

Total No. of printed pages = 4

19/5th Sem/DCE503



2021

GEOTECHNICAL ENGINEERING

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. (a) What is permeability ? Discuss the various factors that affect the permeability of soil. 6
- (b) Write the difference between seepage velocity and discharge velocity. 4
- (c) The stresses during a triaxial test on a sample of soil are as follows :
Major principal stress = 5 kg/cm² and Minor principal stress = 3 kg/cm².
Draw the Mohr's circle and determine the state of stress on a plane inclined at 35° with major plane. 10

[Turn over

2. (a) What do you understand by the term: Consolidation ? Describe Terzaghi's spring-dashpot model to explain the mechanism of consolidation. 10

(b) Following are the results of a compaction test.

Mass of soil +Wet soil(gm)	2695	3095	3159	3125	3070
Water content (%)	10	12	14.3	16.1	18.2

The volume of mold = 1000 cm^3 , mass of mold = 1000 gm and $G = 2.7$.

Plot the compaction curve showing the OMC and MDD. 10

3. (a) Describe Standard Proctor test. 8

(b) An undisturbed sample obtained from field weighted 18 N , with a volume of $1 \times 10^{-3} \text{ m}^3$. The dry unit weight of the sample was 15.4 kN/m^3 and its specific gravity was 2.7 . Determine (i) water content (ii) void ratio (iii) Degree of saturation. (Assume unit weight of water 10 kN/m^3) 12

4. (a) Distinguish between void ratio and porosity. Derive the relation between void ratio and porosity. 6



(b) Write the difference between compaction and consolidation. 4

(c) In a falling head permeability test, the initial head of 1.0m dropped to 0.35m in 3 hours. The diameter of the standpipe being 5 mm. The soil sample was 200 mm long and 100 mm wide. Determine the coefficient of permeability. 10

5. (a) Define principal plane and principal stresses of a soil element. 4

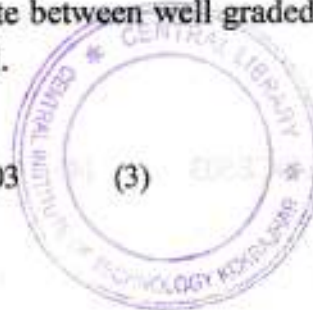
(b) Explain the basic structural units which clay minerals are made. 6

(c) The following results were obtained from the liquid limit test

No. of blows	55	46	32	22	15
Water content (%)	24	30	35	41	49

Find the liquid limit. If plastic limit of the soil is 24%, determine plasticity index. 10

6. (a) Differentiate between well graded and poorly graded soil. 2



(b) Soil deposits can be divided into how many classes in regards to consolidation history? Define the classes. Define over consolidation ratio (OCR) and what are the OCRs for different classes of soil deposits? 10

(c) What are the different states of consistency of a soil? With a neat schematic graph explain the different states of soils at different water content. 8



11	12	13	14	15	16
17	18	19	20	21	22