2024
(MAY)

FOUNDATION ENGINEERING
Full Marks: 100
Time: Three hours
The figures in the margin indicate full marks for the questions.
*Answer **any five** questions.*

		Question body	Marks
1.	a)	State the assumptions of Boussinesq's equation. State and explain Boussinesq's equation for stress distribution	4+8=12
	b)	Define ground improvement technique and what are the objectives of ground improvement techniques? Write a note on a ground improvement technique used to improve cohesionless soil.	4+4=8
2	a)	Define caissons. Describe the various types of caissons	2+6=8
	b)	State the assumptions of Terzaghi's bearing capacity analysis. Draw a neat sketch to illustrate the failure pattern for general shear failure and evaluate the bearing capacity equation of a strip footing as visualized by Terzaghi	12
3	a)	Proportionate a pile group in a deposit of medium stiff clay (c_u= 75 kN/m^2 / adhesion factor = 0.8) to carry a load of 1000 kN. The unit weight of clay is 16 kN/m^3 and FOS= 2.5	10
	b)	Describe the types of soil samples. Write note about the various types of soil samplers	4+6=10
4	a)	Determine the safe load that can be carried by a square footing 2m X 2m placed at a depth of 1.5 m below GL. Foundation soils have the following properties γ=1.65 t/m^3, c = 1.4 t/m^2, FOS=3, $\emptyset$=20°, N_c=11.8, N_q =3.8 and N_γ' =1.3	10
	b)	Describe the pile load test with neat sketch	10
5		Write short note	5X4=20
	a)	Borehole logs	
	b)	Under reamed Piles	
	c)	Vibroflotation	
	d)	Efficiency of pile group	
6	a)	Determine the diameter of a circular footing to carry a concentric column load of 800 kN. The depth of the footing is 1.0 m. The soil is partly saturated and has c = 50 kPa and $\emptyset$= 10° and γ= 18 kN/m^3. For $\emptyset$= 10°, N_c =8.3, N_q= 2.5 , N_γ = 1.4. Use a factor of safety 3	15
	b)	Write difference between general shear failure and local shear failure.	5