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ET-531(B)

B.Tech. Civil (Water Resources Engineering)

Term-End Examination

December, 2010

01275

ET-531(B) : SOIL SCIENCE

Time : 3 hours *Maximum Marks : 70*

Note : Answer any five questions. All questions carry equal marks. Well labelled sketches will carry due weightage.

1. (a) List and explain five factors that are sustaining plant growth from soil as a base. 6

   (b) List the cations and anions, that are present in the liquid phase of soil. 3

   (c) Express the action of : Soluble constituents of soil, secondary minerals, and products of rock weathering, in the form of an equation, while the product is decomposed reacting with water, oxygen and carbon dioxide. 3

   (d) What is meant by mature soil ? 2

2. (a) Describe the two methods adopted in field to assess the texture of any soil. 7

(b) In a hydrometer analysis, a 60-gm soil sample was used. The temperature of suspension was 23°C. And following reading were noted : (i) After 40 secs = 35. (ii) After 2 hours = 15. Find the %ages of silt, sand and clay in the sample. 7

3. (a) List the factors influencing soil texture. 2

(b) Explain any one method of the grain-size determination of a soil sample in the laboratory. Also explain the procedure of determining the soil type using USDA textural triangle. 12

4. (a) Derive an expression for an average suction head in an unsaturated flow through a horizontal sample of soil. 5

(b) Explain ion-exchange in soils and its importance. 4

(c) What are salt affected soils ? How will you differentiate amongst Acidic, Saline and Saline Alkali soils ? 5

5. (a) Explain the stages involved in an indirect land evaluation process. 7

(b) Discuss the US criteria for rating the quality of land. 7

6. (a) Outline the role of : nitrogen transforming, ammonifying, nitrifying and denitrifying bacteria in soils. 7

(b) Discuss the action of four types soil fungus - cellulose and hemi-cellulose decomposing; Lignin decomposing and mycorrhizae. 7

7. Describe carbon, nitrogen cycles; and humus synthesis. 14

8. Write short notes on the following :- 4x3½=14

(a) Nodule formation ;

(b) Biofertilisers;

(c) Fungicides;

(d) Soil aggression.