Total number of printed pages: 1 **5th Semester/Diploma/DCE 503**

2022
(DECEMBER)

GEOTECHNICAL ENGINEERING

Full Marks: 100
Pass Marks: 30
Time: Three hours

The figures in the margin indicate full marks for the questions.
*Answer **all** questions.*

		Question body	Marks
1.	a)	Define compaction. What are the objectives of compaction? Describe the factors affecting compaction of soil.	2+3+5=10
	b)	In a falling head permeability test, the time taken for the head to fall from 27 cm to 3 cm is 10 min. If the test is repeated with the same initial head of 27 cm, what time would it take for the head to fall to 9 cm.	10
2	a)	Define principal stress and principal planes. Describe the procedure of drawing Mohr's circle of stresses for a soil element.	2+8=10
	b)	The void ratio of clay is 1.56 and its compression index is found to be 0.8 at the pressure 180 kN/m^2. What will be the void ratio if the pressure is increased to 240 kN/m^2. Also determine coefficient of compressibility and coefficient of volume compressibility.	10
3	a)	In a direct shear test conducted on cohesion less sand, the sample failed at a shear stress of 120 kPa when the normal stress was 200 kPa. Draw the Mohr's circle and failure envelope. Determine the angle of shearing resistance and also determine the principal stresses.	10
	b)	Explain and deduce Darcy's law. What is the difference between seepage velocity and discharge velocity? Describe the constant head permeability test to determine coefficient of permeability of soil.	2+3+5=10
4	a)	With a neat schematic graph, explain the different states of soils at different water content.	8
	b)	Describe the different types of clay minerals with diagram.	6
	c)	The results of a liquid limit test are given below. Draw flow curve and determine the liquid limit	6

No. of blows	11	15	23	30	46	53
Water content	53.9	50.6	48.1	46.0	43.3	41.0

5	a)	Define consolidation. What is over consolidation ratio (OCR)? What are the difference between consolidation and compaction?	1+2+5=8
	b)	The total unit weight of glacial outwash soil is 6 KN/m^3. The specific gravity of soild particles of soil is 2.67. The water content of the soil is 17%. Calculate dry unit weight, porosity, void ratio and degree of saturation. Assume that unit weight of water is 10KN m^3.	12