INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)**
SEMESTER	**6**
COURSE TITLE	**IRRIGATION ENGINEERING**
COURSE CODE	**01CI0620**
COURSE CREDITS	**4**

Objective:

1 Understand the irrigation methods along with their advantages and disadvantages
2 Know the function of different hydraulic structures of the Irrigation System
3 Determine the depth of irrigation
4 Compute uplift pressure on bottom floor of weir
5 Design the alluvial and non alluvial channel cross section.

Course Outcomes: After completion of this course, student will be able to:

1 Understand functions of hydraulic structure of irrigation system
2 Calculate irrigation water requirement for various crops
3 Determine the pressure at key points of sheet piles and floor thickness for a weir/barrage using Khosla's theory
4 Compute forces acting on the gravity dam
5 Design of the lined and unlined irrigation canal using Manning's equation, Kennedy's and Lacy's theory

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	0	50	30	20	25	25

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Contents : Unit	Topics	Contact Hours
1	**Introduction** Definition, Necessity, Scope, Benefits, and Ill Effects of Irrigation, Types of irrigation schemes, Social and environmental considerations,, Irrigation development in India., Water Requirement of Crops- Duty and delta relation, Soil-waterplant relation- field, capacity, wilting point, available water, Soil moisture extraction pattern, Frequency of irrigation, Consumptive use., Principal Indian crops, Gross command area, Culturable command area, Intensity of irrigation, Irrigation requirements,, Introduction to various methods of application of irrigation water, Irrigation efficiency, assessment of irrigation water	10
2	**Diversion Work; Storage and Outlet Works** Diversion Works: Different stages of a river and their flow characteristics, Weir and barrages,, Various parts of a diversion head work and their functions, Exit gradient, Principles of weir design on permeable formations -Bligh's creep theory and Khosla's theory, Storage and Outlet Works: Types of earthen dams, Gravity dams, Forces acting on a gravity dam, Rock-fill dams,, Spillways, Types of spillways, Spillways gates, and energy dissipation works.	12
3	**Distribution works** Types of irrigation canals, contour canal, ridge canal, side sloping canals, canal alignment, Types of channel, Canal sections-filling, cutting, partial cutting and partial filling, Balanced depth, Canal FSL, Capacity factor and Time factor, L-section, Losses of canal water, Silting, and scouring of canals, Method of design of alluvial and non alluvial canal section, Silt theories, Lining of irrigation channel, Types of lining, Design of lined canal.	10
4	**Regulating and Cross Drainage Works** Cross drainage works, Types of cross drainage works, selection of suitable type of CD works, Necessity and location of canal fall, Types of Canal falls, Canal escapes,, Head regulator and Cross regulator, Silt ejector or, Flow meters - Parshall flume, Irrigation outlets, and types of outlets	6
5	**Miscellaneous Topic** Water logging causes and effect, remedial measure, Drainage principles and practice, Land Reclamation	4
Total Hours		**42**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorial-1** Compute depth of water stored in the root zone	1
2	**Tutorial-2** Determine frequency of irrigation	1
3	**Tutorial-3** Calculate Duty and Delta for crops	1

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
4	**Tutorial-4** Figureout capacity of reservoir for different crops grown in the command area	1
5	**Tutorial-5** Design non allucial channel section	1
6	**Tutorial-6** Design most economical Channel section	1
7	**Tutorial-7** Design alluvial channel using kannedy's theory when Bed slope given	1
8	**Tutorial-8** Design alluvial channel using kannedy's theory when B/D ratio given	1
9	**Tutorial-9** Design alluvial channel using Lacy's theory	1
10	**Tutorial-10** Design lined channel section	1
11	**Tutorial-11** Design weir using bligh's theory	1
12	**Tutorial-12** Compute uplift pressure on key points of the bottom floor of weir/barrage using khosala's specific case 1,2	1
13	**Tutorial-13** Compute uplift pressure on key points of the bottom floor of weir/barrage using khosala's specific case 3 and exit gradient	2
Total Hours		**14**

Textbook :

1 Irrigation & Water Power Engineering, Dr. B.C.Punmia & B.B.Pande, Laxmi Publications, (P)Ltd, New Delhi, 2009

2 Irrigation, Water Resources & Water Power Engineering, Dr. P.N.Modi, Standard BookHouse, Delhi, 2017

3 Irrigation, Water Power & Water Resources Engineering , Dr. K.R.Arora, Standard BookHouse, Delhi, 2018

4 Irrigation Engineering and Hydraulic Structures, S.K.Garg, Khanna Publishers, Delhi, 2016

References:

1 Irrigation Engineering, Irrigation Engineering, S.K. Mazumder, Galgotia Publications Pvt Ltd., New Delhi., 2009

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
5.00	20.00	45.00	10.00	10.00	10.00

Instructional Method:

1. Prerequisites of the course and its pattern shall be discussed at the commencement of the course
2. Lectures shall be conducted in the classroom using various teaching aids.
3. Presence in all academic sessions is mandatory which shall carry 5% marks of the total internal evaluation.
4. A minimum of two internal exams will be conducted and an average of two will be considered as a part of a 15% overall evaluation.
5. At the end of each unit/topic, an assignment based on the course content shall be given to the students which shall carry 5% weightage for timely completion and submission of the assigned work.
6. The assignments/tutorials/technical visits are planned in such a way that they coverthe practical aspects of the course contents.

Supplementary Resources:

1. https://archive.nptel.ac.in/courses/126/105/126105019/
2. https://nptel.ac.in/courses/126105010

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