SWCE 503 Soil and Water Conservation Structures 2+1

Objectives:
To acquaint students with the planning and design of soil and water conservation structures, their stability checks and mechanized soil conservation techniques.

Unit-I
Design, planning and layout of soil and water conservation structures. Criteria of selection of appropriate structures as per soil, land use and climatic conditions.

Unit-II
Design and construction of earthen dam, stability analysis of land slopes and soil mass including landslides.

Unit-III
Hydrological and structural design including stress analysis. Hydraulic jump and energy dissipaters for soil conservation structures.

Unit-IV
Seepage through dams, flownet and determination of uplift pressure in drop structures, design of energy dissipaters.

Unit-V
Design of water harvesting structures, construction, maintenance and utilization of stored water. Mechanized construction techniques for soil and water conservation structures.

Practical:
Stability analysis and structural design of masonry water harvesting structures.Design of earthen dams and other energy dissipating structures. Cost analysis of water harvesting structures. Field visit to already constructed water harvesting structures in the nearby area/ watershed.

Course Outcome:
The student will be able to design the soil and water conservation structures as well as permanent gully control structures and water harvesting structures. They can have understanding of mechanized construction of soil and water conservation structures.

Teaching Schedule

S.No.	Topic	No. of Lectures
1	Introduction and need of Soil and Water Conservation in agricultural watershed	1
2	Runoff process and factors affecting it and estimation of runoff Using various methods	3
3	Analysis of rainfall data, Probability concepts in the design of structures	3
4	Introduction, classification and functional requirement of soil and Water conservation structures-Straight Drop spillway, chute spillway and drop inlet spillway	1
5	Specific energy and specific force	2
6	Hydraulic jump and its application, type of hydraulic jump, energy dissipation due to jump, jump efficiency, relative loss of energy	2

7	Straight drop spillway- Components and their functions, hydrologic, hydraulic and structural design	4
8	Drop inlet spillway-Components and their functions, hydrologic, hydraulic and structural design	2
9	Chute Spillway-Components and their functions, hydrologic, Hydraulic and structural design	3
10	Criteria of selection of appropriate structures as per soil, land use and climatic conditions	1
11	Design of energy dissipaters in soil and water conservation structures	1
12	Introduction, types, design, criteria and construction of earthen dam, causes of failure of earthen dam, retaining wall and its design	3
13	Stability analysis of land slopes and soil mass including landslides, seepage control in earthen dams, flow net in earthen dams	2
14	Water harvesting: principles, importance and issues. Water harvesting techniques: classification based on source, storage and use. Runoff harvesting: short-term and long-term harvesting techniques, purpose and design criteria.	3
15	Mechanized construction techniques for soil and water conservation structures	1
	Total	**32**

List of Practicals

S.No.	Topic	No. of Practicals
1	Construction of specific energy and specific force diagram	1
2	Measurement of hydraulic jump parameters and amount of energy dissipation	2
3	Hydrologic and hydraulic design of a straight drop spillway	1
4	Determination of uplift force and construction of uplift pressure Diagram	1
5	Determination of loads on head wall and construction of triangular Load diagram	1
6	Stability analysis of a straight drop spillway	1
7	Hydraulic design of a chute spillway	1
8	Design of drop inlet spillway	1
9	Design of energy dissipating structures	1
10	Design of earthen dam	1
11	Seepage analysis in earthen embankment	1
12	Design of water harvesting structures	1
13	Economic analysis of water harvesting structures	1
14	Field visit to already constructed water harvesting structures in the nearby area/ watershed.	1
	Total	**15**

Suggested Reading :

1. Murty VVN 1988. *Land and Water Management Engineering.* Second Edition Kalyani Publishers, New Delhi.
2. Singh Gurmel C, Venkataraman G, Sastriand B.P. Joshi 1991. *Manual of Soil & Water conservation Practices*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Singh PK 2000. *Watershed Management (Design and Practice)*.e-media publications, Udaipur.
4. Suresh R 2006. *Soil and Water Conservation Engineering*. Fourth Edition Standard Publishers and Distributors, Delhi.
5. Singh Raj Vir. 2003. *Watershed Management*. Second Edition, Yash Publishing, Bikaner.
6. Mahnot, SC Singh PK and Chaplot PC 2011.*Soil and Water Conservation and Watershed Management*. APEX publishing house,Udaipur.
7. Mutreja K. N. Applied Hydrology, Tata McGraw Hill Publication