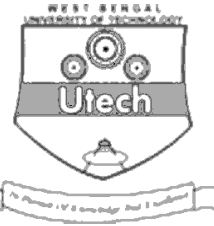
GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. Write short notes on any *one* of the following:
 - a) Geo-physical exploration of soil.
 - b) Planning of soil exploration programme.
3. Derive the formula for load carrying capacity of open caisson.
4. What are the remedial measures for construction of a foundation on problematic soil ?
5. Describe different types of sheet piles. Draw the sketches showing the pressure distribution types.
6. A footing of size 4·3 m × 4·5 m is to be constructed at a site at a depth of 3·0 m below the ground surface. The water table is at the base of the foundation. The average static cone penetration resistance obtained at one site is 25 kg/m². The soil is cohesive. Determine the safe bearing capacity of for settlement of 35 mm.

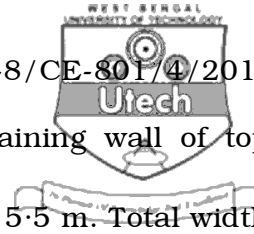


GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) Describe the methods for analyzing the beams on elastic foundation.
- b) Define Infinite beam and Finite beam.
- c) Mention the parameters that affect the design of beams on elastic foundation. $5 + 5 + 5$
8. a) Describe different types of raft foundation.
- b) Discuss on the types of loading and the selection of raft foundation.
- c) A raft ($20 \text{ m} \times 10 \text{ m}$) exerts a gross pressure of 200 kN/m^2 at foundation level. The depth of foundation is 3.0 m . If the soil is clay ($\theta' = 0$, $C_n = 90 \text{ kN/m}^2$, $\gamma = 18.5 \text{ kN/m}^3$), determine factor of safety. The raft is for basement. Use suitable equation.
9. Determine the required depth of penetration for the cantilever sheet pile below dredged level. The height of sheet pile above dredge level is 4.5 m . The backfill is granular soil ($\gamma = 15 \text{ kN/m}^3$, $\theta' = 36^\circ$). Draw neat sketch of sheet pile for analysis and pressure diagram correctly.



10. Check the stability of the cantilever retaining wall of top width 0.4 m, base width 0.6 m and height 5.5 m. Total width of footing of retaining wall is 3.5 m, which are combination of toe, base retaining wall and heel of retaining wall (0.6 m + 0.6 m + 2.3 m). The thickness of footing is 0.6 m and foundation is below 1.0 m from G. L. with top of footing below G. L. 0.4 m. The backfill ($\gamma = 18 \text{ kN/m}^3$, $\theta' = 35^\circ$, $\delta = 30^\circ$, $i = 20^\circ$) is sloped at an angle of 20° . The allowable soil pressure is 600 kN/m^2 .

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