

**B.Tech Odd Semester (CBCS) Exam.,
December—2017**

AGRICULTURAL ENGINEERING

(5th Semester)

Course No. : AE-503 (C)

(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) Differentiate between geological erosion and accelerated erosion. Discuss their role in soil formation and erosion. 7
- (b) In the universal soil loss equation, calculate the LS factor when L is equal to 22 m and S is 9%. 4

- (c) Write short notes on the following : 4
 - (i) USLE
 - (ii) Erodibility
 - (iii) Terminal velocity
 - (iv) Sheet erosion

2. (a) Discuss the factors that affect the raindrop erosion. 7
- (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. 8

UNIT—II

3. (a) List the types of agronomical practices to control the soil erosion and describe any of them. 6
- (b) Define terraces and write its importance. 4
- (c) Calculate the spacing of contour bunds on a land slope of 5%. Annual rainfall is 60 cm, infiltration rate is high and vegetative cover is poor. 5

(3)

4. (a) How does bunding help in soil and water conservation? Name the different types of bunds used for this purpose. 5
- (b) What are the different methods for calculation of spacing of contour bunds? Write the procedure for determination of cross section of contour bunds. 10

UNIT—III

5. (a) Write short notes on the following : 9
- (i) V-shape gully
- (ii) U-shape gully
- (iii) Netting dam
- (b) Explain the location of different permanent gully control structures. 6
6. (a) Considering a typical gully which needs to be protected by using permanent structures, explain a chute spillway and drop inlet structure with their uses and advantages. 10
- (b) Explain the causes of gully erosion. 5

(4)

UNIT—IV

7. (a) Differentiate the following terms : 9
- (i) Windbreaks and Shelterbelt
- (ii) Saltation and Suspension
- (iii) Primary tillage and Secondary tillage
- (b) Define the various causes of wind erosion with their mechanics. 6
8. (a) What do you understand by windbreaks? What are the types of windbreaks? Explain the design considerations of windbreak with neat sketches. 10
- (b) Explain the effect of width, shape and height of shelterbelt on wind erosion control. 5

UNIT—V

9. (a) Explain the methods for protecting of lower bank by stone rip-rap method. 5
- (b) Explain the various methods for controlling the stream bank erosion by protecting the side slopes. 10

(5)

10. (a) Write brief notes with suitable sketch on the following : 5+5=10
- (i) Sliding, undermining and sloughing processes
 - (ii) Spur and their types
- (b) Find the number of spurs to control the stream bank erosion of 450 m length. The average flood flow is $5500 \text{ m}^3/\text{s}$ and length of spur to be used is 15 m. Assume the angle of projection of spur from vertical is 30° . 5

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