

**4CE45: IRRIGATION AND HYDRAULIC STRUCTURES**  
**CREDITS -4 (LTP: 3,1,0)**

**Course Objective:**

1. Understand design concepts of diversion headwork's, canal regulation and cross drainage works
2. Understand design concepts of embankment dams, concrete dams and spillways

**Teaching and Assessment Scheme:**

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	150
3	1	0	4	60	40	20	30	

**Course Contents:**

Unit No.	Topics	Teaching Hours
1	<b>Diversion Headwork:</b> Bligh's creep theory, Lane's weighted creep theory, Khosla's theory, Design of concrete slope weir, Design of Check dams.	09
2.	<b>Canal Regulation works:</b> Cross regulator and distributary head regulator - Sarda fall – Glacis fall – well type fall - canal outlets – types of outlets - design principles of canal structures.	09
3.	<b>Cross drainage works:</b> Determination of maximum flood discharge and waterway for drain, fluming of canal, uplift pressure on underside of barrel roof and at the floor of the culvert, design of bank connections.	07
4.	<b>Embankment Dams:</b> Seepage analysis, principles of design, Stability analysis of embankment dams, settlement and deformation of rock fill dams.	06
5.	<b>Concrete Dams:</b> Design features and stability analysis of concrete dams – roller compacted concrete gravity dams	07
6.	<b>Spillways:</b> Ogee spillway - cavitation on spillway – design features of ogee spillway – Chute spillway – design principle –Energy dissipation – design of different types of stilling basins.	07
<b>Total</b>		<b>45</b>

**List of References:**

1. Modi, P.N., Irrigation, “*Water Resources and Water Power engineering*”, Standard book house, New Delhi.
2. Punmia, B.C. and Pande, B.B, “*Irrigation and Water Power Engineering*”, Laxmi Publication Pvt. Ltd., New Delhi
3. Sharma, R.K., Irrigation “*Engineering and Hydraulic Structures*”, Oxford & IBH, New Delhi
4. Novak, P., Moffat, A.I.B., Nalluri, C. and Narayan, R., *Hydraulic structures* Unwin Press, London
5. Michael, A.M., *Irrigation: Theory and Practice*, Vikas Publishing House Pvt. Ltd., Bombay Course

**Course Outcomes (COs):****After learning the course the students shall be able to:**

1. Design weirs on permeable foundations using various theories and suggest suitable type of cross drainage structures and canal regulation works.
2. Carry out stability analysis of embankment dam under sudden drawdown and steady seepage conditions.
3. Calculate normal stresses, principle stresses and shear stresses at heel and toe of dam and factor of safety of gravity dam against overturning, sliding and shear friction factor.
4. Design an ogee spillway and a chute spillway.
5. Suggest suitable energy dissipation measures.