

Course No.: SWCE-244

**Course Title: Soil and Water Conservation
Engineering**

Semester: IV

Credits: 3(2+1)

**Syllabus
Theory**

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, stages of development. Soil loss estimation – Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity - estimation by $KE > 25$ and EI_{30} methods. Soilerodibility - 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 tillage and mulching. Engineering measures– Bunds and terraces. Bunds - contour and graded bunds - design and surplussing arrangements, compartmental bunding. Terraces - level and graded broad base terraces, bench terraces - planning, design and layout procedure, contour stonewall and trenching(CCT, SCT, & deep CCT). Gully and ravine reclamation - principles of gully control - vegetative measures, temporary structures and diversion drains. Grassed waterways and design. Wind erosion- Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes. Land capability classification. Rate of sedimentation, silt monitoring and storage loss in tanks.

Teaching Schedule – Theory with weightages (%)

Lecture No.	Topic	Book No.	Article No./ Page No.	Weightage (%)
1	Soil erosion, problems caused by erosion	4	1.1,1.2	25
2	Soil erosion types: geological and accelerated erosion, agents of erosion.	4	3.2, 3.2.1, 3.2.2	
3, 4	Water erosion, Factors affecting water erosion, classification of water erosion, mechanics of water erosion	4	3.3, 3.4	
5	Gullies- classification of gullies, stages of gully development.	4	4.1, 4.2	
6,7, 8	Universal Soil Loss Equation (USLE), determination of USLE parameters, Modified USLE, numerical	3 4	7.3, 7.4 19.2(P.66 7-668)	
9	Measurement of soil erosion, runoff plots, soil samplers	6	16.8	30
10	Land capability classification	5	14.1	
11	Water erosion control measures-agronomic measures, contour farming, strip cropping, conservation tillage, mulching	1	5.10, 5.11, 5.12	
12, 13	Engineering measures-contour bund, design criteria, numerical, surplussing arrangement	5 6	P.712- 716 18.12, 18.13	
14, 15	Engineering measures-graded bund, design criteria, numerical, compartmental bunding	5	14.11	
16	Terraces- level and graded broad base terraces	5	P. 685- 688	20
17	Bench terraces-planning, design and layout procedure	5	14.12	
18,19	Contour stone wall and trenching(CCT, SCT, & deep CCT)	6	P.453- 454 P. 440- 442	
20, 21	Gully and ravine reclamation-Principles of gully control, vegetative measures	5	P. 738- 750	25
22, 23	Temporary structures and diversion drain.	5 6	15.9 475-477	
24, 25	Grassed waterways and design, numerical	5	P723-726	
26, 27	Wind erosion- Factors affecting, mechanics, soil loss	6	20.1,20.2	

	estimation		, 20.3	
28, 29, 30	Wind erosion- control measures - vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes.	6 5	20.4, 20.5, 20.6, 20.7 13.8, 13.9	
31,32	Rate of sedimentation, silt monitoring and storage loss in tanks.	4	21.14, 22.5	

Practical Exercises

Exercise No.	Title
1.	Computation of rainfall erosivity index.
2	Computation of soil erodibility index
3	Determination of length of slope (LS) and cropping practice (CP) factors for soil loss estimation.
4-5	Study of soil loss estimation and measuring techniques.
6	Study of rainfall simulator for erosion assessment.
7	Study of Coshocton wheel sampler and multi-slot devisor.
8	Study of determination of sediment concentration through oven dry method.
9	Design of contour bunds.
10	Design of graded bunds.
11	Design of broad base terraces.
12	Design of bench terraces.
13	Design of vegetative waterways.
14	Study of shelterbelts and wind breaks for wind erosion control.
15-16	Visit to watershed project.

Suggested readings

Text Books:

1. Frevert, R.K., G.O. Schwab, T.W. Edminster and K.K. Barnes. 2009. Soil and Water Conservation Engineering, 4th Edition, John Wiley and Sons, New York.
2. Norman Hudson. 1985. Soil Conservation. Cornell University Press, Ithaca, New York, USA.
Singh Gurmel, C. Venkataraman, G. Sastry and B.P. Joshi. 1996. Manual of Soil and Water
3. Conservation Practices. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Suresh, R. 2014. Soil and Water Conservation Engineering. Standard Publisher Distributors, New Delhi.
5. Michael, A.M. and T.P. Ojha. 2003. Principles of Agricultural Engineering. Volume II. 4th Edition, Jain Brothers, New Delhi.
6. Murthy, V.V.N. 2002. Land and Water Management Engineering. 4th Edition, Kalyani Publishers, New Delhi.

Reference Books:

1. Mahnot, S.C. 2014. Soil and Water Conservation and Watershed Management. International Books and Periodicals Supply Service, New Delhi.
2. Mal, B.C. 2014. Introduction to Soil and /Water Conservation Engineering. 2014. Kalyani Publishers.