2018

B.Tech Even Semester (CBCS) Exam., May—2018

AGRICULTURAL ENGINEERING

(6th Semester)

Course No. : AECC 29

(Soil Mechanics)

Full Marks : 50
Pass Marks : 15

Time : 2 hours

Note : 1. Answer *any* **five** questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the margin indicate full marks for the questions.

1. *(a)* Develop the functional relationship among e, G, w and Sr for a soil mass, where

e = volume of voids; w = moisture content; Sr = degree of saturation; G = specific gravity. 4

(b) Establish the relationship

$$Y_d \quad \frac{(1 \quad n_a)Y_w \quad G}{1 \quad wG}$$

where

Y_d = dry unit weight of soil mass; n_a = air void ratio; w = dry basis water content; G = specific gravity; Y_w = unit weight of water. 4

(c) Classify the soil mass on the basis of degree of saturation. 2

2. *(a)* With neat sketch, explain the Atterberg limits. 4

(b) Write short notes on the following : 1½×4=6

(i) Unit weight of solids
(ii) Consistency index
(iii) Apparent specific gravity
(iv) Shrinkage limit

3. *(a)* A natural soil deposit has a bulk unit weight of 18·44 kN/m^3 and water content of 5%. Calculate the amount of water required to be added to 1 cubic meter of soil to raise the water content to 15%. Assume the void ratio to remain constant, then what will be the degree of saturation? Assume G 2 67. 6

(b) What is capillary rise? Find the expression of maximum tensile stress. 1+3=4

4. *(a)* Define the permeability and discuss the falling head permeability test with neat diagram for the determination of coefficient of permeability. 7

(b) Draw the effective pressure distribution diagram for submerged soil mass. 3

5. *(a)* Explain in brief the basic assumptions of theory of elasticity. 4

(b) With the help of neat sketch, show that the total number of independent stresses are six three-dimensional element. 6

6. *(a)* Differentiate between body forces and surface forces. 2

(b) Derive equilibrium equations for an elemental volume of size *dx*, *dy* and *dz*. 8

7. *(a)* Describe the factors affecting compaction. 4

(b) Explain the standard and modified proctor test with schematic diagram. 6

8. *(a)* Describe the essential points of Mohr's strength theory and draw the Mohr's failure envelope curve. 6

(b) Differentiate between active earth pressure and passive earth pressure. 4

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