Question Paper Code: R18A31CE05

R18

ANURAG Engineering College

(An Autonomous Institution)

III B.Tech I Semester Regular/Supplementary Examinations, Dec–2023/Jan-2024

GEOTECHNICAL ENGINEERING

(CIVIL ENGINEERING)

Time: 3 Hours **Max.Marks:75**

Section – A (Short Answer type questions) (25 Marks)

Answer All Questions		Course Outcome	B.T Level	Marks
1.	Define water content and name the laboratory tests used for determining water content	CO1	L1	2M
2.	Draw three phase diagram and two phase diagram? Explain its use?	CO1	L2	3M
3.	Differentiate total and effective stress of soils	CO2	L2	2M
4.	Write the expressions for finding out the coefficient of permeability using falling head and constant head test	CO2	L1	3M
5.	Express the formula for determination of stress distribution under point load according to Westergaard's theory.	CO3	L1	2M
6.	Define zero air void line in compaction curve and explain how to find out.	CO3	L2	3M
7.	Define coefficient of volume change	CO4	L1	2M
8.	Differentiate between compaction and consolidation of soil	CO4	L2	3M
9.	Define Dilatancy and critical void ratio.	CO5	L1	2M
10.	What are the important characteristics of Mohr's circle?	CO5	L1	3M

Section B (Essay Questions)

Answer all questions, each question carries equal marks. **(5 X 10M = 50M)**

11. A)	i) Derive the Relation between e, W, G and S.	CO1	L3	5M
	ii) Explain the laboratory procedure for determining the liquid limit of soil.			5M
	OR			
B)	The following results were recorded in a shrinkage limit test using mercury Mass of container =17.0g Mass of wet soil and container =72.30g Mass of dish =132.40g, Mass of dish and displaced mercury =486.10g Mass of dry soil and container =58.20g Volume of wet soil =32.4 cm^3. Determine the shrinkage limit, the linear shrinkage and the shrinkage ratio. The density of mercury is 13.6g/cm^3.	CO1	L3	10M
12. A)	A clay structure of thickness 8 m is located at a depth of 6 m below the ground surface, it is overlaid by fine sand, the water table is located at a depth of 2 m below the ground surface. For fine sand submerged unit weight is 10.2 kN/m^3. The moist unit weight of sand located above the water table is 16 kN/m^3. For clay layer, G=2.76 and water content is 25%. Compute the effective stress at the middle of the clay layer and junction of clay and sand layers	CO2	L3	10M
	OR			
B)	i) Explain about Variable head permeability test for finding Permeability of clayey soil.	CO2	L3	6M
	ii) Explain any four factors effecting Permeability of soil.			4M

13. A)	i) Differentiate standard proctor test and modified proctor test. ii) Mention types of rollers used for field compaction? Explain two type rollers briefly?	CO3	L3	4M 6M
	OR			
B)	A circular area is loaded with a uniform load intensity of 100 kN/m^2 at ground surface. Calculate the vertical pressure at a point P so situated on the vertical line through the centre of loaded area that the area subtends an angle 90^O at P. use the Boussinesq analysis	CO3	L3	10M
14. A)	In a consolidation test the pressure on a sample was increased from 140 to 280kN/m^2. The void ratio after 100% consolidation under 140kN/m^2 was 0.95, and that under 280kN/m^2 was 0.82. The coefficient of permeability of the soil was 20 x 10^{-6} mm/s and the initial height of the sample was 20mm. Determine The coefficient of consolidation, and (ii) the time taken in days for 90% consolidation of the layer of this clay, 0.5mm thick in the field, sandwiched between an impervious layer beneath and the pervious layer on top	CO4	L3	10M
	OR			
B)	i) Differentiate between normally consolidated, under consolidated and over consolidated soils. ii) Define the following terms: a) Coefficient of compressibility b) Coefficient of volume change	CO4	L3	6M 4M
15. A)	Write a note on the laboratory Triaxial shear test and explain types of Triaxial test based on drainage conditions	CO5	L3	10M
	OR			
B)	i) Explain liquefaction of soils. Discuss various conditions causing liquefaction of sand. ii) A direct shear test was performed on a 6cm x 6cm sample of dry sand the normal load was 360N. The failure occurred at a shear load of 180N. Plot the Mohr strength envelope and determine ϕ. Assume c=0 also determine principal stress at failure.	CO5	L3	5M 5M