B.Tech Even Semester (CBCS) Exam., April—2017

AGRICULTURAL ENGINEERING

(4th Semester)

Course No. : AECC–11

(Soil Science)

Full Marks : 50
Pass Marks : 15

Time : 2 hours

Note : 1. Attempt *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)* What is horizon? Briefly explain about the major kinds of changes that take place during the formation of horizon. 1+4=5

(b) Briefly explain about different suborders of Alfisols. 5

2. *(a)* Distinguish between the following : 2+2+2=6

(i) Water holding pores and aeration pores in soils

(ii) Dry bulk density and wet bulk density of soils

(iii) Columnar structure and platy structure in soils

(b) Write the effect of texture and structure on porosity. 4

3. *(a)* Derive an equation for calculation of the percentage of total pore space in soil. We assume that the particle density is approximately that of the common silicate mineral is 2·65 g/cc. Calculate the percent pore space using the derived formula. Assume standard value of any missing data. 3+3=6

(b) Write short notes on the following : 2+2=4

(i) Structural management of soil

(ii) Importance of soil aeration

4. *(a)* Give a specific relation between soil temperature and soil moisture. Write the factor affecting soil temperature. 1+4=5

(b) How can the gases exchange between soil and atmosphere? Write the mechanism of gas exchange. 5

5. *(a)* What is soil air? Write the factors affecting the composition of soil air. 1+4=5

(b) How do the forces of adhesion and cohesion operate in the soil system? 2

(c) A soil core, with a height of 6 cm and a diameter of 5 cm, weighs 215 g when collected and 188 g when oven-dried. When the core was ground and poured into 100 ml of water, the final volume of the soil-water mixture was 171 ml. Calculate the soil bulk density, particle density and percent pore space. 3

6. *(a)* Explain the hydrometer method of classifying soil texture. 5

(b) Calculate the percentage of sand, clay and silt when a 40-second and 8-hr hydrometer readings are 20 and 15, respectively. Assume a 50 g soil sample is used. 3

(c) Differentiate among type, class and grade of soil. 2

7. Briefly describe about Goldschmidt's law–I and II for structural characteristics of phyllosilicates. 10

8. *(a)* Briefly describe about the sources of charges on soil colloids and their charge characteristics. 5

(b) Briefly describe about electrokinetic phenomena in soil colloids. 5

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