

IIT Mandi

Proposal for a New Course

Course number : CE451
Course Name : Irrigation Engineering and Hydraulic Structures
Credit : 3-0-0-3
Distribution : L-T-P-C
Intended for : B.Tech. (Civil Engineering)
Prerequisite : CE303
Mutual Exclusion: None

1. Preamble:

This course aims to teach students about the importance of the irrigation system in India. During this course, students will learn about the water requirements of the crops, the hydraulic design of canals, and irrigation structures such as diversion headwork, cross drainage structures, weirs, barrage, dams, etc. In this course, students will also learn about some of the important dams of India and the design criteria for gravity and earthen dams.

2. Course Modules with quantitative lecture hours:

Module I: Crop water requirement Scope of irrigation engineering, Irrigation requirements in India, Soil moisture and plant growth, Crop water requirement, Evapotranspiration, Duty, Delta, irrigation scheduling, methods and efficiency, irrigation water quality.	6 Hours
Module II: Design of Irrigation Channel Alignment; canal capacity; losses; FSL of the canal; design of canal in alluvial soil and nonalluvial soils; Kennedy's silt theory; Lacey's regime theory; balancing depth; use of Garrets diagrams and Lacey's Regime diagrams; the lining of irrigation channels; design of lined canal drainage behind lining; Water logging: Causes, Measures: surface and sub-surface drains, land reclamation	8 Hours
Module III: Diversion head works Introduction; the layout of diversion headwork and its component; Selection of site, Khosla's theory and concept of flow net; safe exit gradient; hydraulic design of weir on Bligh's theory; and design of modern barrage on Khosla's theory; Necessity & functioning of silt excluder & silt extractor.	8 Hours
Module IV: Cross drainage structures Types; selection of the suitable type of Cross drainage works; aqueduct and Siphon aqueduct; determination of maximum flood discharge and waterway	6 Hours

for drain, fluming of the canal; uplift pressure on the underside of barrel roof and at the floor of the culvert; design of bank connections

Module V: Reservoir and planning of dam reservoirs 8 Hours

Types of dams; selection of the type of dam; capacity elevation and area elevation curves; design of reservoir capacity; Rule curves and operating tables; sedimentation of the reservoir; Gravity dams: modes of failure, stability analysis, construction, joints; Earthen dams: types, modes of failure, design criteria, seepage analysis, and control

Module VI: Spillway energy dissipators and Spillway gates 6 Hours

Location of a Spillway; design criteria; controlled and uncontrolled Spillways; Ogee, Chute, Side Channel, Shaft, Syphon Spillways; Energy dissipation; Stilling + basins; Crest gates

Laboratory/practical/tutorial Modules:

3. Text books:

(Latest, Only 2)

1. Irrigation Engineering and Hydraulic Structures, S.K. Garg, Khanna Publications.
2. Irrigation and Water Power Engineering, B.C. Punmia, Laxmi Publication.

4. References:

1. Viessmen, Jr. & Lewis, Introduction to Hydrology, PHI Learning Private Ltd.
2. Larry W. Mays, Water Resources Engineering. Wiley Publications.

5. Similarity with the existing courses:

(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.	Course Code	Similarity Content	Approx. % of Content
1.			

6. Justification of new course proposal if cumulative similarity content is >30%: