

IV Year I - Semester

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AG401 Soil and Water Conservation and Structures

Course Description & Objectives:

To study the concepts of conservation techniques of soil and water, to design the structures required for the same under varying conditions.

Course Outcomes:

Students will have fundamental knowledge:

1. *on soil erosion with its control as well as sedimentation.*
2. *on soil and water conservation structures and their management.*
3. *on designing of suitable structures for effective erosion control*

Unit I: Soil Erosion:

Soil erosion causes, types and agents of soil erosion; water erosion forms of water erosion, mechanics of erosion; Effect of slope, slope length, soil, vegetation, topographical features and rainfall on erosion, gullies and their classification, stages of gully development; soil loss estimation universal soil loss equation and modified soil loss equation, determination of their various parameters.

Unit II: Erosion Control Measures:

Erosion control measures agronomic measures contour cropping, strip cropping, mulching; mechanical measures terraces – level and graded broad base terraces and their design, bench terraces and their design, layout procedure, terrace planning, bunds contour bunds, graded bunds and their design; gully and ravine reclamation principles of gully control vegetative and temporary structures; control measures for stream bank and coastal erosion.

Unit III: Sedimentation and Wind Erosion:

Landslides factors causing it, land slips, Measures for control; Sedimentation sedimentation in reservoirs and streams; Estimation and measurement, sediment delivery ratio, trap efficiency; Land use capability classification; Grassed waterways and their design; Introduction to water harvesting techniques; introduction to stream water quality and pollution. Wind erosion factors affecting wind erosion, mechanics of wind erosion, soil loss estimation, wind erosion control measures vegetative, mechanical measures, wind breaks and shelterbelts, sand dunes stabilization.

Unit IV: Conservation Structures:

Classification of conservation structures, functional requirements of soil erosion control structures; flow in open channels types of flow, state of flow, regimes of flow, energy and momentum principles, specific energy and specific force, flow transitions due to hump and width variations; hydraulic jump and its application, type of hydraulic jump, energy dissipation due to jump, jump efficiency, relative loss of energy; straight drop spillway general description, functional use, advantages and disadvantages, structural parts and functions; components of spillway, hydrologic and hydraulic design, free board and wave free board, aeration of weirs, concept of free and submerged flow.

Unit V: Structure Design:

Structural design of a drop spillway loads on headwall, variables affecting equivalent fluid pressure, determination of saturation line for different flow conditions, seepage under the structure, equivalent fluid pressure, triangular load diagram for various flow conditions, creep line theory, uplift pressure estimation, safety against sliding, overturning, crushing and tension; chute spillway general description and its components, hydraulic design, energy dissipaters, design criteria of a SAF stilling basin and its limitations, drop inlet spillway general description, functional use, design criteria; design of diversions; small earth embankments their types and design principles, farm ponds, percolation ponds, check dams and reservoirs. Environmental impact assessment.

TEXT BOOKS:

1. Murthy, V.V.N. (1998). Land and Water Management. Kalyani Publishing, New Delhi.
2. Suresh, R. (1997). Soil and water Conservation Engineering. Standard Publishers and Distributors.

REFERENCES:

1. Schwab, G.O, Frevert, R.K., Edminister T.W., and Barnes, K.K. (1993). Soil and water conservation engineering. John Wiley and sons.
2. Singh, G. (1985). Manual of Soil and water conservation Practice in India.. Central Soil and water conservation Research and training institute, Dehradun.
3. USBR. (1978). Design of Small Canal Structures. U S Bureau of Reclamation.
4. USBR. (1987). Design of Small Dams. US Bureau of Reclamation.
5. Chow, V. T. (1957). Open Channel Hydraulics. McGraw Hill.

6. Dhruvanarayana, V. V. (1993). Soil and Water Conservation Research in India. ICAR, New Delhi.
7. Goldman, S. J, Jackson K. and Bursztynsky, T. A. (1986). Erosion and Sediment Control Handbook. McGraw Hill Book Company.
8. Michael, A. M. and Ojha, T.P. (1985). Principles of Agricultural Engineering. (Vol. II). Jain brothers, New Delhi.
9. http://ecourses.iasri.res.in/e-Learningdownload3_new.aspx?Degree_Id=04