22SWCE202 SOIL AND WATER CONSERVATION ENGINEERING

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Hours Per Week :

L	T	P	C
2	0	2	3

PREREQUISITE KNOWLEDGE: Basics of Soil Erosion and runoff characteristics.

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with the different types of erosion, causes of erosion and management. This course helps students to impart knowledge of different conservation structures and methods to control soil erosion.

MODULE-1

UNIT-1 **8L+0T+8P=16 Hours**

SOIL EROSION:

Soil erosion : Introduction, causes and types - geological and accelerated erosion, agents, factors affecting and effects of erosion. Water erosion - Mechanics and forms - splash, sheet, rill, gully, ravine and stream bank erosion. Gullies-classification and stages of Gully development.

UNIT-2 **8L+0T+8P=16 Hours**

SOIL LOSS ESTIMATION:

Soil loss estimation : Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity-estimation by KE>25 and EI30 methods. Soil erodibility, topography, crop management and conservation practice factors. Measurement of soil erosion, Runoff plots, soil samplers. Water erosion control measures, agronomical measures, contour farming, strip cropping, conservation by tillage and mulching.

PRACTICES:

- Study of different types and forms of water erosion.
- Exercises on computation of rainfall erosivity index, Computation of soil erodibility index in soil loss estimation.
- Determination of length of slope (LS) and cropping practice (CP) factors for soil loss estimation by USLE and MUSLE.
- Exercises on soil loss estimation/measuring techniques.
- Study of rainfall simulator for erosion assessment.
- Estimation of sediment rate using Coshocton wheel sampler and multi-slot devisor.
- Determination of sediment concentration through oven dry method.
- Design and layout of contour bunds.
- Design and layout of graded bunds.

MODULE-2

UNIT-1 **8L+0T+8P=16 Hours**

SOIL CONSERVATION STRUCTURES:

Engineering measures– Bunds and terraces, contour and graded bunds - design and surplussing arrangements. Terraces, level and graded broad base terraces, bench terraces, planning, design and layout procedure, stone wall and trenching.

SKILLS:

- ✓ *Design prototype models of drop spillway, drop inlet spillway and chute spillway with standard procedures.*
- ✓ *Prepare an estimation of various costs and benefits of different structures.*
- ✓ *Analyze various soil and water conservation structure designs using software.*

UNIT-2 **8L+0T+8P=16 Hours**

DESIGN OF CONSERVATION STRUCTURES:

Gully and ravine reclamation, Principles of gully control, vegetative measures, temporary structures and diversion drains. Grassed waterways and design. Wind erosion, Factors affecting, mechanics, wind breaks and shelter belts and stabilization of sand dunes, Land capability classification, Rate of sedimentation, silt monitoring and storage loss in tanks.

PRACTICES:

- Design and layout of broad base terraces.
- Design and layout of bench terraces.
- Design of vegetative waterways.
- Exercises on rate of sedimentation and storage loss in tanks.
- Computation of soil loss by wind erosion.
- Design of shelter belts and windbreaks for wind erosion control.
- Visit to soil erosion site and watershed project areas for studying erosion control and water conservation measures.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the knowledge of different types of erosion to conserve soil loss.	Apply	1	1, 2, 4, 7
2	Examine soil erosion and its measurement to develop erosion control measures.	Analyze	1	1, 2, 4, 5, 7
3	Design and development of soil conservation structures.	Create	2	1, 2, 3, 4, 5, 6, 7, 12
4	Development of conservation soil conservation methods in terrain area.	Create	2	1, 2, 3, 4, 5, 6, 7, 12

TEXT BOOKS:

1. Suresh, R., “Soil and Water Conservation Engineering” Standard Publisher Distributors, New Delhi, 2014.

REFERENCE BOOKS:

1. Mal, B.C. “Introduction to Soil and Water Conservation Engineering” 2014. Kalyani Publishers.
2. Mahnot, S.C. “Soil and Water Conservation and Watershed Management” International Books and Periodicals Supply Service, New Delhi, 2016.
3. Michael, A.M. and T.P. Ojha. “Principles of Agricultural Engineering” Volume II.4th Edition, Jain Brothers, New Delhi, 2016.