Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree Regular and Supplementary Examination December 2022 (2019 Scheme)

Course Code: CET 305

Course Name: GEOTECHNICAL ENGINEERING - II

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

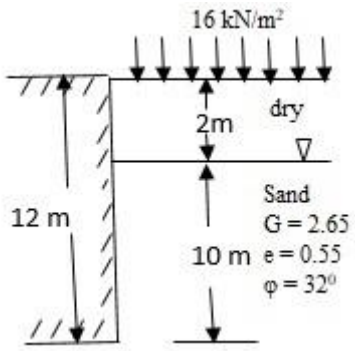
1	Define (i) active earth pressure, (ii) passive earth pressure and (iii) earth pressure at rest. Mention its equations	3
2	Mention any three selection criteria of type of foundation	3
3	Define (i) Gross pressure intensity (ii) Net ultimate bearing capacity (iii) Safe bearing capacity	3
4	Elucidate any three limitations in Terzaghi's analysis	3
5	Explain floating foundation	3
6	Define (i) allowable settlement (ii) total settlement (iii) differential settlement	3
7	What is negative skin friction?	3
8	Write an expression to determine dynamic pile capacity	3
9	Mention any three objectives of soil exploration	3
10	Differentiate disturbed sample and undisturbed sample	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	For an earth retaining structure shown in Figure, construct earth pressure diagram for active state and find the total thrust per unit length of the wall	10



b) With a neat sketch of well foundation mark the various components of well foundation 4

12 a) A smooth retaining wall 6m high retains dry granular backfill weighing 16kN/m^3 to its level surface. The active thrust on the fall is 96kN/m of wall. What will be the total active thrust if the water table comes upto backfill surface? Take specific gravity of backfill = 2.65 6

b) Explain raft foundation with neat sketch. At what conditions raft foundations are recommended? 4

c) Define depth of tension crack in cohesive soils and write an expression for its evaluation 4

Module -2

13 a) A square footing located at a depth of 1.3m below the ground has to carry a safe load of 800kN. Using Terzaghi's analysis, find the size of the footing if the desired factor of safety is 3. The soil has the following properties: e = 0.55, S = 50%, G=2.67, c= 8 kN/m^3, $\varphi = 30^0$ (N_c = 37.2, N_q = 22.5, N_γ =19.7) 8

b) Explain the effect of water table on bearing capacity of foundation if the water table is a) at the base of the footing, b) at a depth equal to width of the footing with equations and c) at intermediate position with equation. 6

14 a) Determine the ultimate net bearing capacity of the circular footing (diameter 2m and depth of footing is 1.5m) resting on a clayey soil (c_u = 48 kN/m^2, γ = 17.66 kN/m^3, N_c = 5.7). The initial water table level is at 3.5m from the base of the footing. Also, compute the change in ultimate net bearing capacity, if the entire region is flooded, due to which the ground water level reaches ground level. 8

b) Explain the type of shear failure can be expected for footings located at considerable depth, if the subsoil is of low compressibility? Draw the typical pressure versus settlement curve for the same condition 6

Module -3

15 a) Explain Plate load test with neat sketch. List the limitations of plate load test. 8

b) A footing 3m x 1.5m in plan transmits a pressure of 160 kN/m^2 on a cohesive soil having E = $8x10^4$ kN/m^2 and μ = 0.48. Determine the immediate settlement at the centre, assuming the footing to be (a) flexible (I_w = 1.52), and (b) rigid(I_w = 1.22). 6

16 a) Explain the method for estimating total settlement for shallow footing 8

	b)	A plate load test was conducted in a sandy soil with a plate of size 0.3m x 0.3m. The ultimate load per unit area was found to be 2.0 kg/cm^2. Find the allowable load for a footing of 2m x 2m, using a factor of safety of 3.	6

Module -4

17	a)	A group of 9 piles of 600mm diameter is arranged in a square pattern with centre to centre spacing of 1.2m. The piles are 10m long and are embedded in soft clay with cohesion of 30 kN/m^2. Adhesion factor is 0.6 and bearing resistance is neglected. Evaluate the ultimate load capacity of the pile group.	6
	b)	Briefly explain the classification of piles with neat sketches based on (i) its function and (ii) materials of construction	8
18	a)	A square pile group of 16 piles penetrates through a filled-up soil of 4m depth. The pile diameter is 250mm and pile spacing is 0.75m. The unit cohesion of the material is 20 kN/m^2 and the unit weight of soil is 15 kN/m^3. Evaluate the negative skin friction on the group. Take m = 0.3	6
	b)	Explain the procedure of pile load test to determine the load carrying capacity of pile	8

Module -5

19	a)	Explain Auger boring and wash boring methods used in soil exploration	6
	b)	Explain in detail the procedure for standard penetration test. How it is correlated with shear strength parameters? Mention its applications	8
20	a)	How the depth of exploration are decided as per the guide rules?	6
	b)	Explain (i) Seismic refraction method and (ii) Electrical Resistivity method. Mention its applications	8

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