

B TECH DEGREE EXAMINATION – SIXTH SEMESTER

MODEL QUESTION PAPER

CE010 602: GEOTECHNICAL ENGINEERING II

(Regular-New Scheme)

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **all** questions

1. How will you decide up on the number of borings for a site exploration.
2. Define K_p and K_a .
3. What is meant by vibroflotation?
4. Discuss various types of loads that are to be considered in the design of foundations.
5. What is meant by compensating raft?.

(5 × 3 = 15 marks)

Part B

Answer **all** questions

6. A concentrated load of 2000kN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress by Boussinesq's approach at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load.
7. List applications of sheet piles.
8. Explain the influence of water table on the bearing capacity.
9. How will you proportion footing for equal settlement.
10. Explain negative skin friction.

(5 × 5 = 25 marks)

Part C

11. A) Explain the various geophysical methods of soil exploration and mention their limitations and uses. (6 marks)

B) What is meant by pressure bulb? (6 marks)

Or

12.A) What are the corrections to be applied for N value? In what circumstances are these corrections required. (6 marks)

B) Derive the expression for stress at any depth due to uniformly loaded circular area.

(6 marks)

13.A) Explain Culmann's graphical method. (5 marks)

B) A retaining wall is 7m high, with its back face smooth and vertical. It retains sand with its surface horizontal using Rankine's theory, determine active earth pressure at the base when the back fill is a) dry. (b) saturated (c) submerged with water table at surface. Take $\gamma = 18 \text{ kN/m}^3$, $\phi = 30^\circ$, $\gamma_{\text{sat}} = 21 \text{ kN/m}^3$. (7 marks)

Or

14. A) Describe Coulomb's wedge theory. Explain how maximum active pressure is determined. (6 marks)

B) A wall with a smooth vertical back 6m high retains a mass of purely cohesive soil. Cohesion of soil is 20 kN/m^2 and unit weight is 15 kN/m^3 . What is the total Rankine's active earth pressure against the wall. Also determine depth at which the pressure is zero and centre of pressure. (6 marks)

15. A) Describe the Terzaghi's equation of bearing capacity, indicating its assumptions and concept. (4 marks)

B) A footing 2m square is laid at a depth of 1.3m below the ground surface. Determine the safe bearing capacity assuming a factor of safety of 3. Take $\gamma = 20 \text{ kN/m}^3$, $\phi = 30^\circ$, $c = 0$, $N_c = 70$, $N_q = 73.33$ and $N_\gamma = 88.8$ (8 marks)

Or

16. Two plate load tests at a site gave the following results:

Size of plate(m)	Load(KN)	Settlement (mm)
0.3 X 0.3	40	25
0.6 x 0.6	40	15

a) Assuming Poisson's ratio and taking Influence factor as 1.12, find the deformation modulus of soil.

b) If there are two columns, one of the size 2.5 x 2.5 m, carrying a load of 3000 KN and the other of size 3 x 3m, carrying a load of 3800KN, Determine the differential settlement when the columns are placed at 7m apart. (12 marks)

17. A) Discuss the design procedure for combined rectangular footing. (8marks).

B) What are the different types of mat foundation? (4 marks)

Or

18. Design a trapezoidal combined footing for two columns 0.2 x 0.2 m carrying loads of 0.8MN and 0.60MN. If the spacing between column is 4m and allowable soil pressure is 250 KN/m² and length of footing is 5m. (12 marks).

19. A concrete pile 30 cm diameter is driven into a medium dense sand for a depth of 10m. Assume $\gamma = 21 \text{ kN/m}^3$, $\phi = 35^\circ$, $k = 1.0$ and $\tan\delta = 0.70$. Estimate the safe load taking a factor of safety of 2.50. Also determine the safe load for pile, if water table rises to 2m below the ground surface. Take $\gamma_w = 10 \text{ KN/m}^3$. (12 marks)

Or

20. A) Describe in detail Pneumatic Caissons (5 marks)

B) Determine the outside diameter of an open caisson to be sunk through 50m of sand and water to bed rock if allowable bearing capacity is 2500KN/m². The caisson receives a load of 60MN from superstructure. The mantle friction is 30KN/m². Test the feasibility of sinking and also find the thickness of seal. (7 marks)

(5 × 12 = 60 marks)