



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Illustrate your answers whenever necessary with the help of neat sketches.
  11. Use of non programmable calculator is permitted.

1. a) Explain methods of boring? 6
- b) Explain types of soil samples and samplers. 7

**OR**

2. a) The following dimensions are given for a shelly tube sampler:- 6  
 External diameter = 55 mm  
 Internal diameter = 51 mm.  
 Determine the area ratio.
- b) Explain any one geophysical method. 7
3. a) Explain different types of slope failures. 6
- b) A infinite slope is having following details: Saturated unit weight =  $18 \text{ kN/m}^3$ ,  $C' = 10 \text{ kN/m}^2$ ,  $\phi = 22^\circ$ , height of slope = 7m, slope angle =  $15^\circ$ . If the water table is located at ground surfaces & assuming that there is a seepage through the soil, find the factor of safety of the slope. 8

**OR**

4. a) Explain friction circle method. 7
- b) Explain in detail about method of improving stability of slopes. 7
5. a) State the assumptions made in Rankine's earths pressure theory. 6
- b) A retaining wall 5m high with vertical back supports a backfill with a horizontal surface. 7  
 The unit weight of soil is  $19 \text{ kN/m}^3$  & angle of internal friction is  $30^\circ$ . The angle of wall friction is  $18^\circ$ . A footing running parallel to the retaining wall & carrying a load of  $18 \text{ kN/m}$ , is to be constructed. Find the safe distance of the footing from the face of wall.

**OR**

6. a) Explain in brief: 6  
1) Earth at rest;  
2) Active  
3) Passive earth pressure.
- b) Using Rebhann's method, determine the total active earth pressure on the wall with 7  
following data: 1) Ht. of wall = 7m, inclination of wall with vertical = 5°, Inclination of  
backfill slope with horizontal = 10°, Angle of wall friction = 20°, unit wt. of backfill =  
18kN/m<sup>3</sup>, Angle of shearing resistance = 30°, Cohesion = 0.

7. a) Write short notes on soil Improvement. Explain applications of geosynthetic material for 7  
soil Improvement.
- b) Write short note on Reinforced Earth. 6

**OR**

8. a) Write short note on VIBROFLOATATION. 6
- b) Explain characteristics of geosynthetics in geotechnical construction. 7
9. a) Explain the effect of ground water table on bearing capacity. 6
- b) Determine the depth at which a circular footing of 2m diameter be founded to provide a 7  
factor of safety of 3, if it has to carry a safe load of 1500 kN. The foundation soil has  
 $C = 10 \text{ kN/m}^2$ ,  $\phi = 30^\circ$ ,  $\gamma = 18 \text{ kN/m}^3$ . Use Terzaghi's analysis for  $\phi = 30^\circ$ , bearing  
capacity factors are  $N_c = 37.2$ ,  $N_q = 22.5$ ,  $N_\gamma = 19.7$

**OR**

10. a) State assumptions of Terzaghi's bearing capacity. 6
- b) Explain Plate load test with its limitations. 7
11. a) Explain how piles are classified. 7
- b) Explain group actions in piles. 7

**OR**

12. a) Explain negative skin friction. 7
- b) A square group of 9 piles was driven into soft clay extending to a large depth. The 7  
diameter & length of the piles were 300 mm & 9m respectively. If unconfined  
compressive strength of the clay is 90 kN/m<sup>2</sup> & the spacing is 900 mm c/c, what is the  
capacity of the group? Assume  $f_{os}$  is equal to 2.5 and adhesion factor is equal to 0.75.

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