B.Tech Odd Semester (CBCS) Exam., December—2018

AGRICULTURAL ENGINEERING

(5th Semester)

Course No. : AE-CC–22

(Soil and Water Conservation Engineering)

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)* Classify the erosion and state the causes and effects of soil erosion. 2+2+2=6

(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 coefficients of 3 mm and 5 mm diameter of raindrops are 0·617 and 0·659 respectively. 2+2=4

2. *(a)* What do you mean by USLE? Explain the applications and limitations of USLE. 2+2+3=7

(b) In the universal soil loss equation, calculate the LS factor when L is equal to 22 m and S is 9%. 3

3. *(a)* Using the following rainfall data of a particular storm, calculate the 30 minutes maximum rainfall intensity (I_{30}) and rainfall erosivity index (R) of storm by EI_{30} method : 3+3=6

Time (min)	0	10	20	30	40	50	60	70	80	90	100
Rainfall (cm)	0	0·87	0·10	1·23	1·28	0·41	1·69	1·0	1·38	1·31	0·64

(b) List the types of agronomical practices to control the soil erosion and explain any one of them. 2+2=4

4. *(a)* Calculate the volume of earthwork for 100 hectare catchment which has a land slope of 3%. The following parameters of the contour bund were calculated :

VI = 1·3 m, Base width=2·25 m, Top width=0·45 m, Height of bund=0·90 m.

Also determine the percentage area lost due to bunding. 2+2=4

(b) Explain the design consideration of contour bund. 6

5. *(a)* Define the gully erosion and state the stages and process of gully development. 2+2+2=6

(b) Differentiate between : 2+2=4

(i) U-shaped and V-shaped gully

(ii) Single-row brush dam and Double-row brush dam

6. *(a)* Define the permanent gully control structures and write their requirement. 2+2=4

(b) Describe vegetative measures needed to prevent soil erosion caused by wind. 6

7. *(a)* Describe the mechanics of wind erosion. 7

(b) What do you mean by wind break? How is it different from shelterbelt? 1+2=3

8. *(a)* Define stream bank erosion and write various causes of stream bank erosion. 1+2=3

(b) What do you mean by spur? List the types of spurs used for controlling the stream bank erosion. 1+2=3

(c) 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. 2+2=4

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