

Code No: R1931352

R19

SET - 1

III B. Tech I Semester Regular Examinations, February-2022

SOIL AND WATER CONSERVATION ENGINEERING

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Distinguish between peak runoff and design peak runoff. Explain significance of time of concentration in estimation of runoff. [8M]
- b) Calculate the peak runoff rate for a 10 years return period from a micro water shed area of 75 hectares. The water shed is divided into three parts, based on its land use and soil texture in which first part of 25 hectare with 1% slope is under cultivation, second part of 30 hectares with a slope of 7% is under pasture and rest of the land with a slope of 12% is under farm forestry. The maximum length of path is 3000 meters to the outlet. The average slope of channel is 5%. And the maximum rainfall intensity of 1-h rainfall is 5 cm/h during the 10 years return period. [7M]

(OR)

2. a) What do you understand by Curve number? Discuss about Curve Number method in detail. [8M]
- b) Discuss about Cook's method for estimation of runoff. [7M]

UNIT-II

3. a) Give the classification of Gully erosion. Also explain stages of gully development. [8M]
- b) Explain factors affecting erosion in detail. [7M]

(OR)

4. a) Explain mechanics of water erosion. [8M]
- b) i) Explain all terms in Universal soil loss equation. [7M]

ii) Compute the annual soil loss from the continuous fallow field tilled up and down the slope using USLE. The values of the other factors of USLE are as follows:

Rainfall factor $R = 500$

Soil erodability factor $k = 0.19$

Topographic factor $LS = 0.2$

Also compute the soil loss from the above field when it is cultivated on contour with maize crop and assume the value of crop management factor $C = 0.6$ and $p = 0.5$.

UNIT-III

5. a) Discuss about wind erosion control measures. [8M]
- b) Explain mechanics of wind erosion. [7M]

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(OR)

6. a) What are factors affecting wind erosion? Give details. [8M]
 b) Explain stabilization of sand dunes in detail. [7M]

UNIT-IV

7. a) Calculate the storage area required and the height of bund required in clayey soil having an average slope of 2%. The maximum expected rainfall during 10-year recurrence interval is 15 cm. The infiltration capacity of the soil of the area is such that 50 % of the rain fall absorbed in the field. The horizontal interval between bunds is 60 cm. Assume the slope of seepage line to be 5:1. [8M]
 b) Give the classification of terraces with neat figures. [7M]

(OR)

8. a) Design a 400 m long graded terrace for a land having an average slope of 3%. Maximum permissible velocity of water in the terrace channel is 75 cm/sec. Intensity of 1-hr rainfall expected during the recurrence interval of 10 years is 10 cm/h. vertical interval is 1.05 m and horizontal spacing is 35 m. Channel grading for 400 m terrace are [8M]

Lower	$\frac{1}{4}$	0.5%
Second	$\frac{1}{4}$	0.4%
Third	$\frac{1}{4}$	0.3%
Upper	$\frac{1}{4}$	0.2%

Side slopes of channel and ridge are: Channel back slope is 6:1, ridge front slope is 8:1, ridge back slope is 8:1, and runoff coefficient is 0.3.

- b) Derive equation for vertical interval of contour bund. [7M]
- UNIT-V**
9. a) Design a grassed water way of trapezoidal cross section which is to be constructed as an outlet for flow from a graded bund system. The expected run of is 4 cubic meter per sec. Grade to be used (S) = 0.3%, Manning's co-efficient = 0.04. Side slope = 2:1. Assume a trail value of bottom width of water way as $b = 2$ m. [8M]
 b) What is trap efficiency? Explain the procedure to calculate useful life of a reservoir. [7M]

(OR)

10. a) Explain the Stage-Volume relationship structures for water harvesting. Also discuss about different water harvesting structures. [8M]
 b) What are different temporary gully control structures? Enumerate with neat figures. [7M]
