Reg. No.															

Question Paper Code	13917

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fifth Semester

Civil Engineering

20CEPC501 - FOUNDATION ENGINEERING

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	The minimum depth for all foundations below the natural ground level is (a) 500mm (b) 1200mm (c) 250mm (d) 100mm	1	K1	CO1
2.	For undisturbed sampling the area ratio for a thin wall sampler should not normally exceeded (a) 10% (b) 25% (c) 30% (d) 35%	1	K1	CO1
3.	General shear failure is characterized with (a) Low strain before plastic failure (b) Soil behaves like an ideally plastic material (c) Occurs in stiff soils (d) All the above	1	K1	CO2
4.	If the water table rises to the ground level of a footing resting on cohesionless soils, the bearing capacity approximately (a) Reduces to half (b) Reduced to one third (c) Remains same (d) None of the above	1	K1	CO2
5.	The allowable soil pressure for foundations in cohesive soils is generally controlled by (a) Settlements (b) Bearing capacity (c) Both (a) and (b) (d) Neither (a) and (b)	1	K1	CO3
6.	The permissible settlement is the maximum in the case of (a) Isolated footing on clay (b) Raft on clay (c) Isolated footing on sand (d) Raft on sand	1	K1	CO3
7.	The foundation that is used when the soil mass is sufficiently erratic? (a) Strap footing (b) Combined footing (c) Mat footing (d) Rectangular combined footing	1	K1	CO4
8.	Usually, rafts are designed as _____ (a) Reinforced slabs (b) Reinforced concrete flat slabs (c) Ordinary concrete slab (d) Inverted flat slabs	1	K1	CO4
9.	Dynamic formulae cannot be used to obtain carrying capacity in (a) Saturated sands (b) Saturated clays (c) Dry sands (d) Dry gravels	1	K1	CO5
10.	In passive case, the wall moves (a) Towards the back fill (b) Away from the back fill (c) No movement at all (d) Downwards	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Define area ratio.	2	K1	CO1
12.	What do you mean by soil exploration?	2	K1	CO1
13.	List out the factors, which will affect safe bearing capacity.	2	K1	CO2
14.	Compare General and Local shear failure.	2	K2	CO2
15.	Define settlement and its types.	2	K1	CO3
16.	What are the various causes of settlement?	2	K1	CO3
17.	Under what circumstances mat footing is adopted.	2	K1	CO4
18.	Furnish the situations under which trapezoidal combined footing will be recommended.	2	K1	CO4

19.		Define negative skin friction.	2	K1	CO5
20.		What is meant by under reamed pile?	2	K1	CO5
21.		Differentiate active and passive earth pressure.	2	K2	CO6
22.		If poisons ratio of soil is 0.4, find its coefficient of earth pressure at rest.	2	K2	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain various methods of soil exploration.	11	K2	CO1
		OR			
	b)	Discuss standard penetration method in detail with relative merits and demerits.	11	K2	CO1
24.	a)	A strip footing 2m wide carries a load intensity of 400 kN/m^2 at a depth of 1.2m in sand. The saturated unit weight of sand is 19.5 kN/m^3 and unit weight above water table is 19.8kN/m^3. The shear strength parameters are c = 0 and ϕ = 35˚. Determine the factor of safety with respect to shear failure for the following cases of location of water table. Determine the ultimate bearing capacity of the footing if the ground water table is located at the following conditions. Use Terzaghi Theory. (i) At a depth of 0.5m below the ground surface. (ii) At a depth of 0.5m below the base of the footing. (iii) At the base of the footing. (iv) At the ground level. Nc = 57.75 , Nq =41.44 , Nγ=45.41	11	K3	CO2
		OR			
	b)	A rectangular footing has a size of 1.8m × 3.0m has to transmit the load of a column at a depth of 1.5m. Calculate the safe load which the footing can carry at a factor of safety of 3 against shear failure. The soil has following properties: n = 40%; G =2.67; w = 15%; c = 8 kPa; φ' = 32.5°. Use IS code method. For φ = 32.5°, N_c = 38.13;N_q = 25.85 and N_γ = 35.21.	11	K3	CO2
25.	a)	What is differential settlement? What are the causes? Explain the remedial measures to be taken to minimize the differential settlement.	11	K2	CO3
		OR			
	b)	Explain in detail about Plate load tests and its limitations.	11	K2	CO3
26.	a)	Design a strap footing for the two columns 400mm × 400mm carrying loads of 600kN and 1000 kN, if the spacing between the columns is 6m. Take allowable soil pressure as 100 kN/m^2.	11	K3	CO4
		OR			
	b)	A combined footing is to support two columns 250mm × 250mm and 300mm × 300mm carrying loads of 300kN and 450 kN respectively. The columns are spaced at 4m c/c. The allowable bearing capacity of soil is 150 kPa. Find the plan dimensions of the footing, if (a) The first column alone is on the boundary line (b) Both the columns are on the boundary line.	11	K3	CO4
27.	a)	Design a square pile group to carry 600 kN in clay with an unconfined compressive strength of 60kN/m^2. The piles are 25cm diameter and 6.2m long. Adhesion may be taken as 0.6.	11	K3	CO5
		OR			
	b)	A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30cm and 9m respectively. If unconfined compression strength of the clay is 90KN/m^2, and the pile spacing is 90cm centre to centre. What is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor 0.75. Evaluate the efficiency of the pile group.	11	K3	CO5

28. a) Explain the Coulomb's wedge theory of earth pressure with a neat sketch. *11 K2 CO6*

OR

b) Explain the Culmann's graphical procedure for determining the lateral earth pressure with neat diagram. *11 K2 CO6*