Q. Code:838704

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

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

Fourth Semester

CE18403 – BASIC GEOTECHNICAL ENGINEERING

(Civil Engineering)

(Regulation 2018/2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Describe the procedures to determine index properties of any type of soil, classify the soil based on its index properties	**3**
CO 2	Determine compaction characteristics of soil and apply that knowledge to assess field compaction procedures	**3**
CO 3	Analyze the problems related to permeability and seepage characteristics of a given type of soil.	**3**
CO 4	Solve problems related to estimation of consolidation settlement of soil deposits also time required for the same	**3**
CO 5	Estimate shear strength parameters of different types of soils using the data of different shear tests and comprehend Mohr-Coulomb failure theory.	**3**

PART- A (10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Sketch the "Two phase diagram" and "Three phase diagram".	**1**	**2**
2.	If the soil having liquid limit and plastic limit of 60% and 35%, what will be the plasticity index?	**1**	**2**
3.	Define OMC and ZAV.	**2**	**2**
4.	Differentiate "Flocculated soil structure" and "Dispersed soil structure".	**2**	**2**
5.	What is meant by effective stress in soil?	**3**	**2**
6.	State Darcy's Law. Write its assumptions.	**3**	**2**
7.	What is meant by co-efficient of consolidation?	**4**	**2**
8.	What is meant by compression index?	**4**	**2**
9.	What is meant by shear strength of soil?	**5**	**2**
10.	List the different factors affecting shear strength.	**5**	**2**

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	The mass of a chunk of moist soil is 20 kg, and its volume is 0.011 m^3. After drying in an oven, the mass reduces to 16.5 kg. Determine the water	**(14)**	**1**	**3**

content, density of moist soil, dry density, void ratio, porosity, degree of saturation, air content and percentage of air voids. Take specific gravity of solid as 2.70.

(OR)

(b)	A sample of clay was coated with paraffin wax and its mass, including the mass of wax, was found to be 697.5 gram. The sample was immersed in water and the volume of the water displaced was found to be 355 ml. The mass of the sample without wax was 690 gram, and the water content of the representative specimen was 18%. Determine the bulk density, dry density, void ratio and the degree of saturation. The specific gravity of solids was 2.70 and that of wax was 0.89.	**(14)**	**1**	**3**
12. (a)	Sketch the compaction curve and differentiate the "Dry side of optimum" and "Wet side of optimum" in detail.	**(14)**	**2**	**2**

(OR)

(b)	Explain the effect of compaction on different properties of the soil in detail.	**(14)**	**2**	**2**
13. (a)	In a deposit of fine sand, the water table is 3 m below the ground surface. The sand up to a height of 1 m above the water table is saturated by capillary water. The sand above this height may be considered as dry. For the sand, take G_s = 2.68 and n = 40%. Calculate the effective stress at 2 m, 3 m, 5 m and 10 m from the ground surface.	**(14)**	**3**	**2**

(OR)

(b)	Derive the coefficient of permeability for the soil tested under variable head permeability test.	**(14)**	**3**	**2**
14. (a)	Sketch the one dimensional consolidation test setup. Explain the each component with the detailed procedure to arrive the consolidation parameters.	**(14)**	**4**	**2**

(OR)

(b)	Explain in detail about "Square root of time fitting method" with the neat sketch to determine the coefficient of consolidation.	**(14)**	**4**	**2**

15. (a) The stresses on a failure plane in a drained test on a cohesionless soil are as follows: Normal stress = 100 kN/m^2 and Shear stress = 40 kN/m^2. Determine the angle of shearing resistance and the angle of the failure plane makes with the principal plane. Also, find the major and minor principal stress acts on soil sample. **(14) 5 3**

(OR)

(b) The following results were obtained from as undrained shear box test on a soil. Determine the strength parameters in terms of total stresses. The cross sectional area of the shear box was 36 cm^2. **(14) 5 3**

Sample No.	**1**	**2**	**3**
Normal Load (N)	250	500	750
Failure Load (N)	320	460	610

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	**CO**	**RBT LEVEL**
16.	Explain the "Triaxial compression test" in detail with neat sketch. Sketch the failure envelope for CD, CU and UU test.	**(10)**	**5**	**2**