B.E. Semester: VII
Civil Engineering
Subject Name: IRRIGATION ENGINEERING (CV703)

A. Course Objective:

- 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 /Examination Scheme:

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract/ Tut.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	02	00	05	05	03	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 efficiencies- assessment of irrigation water

3 Methods of Irrigation:
Classification- choice of method of irrigation- surface and subsurface irrigation methods, 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. Water logging: Causes, Measures: surface and sub-surface drains, land reclamation

5 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- Khosla's theory- Design of concrete sloping glacis weir

6 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- design of bank connections

7 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:

Sr.No.	Title of the Unit	Minimum Hours	Weightage
1	Introduction, Water requirements of crops	5	11%
2.	Methods of Irrigation:	3	7%
3.	Irrigation Channels	15	33%
4.	Diversion head works	10	22%
5.	Cross drainage works	7	16%
6.	Canal regulation works	5	11%

E. List of Tutorials:

Sr. No.	Title
1	Introduction, Water requirements of crops
2	Methods of Irrigation:
3	Irrigation Channels
4	Diversion head works
5	Cross drainage works
6	Canal regulation works

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 and practical which carries marks.
- At regular intervals assignments will be given. Students should submit all assignments during given period.
- Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks
- Internal exam of 30 marks will be conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the field related to course contents.
- The course includes a practical, where students have an opportunity to build an appreciation for the concept being taught in lectures.

G. Students Learning Outcomes:

On the completion of the course one should be able to understand:

- 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. Reference Books:

1. Modi, P.N., Irrigation Water Resources and Water Power Engineering, Standard Book House, New Delhi.

2. Garg, S.K., Irrigation Engineering and Hydraulic Structures, Khanna Publishers, New Delhi.

3. Sharma, R.K., Text book of Irrigation Engineering and Hydraulic Structures, Oxford and IBK Publishing House, New Delhi.

4. Sharma, S.K., Principles and Practice of Irrigation Engineering, S. Chand & Company Pvt. Ltd, New Delhi

5. Punmia, B.C., and B.B. Pande, “Irrigation and Water Power Engineering”, Laxmi Publication Pvt. Ltd., New Delhi

6. 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/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/New_index1.html
4. http://nptel.iitm.ac.in/courses/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3l02.pdf
5. http://nptel.iitm.ac.in/courses/Webcourse contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3l03.pdf
6. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3l05.pdf
7. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3l07.pdf
8. http://nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Kharagpur/Water%20Resource%20Engg/pdf/m3l09.pdf