

B.E. Semester: VII
Department of Civil Engineering

Subject Name: Irrigation Engineering (CV702-N)

Course Category: Program Course Core (PCC)

A. Objectives of the Course:

- To take up the basic concepts of irrigation and construction of various hydraulic structures.
- To introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management.
- The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.
- To develop analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects

B. Teaching & Evaluation Scheme:

Teaching Scheme				Credit	Evaluation Scheme					Total Marks
L hrs	T hrs	P hrs	Total Hrs		Theory		IE	CIA	Pra/Viva	
					Hrs	Marks	Marks	Marks	Marks	
3	2	0	5	5	3	70	30	20	30	150

C. Detailed Syllabus:

- 1. Introduction:** Necessity of Irrigation- Scope of Irrigation Engineering- Benefits and Ill Effects of Irrigation- Irrigation Development in India- Types of Irrigation Systems, Soil-Water Plant Relationship: Classification of Soil Water- Soil Moisture Contents- Depth of Soil Water Available to Plants- Permanent and Ultimate Wilting Point
- 2. Water requirements of crops:** Depth of Water Applied During Irrigation- Duty of Water and Delta Improvement of Duty- Command Area and Intensity of Irrigation Consumptive use of

Water and Evapotranspiration- Irrigation Requirements, Irrigation Efficiencies- Assessment of Irrigation Water

3. Methods of Irrigation:

Classification- choice of method of irrigation- surface and subsurface irrigation methods, Micro irrigation system: Sprinkler and Drip Irrigation

4. Design of Irrigation Channel:

Alignment- Canal Capacity- Losses- FSL of Canal- Design of Canal in Alluvial Soil and Non Alluvial soils- Kennedy's Silt theory- Lacey's Regime Theory- Balancing Depth- Use of Garrets diagrams and Lacey's Regime diagrams- lining of irrigation Channels- Design of Lined canal drainage behind lining.

5. Water Logging:

Causes, Measures: Surface and Sub- Surface Drains, Land Reclamation

6. Diversion Head Works:

Types- selection of the suitable site for the diversion headwork components of diversion headwork- Causes of failure of structure on pervious foundation- Bligh's creep theory, Lane's weighted creep theory, Khosla's theory, Khosla's solution for horizontal floor, correction to superposed values of pressure.

7. Cross Drainage Works:

Types- selection of suitable type of CD works- aqueduct and Syphon aqueduct- 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

8. Canal Regulation Works:

Canal fall- necessity and location- types of falls- Cross regulator and distributory head regulator- their functions, Silt control devices, Canal escapes- types of escapes.

D. Lesson Planning:

Unit No	Title of the Unit	Minimum Hours	Weightage (%)
1	Introduction	02	05
2	Water Requirements of Crops	05	11
3	Methods of Irrigation	05	11
4	Design of Irrigation Channel	09	20
5	Water Logging	03	06
6	Diversion Head Works	09	20
7	Cross Drainage Works	07	16
8	Canal Regulation works	05	11
Total		45	100

E. Assignments:

- 5 Examples and theories from each topic

F. Instructional Method and Pedagogy (Continuous Internal Assessment Scheme CIA):

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures, practical and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.
- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of Mid Semester evaluation.
- Guest lecture about Narmada Yojana will be organized

G. Students Learning Outcomes:

On the successful completion of this course

- Concepts of irrigation and different hydraulic structures
- How to estimate the quantity of water required by crops
- Be able to plan and design irrigation projects.
- Design channels and other irrigation structures required for irrigation, drainage, soil conservation, flood control and other water-management projects.

H. Recommended Study Materials:

a. Text book & Reference Books:

1. Arora, K.R., Irrigation, Water Power And Water Resources Engineering, Standard Publisher Distributors, Delhi
2. Modi, P.N., Irrigation Water Resources and Water Power Engineering, Standard Book House, New Delhi.
3. Garg, S.K., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, New Delhi.
4. Sharma, R.K., Text book of Irrigation Engineering and Hydraulic Structures, Oxford and IBK Publishing House, New Delhi.
5. Sharma, S.K., Principles and Practice of Irrigation Engineering, S. Chand & Company Pvt. Ltd, New Delhi
6. Punmia, B.C., and B.B. Pande, "Irrigation and Water Power Engineering", Laxmi Publication Pvt. Ltd., New Delhi
7. A.M. Micheal, "Irrigation, Theory and Practice", Vikas Publishing House Pvt.Ltd.New Delhi

b. Web Materials:

1. <http://nptel.iitm.ac.in/video.php?courseId=1029&v=XmO2pltg7YBz>
2. <http://nptel.iitm.ac.in/video.php?courseId=1029&v=SO0suW7TLiCs>
3. http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Water%20Resource%20Engg/New_index1.html

4. <http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharag/Water%20Resource%20Engg/pdf/m3102.pdf>
5. <http://nptel.iitm.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3103.pdf>
6. <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3105.pdf>
7. <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3107.pdf>
8. <http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3109.pdf>

c. Indian Code of Practice:

1. IS 11624: Guidelines for the Quality of Irrigation Water
2. IS 10317 : 1982 Guide for evaluation of soil properties relevant to irrigation
3. IS 10799 : 1999 (First Revision) Irrigation equipment - Design, installation and field evaluation of micro irrigation systems - Code of practice (First Revision)
4. IS 10430-2000 Indian Standard Criteria For Design Of Lined Canals And Guidance For Selection Of Type Of Lining
5. IS 7784-2-1: Design of cross drainage works -Code of practice, Part 2: Specific requirements Section I Aqueducts"