B.Tech Odd Semester (CBCS) Exam., December—2016

AGRICULTURAL ENGINEERING

(5th Semester)

Course No. : AE-503

(Soil and Water Conservation Engineering)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

Note : 1. Attempt **one** question from each Unit.
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.

UNIT—I

1. *(a)* Define the soil erosion and state the causes and effects of soil erosion. 5

(b) Describe the mechanics of water erosion. 5

(c) Define the terminal velocity of raindrop and establish the relation between terminal velocity and raindrop diameter. 5

2. *(a)* Write short notes on the following : 6

(i) Raindrop erosion

(ii) Erodibility

(iii) Detachment-limited erosion

(iv) Sheet erosion

(b) Determine the terminal velocity and kinetic energy of 2 mm and 3 mm diameter of raindrops, if atmospheric temperature and atmospheric pressure are 20 °C and 101·3 kPa respectively. Drag coefficient of 3 mm and 5 mm diameter of raindrops are 0·617 and 0·659 respectively. 4

(c) What do you mean by USLE? State the applications and limitations of USLE. 5

UNIT—II

3. *(a)* What is bund? Describe the different types of bund. 6

(b) List the types of biological methods to control the soil erosion. 3

(c) Calculate the cross-section of a contour bund used to store a 24 hours excess rainfall of 10 cm. Annual rainfall is

about 100 cm, the soil has high intake rate and there is a low coverage of crops over the land. The land slope is 3%. 6

4. *(a)* Explain the design considerations of contour bund. 10

(b) Differentiate between the bunding and terracing, and explain with neat sketch. 5

UNIT—III

5. *(a)* Describe the classification of gully. 8

(b) What are the differences between chute spillway and drop spillway? 7

6. *(a)* Define the gully erosion and state the stages and process of gully development. 7

(b) Define the permanent gully control structures and write their requirement. 8

UNIT—IV

7. *(a)* What is the difference between turbulent and laminar flows? Describe free flow and restricted flow of air which takes place near a vegetation cover with a neat diagram. 8

(b) Describe vegetative measures needed to prevent soil erosion caused by wind. 7

8. *(a)* Describe the mechanics of wind erosion. 8

(b) Describe different types of soil particle movement which is caused by turbulent nature of wind. 7

UNIT—V

9. *(a)* Calculate the spacing and number of spurs to control a stream bank of 250 m length on both sides, if the length of spur is 8 m and projected at angle of 45° from the top. 8

(b) What do you mean by spur? Explain the types of spurs used for controlling the stream bank erosion. 7

10. *(a)* Describe direct method for controlling the stream bank erosion. 8

(b) Define stream bank erosion and write various causes of stream bank erosion. 7

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