

**Course No. : SWCE – 355**

**Title: Soil Conservation Structures Design**

**Sem : V**

**Credit: 3 (2+1)**

**Theory:**

Introduction; classification of 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; hydraulic jump and its application, type of hydraulic jump, energy dissipation due to jump, jump efficiency, relative loss of energy; runoff measuring structures-parshall flume, H - flume and weirs; 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, structural design of a drop spillway- forces on retaining wall, determination of saturation line, seepage under the structure, uplift pressure estimation, safety against sliding, over turning, 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 and reservoirs, cost estimation of structures.

**Practical:**

Study of H-flume; Study of Parshall flume; Construction of specific energy and specific force diagram; Measurement of hydraulic jump parameters and amount of energy dissipation; Hydraulic design of a straight drop spillway; Determination of uplift force and construction of uplift pressure diagram; Determination of loads on headwall and construction of triangular load diagram; Stability analysis of a straight drop spillway; Hydraulic design of a chute spillway; Design of a SAF energy dissipater; Design of small earth embankments and water harvesting structures; Cost estimation of structures.

**DEPARTMENT OF SOIL AND WATER CONSERVATION  
ENGINEERING**

**Lesson Plan for the B. Tech.[Agril. Engg.] from 2007-08**

Course No.: **SWCE-355**

Course Title: **Soil Conservation Structure Design.**

Credit: **3 ( 2+1)**

Semester- **V**

Lect. No.	Topic	Book No.	Article No.	Page No.
1	Introduction, classification of structures, functional requirements of soil erosion control structures	2	9.1-9.2	172-173
2	Open channel flow, types of flow, state of flow, Regime of flow	6	1.1-1.4	1-16
3 and 4	Energy & Momentum principles Specific energy & Specific force criteria for critical state of flow.	6	3.1-3.2,3.3,3.6, 3.7	39-43 49-55
5 and 6	Hydraulic jump, loss of energy in hydraulic jump, Application of hydraulic jump, types of hydraulic jump	4	5.4	193-196
7	Dissipation of energy due to jump, jump efficiency	4	5.4	196-200
8	Runoff measuring structures: Parshall flume, H- flume & weirs	7	4.4	57-68
9 and 10	Straight drop spillway: General description, functional uses, adaptability, advantages & limitations, components of drop spillway	1	5.4	234-236
		4	4.7	172-175
11 and 12	Hydraulic and Hydrologic design	1	5.4	236-249
		4	5.1	191-192 206-208
13	Structural design of drop spillway	4	5.4.1	209-214
14 - 15	Forces on retaining wall, gravity dam	3	19.1 to 19.3	944-951
16 to 18	Modes of failure of gravity dam with examples	3	19.4	951-959
19 20	Safety against sliding, overturning, crushing and tension.	1	5.7	280-288
21 22	Chute spillway: General description and its components, hydraulic design.	1	5.4	251-253
		4	5.6	219-223
23	Design of SAF stilling basin	4	-	222-223

24	Drop inlet spillway: functional uses, adaptability, advantages & limitations, design criteria.	1	5.4	253-259
25 and 26	Design of pipe spillway	2	9.11	182-187
		4	5.5.2,5.5.3	215-219
27	Design of diversion drains	7	22.16	480
28 to 29	Small earthen embankments, their types and design principles	3	20.1,20.2,20.8	1041-1044 1054-1055
30 to 32	Farm pond: types, design, site selection, water storage requirements and numericals	2	10.17-10.20	212-217
		5	8.3-8.5	93-107

### **PRACTICALS :**

Practical No.	Title
1	Design of drop spill way
2	Design of stilling basin of drop spillway
3	Design of drop inlet spillway
4	Design of chute spillway
5,6	Design of retaining wall
7	Design of earthen embankment (Fill volume and storage volume)
8	Estimating and costing of earthen embankment
9	Design of farm pond (dug out type)
10	Determination of forces acting on gravity dam

### **TEXT BOOKS :**

1. Manual of Soil and Water Conservation Practices by G.Singh,C.Venkatramanan, G. Shastry and B.P. Joshi.
2. Soil and Water Conservation Engineering by G.O. Schwab, D.D. Fangmeier, W.J., Elliot and R.K. Frevert(edition year 1993).
3. Irrigation Engineering and Hydraulic Structures by S.K. Garg.

4. Soil and Water Conservation Engineering by R. Suresh (second edition).
5. Watershed Management (design & practices) by P.K. Singh.
6. Open Channel Hydraulics by Ven Te Chow.
7. Land and Water Management Engineering by V.V.N. Murty.