Q. Code:993116

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

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

Fifth Semester

CE18501 – APPLIED GEOTECHNICAL ENGINEERING

(Civil Engineering)

(Regulation 2018/2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Describe the various site investigation procedures 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 (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How do you decide the depth of exploration?	**1**	**2**
2.	Write the different types of samplers.	**1**	**1**
3.	Draw the pressure distribution diagram beneath a rigid footing for cohesionless soil.	**2**	**2**
4.	Differentiate general shear failure and local shear failure.	**2**	**2**
5.	Under what circumstances the strap footing is adopted.	**3**	**2**
6.	What is floating foundation?	**3**	**1**
7.	State Feld's rule for determining group capacity of pile groups.	**4**	**1**
8.	What are the methods available to determine load carrying capacity of pile?	**4**	**1**

9.	Write the formula to determine the earth pressure at rest.	**5**		**1**
10.	List out the different types of retaining wall.	**5**		**1**

PART- B (5 x 14 = 70 Marks)

		Marks	CO	RBT LEVEL
11. (a)	Explain the different types of boring with a neat sketch.	**(14)**	**1**	**2**
	(OR)			
(b)	Describe the principle and procedure of conducting subsoil exploration study using seismic refraction method.	**(14)**	**1**	**2**
12. (a)	A footing 3 m square carries of gross pressure of 375 kN/m^2 at a depth of 1.2 m in sand. A saturated unit weight of sand is 23 kN/m^3, and the unit weight above the water table is 20 kN/m^3. The shear strength parameters are c = 0 and $\Phi = 30^o$ (for $\Phi = 30^o$, $N_q = 22$, $N_\gamma = 20$). Determine the factor of safety with respect to shear failure for the following cases: a) Water table is 5 m below the ground level b) Water table is 1.2 m below the ground level	**(14)**	**2**	**3**
	(OR)			
(b)	A rectangular footing has a size of 1.8 m x 3 m has to transmit the load of a column at a depth of 1.5 m. Calculate the safe load which the footing can carry at a FOS of 3 against shear failure. Use IS Code method. Take n = 40%, $G_s = 2.67$, w = 15%, c = 8 kN/m3, Ø = 32.5°, $N_c = 38.13$, $N_q = 25.85$, $N_\gamma = 35.21$.	**(14)**	**2**	**3**
13. (a)	Two adjacent columns are to be supported by a trapezoidal combined footing. The heavier column carries a load of 5000 kN and size of 500 mm x 500 mm. The lighter column carries a load of 3500 kN with a size of 350 mm x 350 mm. The columns are spaced 5.3 m c/c. Take allowable bearing capacity as 320 kN/m^2. Assume the heavier column is on the property line. Proportion a suitable foundation.	**(14)**	**3**	**3**
	(OR)			
(b)	Explain the design procedure of Rectangular combined footing with the	**(14)**	**3**	**2**

suitable sketch.

14. (a)	A group of 16 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 50 cm and 9 m. unconfined compression strength of 30 kN/m^2 and pile spacing of 1 m center to center. Consider both the tip bearing and friction resistance of the pile. Determine the ultimate load capacity of the group. Take Adhesion factor = 0.6 and $N_c = 9$.	**(14)**	**4**	**3**
	(OR)			
(b)	**(i)** Briefly explain the classification of piles with neat diagram,	**(10)**	**4**	**2**
	(ii) Explain about the different methods of pile driving.	**(6)**	**4**	**2**
15. (a)	A retaining wall with a smooth vertical back retains sand backfill for the depth of 8 m. The backfill has horizontal surface and has the properties of $c = 0$, $\Phi = 28°$, γ_{bulk} = 18 kN/m3, γ_{sat} = 20 kN/m^3. Calculate the active thrust and its point of application on the wall. Take the water table is at 5 m from the ground surface. Also determine the change in the total active thrust if the water table rises to 3 m from ground level.	**(14)**	**5**	**3**
	(OR)			
(b)	A vertical wall 5 m high supports a saturated cohesive backfill with horizontal surface. The top 3 m of the backfill weighs 2.76 g/cm^3, and has an apparent cohesion of 0.15 kg/cm^2. The bulk density and apparent cohesion of the bottom 2 m of the backfill are 2.92 g/cm^3 and 0.2 kg/cm^2 respectively. Determine the likely depth of tension cracks behind the wall. If tension cracks develop, what will be the total active pressure? Sketch the pressure distribution diagram and locate the point of application of the resultant pressure.	**(14)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.16 is compulsory)

	Marks	**CO**	**RBT LEVEL**

16. How Standard penetration test is conducted in the field to determine the properties of the subsurface soil? Also discuss the corrections to be applied for field 'N' Value. **(10) 1 3**