Q. Code:983249

Reg. No. | | | | | | | | | | | | | |

B.E./ B. TECH. DEGREE EXAMINATIONS, MAY 2024

Fourth Semester

CE22403 – FOUNDATION ENGINEERING

(Civil Engineering)

(Regulation 2022)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Plan and execute a detailed site investigation to select geotechnical design parameters and type of foundation.	**3**
CO 2	Design shallow foundations, its component or process as per the needs and specifications.	**3**
CO 3	Design combined footings and raft foundations, its component or process as per the needs and specifications.	**3**
CO 4	Design deep foundations, its component or process as per the needs and specifications.	**3**
CO 5	Design retaining walls, its component or process as per the needs and specifications.	**3**

PART- A (20x2=40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What is meant by significant depth?	**1**	**2**
2.	What are the different factors to be considered for site investigation?	**1**	**2**
3.	What is meant by liquefaction?	**1**	**2**
4.	Differentiate disturbed and undisturbed soil sample.	**1**	**2**
5.	What is meant by “Net ultimate bearing capacity”?	**2**	**2**
6.	Why differential settlement occurs in the soil when it loaded?	**2**	**2**
7.	What are the different factors considered in IS code method to arrive the bearing capacity of soil?	**2**	**2**
8.	List the limitations of “Plate load test”.	**2**	**2**
9.	When the trapezoidal combined footing will be recommended?	**3**	**2**
10.	Differentiate “Strip footing” and “Strap footing”.	**3**	**2**
11.	What is meant by “Floating foundation”?	**3**	**2**
12.	At what circumstances mat foundation will be recommended? List the different types of mat foundation.	**3**	**2**
13.	What is meant by “Negative skin friction”?	**4**	**2**
14.	What is meant by “Pile group efficiency”?	**4**	**2**

15.	How to arrive uplift capacity of pile foundation?	**4**	**2**
16.	Differentiate "Bored pile" and "Driven pile".	**4**	**2**
17.	What is meant by "Coefficient of active earth pressure" and "Coefficient of passive earth pressure"?	**5**	**2**
18.	How to arrive the "Depth of tension crack"?	**5**	**2**
19.	List the different stability to be check to design the retaining walls.	**5**	**2**
20.	What is meant by "Critical depth of vertical cut"?	**5**	**2**

PART- B (5x 10=50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Explain any two types of samplers in detail with neat sketch. Highlight its merits and demerits.	**(10)**	**1**	**2**
	(OR)			
(b)	Explain in detail about "Seismic refraction method" of geophysical method with neat sketch.	**(10)**	**1**	**2**
22. (a)	Determine the ultimate bearing capacity of a circular footing having the diameter of 1.5 m and having the depth of foundation of 1 m. Use Terzaghi's theory and assume general shear failure. Take ϕ = 35 degree, γ = 18 kN/m^3 and c = 15 kN/m^2. (For ϕ = 35 degree, N_c = 57.8, N_q = 41.4 and N_γ = 42.4). Also determine the safe bearing capacity with the factor of safety of 3.	**(10)**	**2**	**3**
	(OR)			
(b)	A square footing of 2 m x 2 m is built in a sand deposit of saturated unit weight of 24 kN/m^3 and the unit weight above water table of 20 kN/m^3 having an angle of shearing resistance of 36 degree. The depth of the base of the footing is 1.5 m below the ground surface. Calculate the safe load that can be carried by a footing for following cases with a factor of safety of 3 against shear failure. Use Terzhagi's Analysis. (For Ø = 36°, N_c =65.4, N_q=49.4, N_γ=54.0) Case 1 : Water Table at Ground Level Case 2 : Water Table at Base of the Footing	**(10)**	**2**	**3**

23. (a)	Explain the different types of mat foundation in detail with neat sketch. Highlight the application of each type of mat footing.	**(10)**	**3**	**2**
	(OR)			
(b)	Explain the step by step procedure to proportionate the rectangular combined footing with neat sketch.	**(10)**	**3**	**2**
24. (a)	Elaborate the working principle and procedure of "Pile load test" in detail with neat sketch. Also discuss how to arrive the ultimate pile capacity using the load settlement curve?	**(10)**	**4**	**2**
	(OR)			
(b)	Explain the following in detail A. Feld's rule to arrive pile group capacity B. Under reamed pile C. Hiley's method to arrive pile capacity	**(10)**	**4**	**3**
25. (a)	Determine the active earth pressure acting on the 5 m height retaining wall having the two soil layers. The water table is at 2.5 m from top of the wall. Take γ_w = 10 kN/m^3. The soil parameters in each soil layer as follows Top Layer - 0 to 2.5 m - ϕ = 35 Degree & γ = 17 kN/m^3 Bottom Layer - 2.5 to 5.0 m - ϕ = 38 Degree & γ_{sat} = 18 kN/m^3	**(10)**	**5**	**3**
	(OR)			
(b)	The retaining wall of 4 m height retains the soil having the angle of internal friction, cohesion and unit weight of 12 degree, 20 kN/m^2 and 18 kN/m^3. Determine the depth of tension crack and the active earth pressure acting on the wall.	**(10)**	**5**	**3**

PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	A group of 16 piles arranged in a square pattern with the diameter and length of each pile as 30 cm and 12 m respectively. Take the shear strength of the clayey soil, pile spacing, adhesion factor and factor of safety as 50 kN/m^2, 100 mm (C/C), 0.70 and 2.5. Determine the load carrying capacity of the pile group.	**(10)**	**4**	**3**

****