

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: IRRIGATION ENGINEERING
(COURSE CODE: 3350607)**

Diploma Programme in which this course is offered	Semester in which offered
Civil Engineering	5th Semester

1. RATIONALE

In India water requirement is rapidly increasing due to vast industrial development and population growth. We are mostly dependent on rain as a predominant source of water. Looking to scarcity of water in our country, it is essential to store the water in appropriate manner for anticipated requirement. Irrigation engineering is the artificial process of applying water to the soil to help in growing agriculture crops or maintaining the landscapes when there is shortage of natural water by rain. It deals with the analysis and design of irrigation systems which include dams, weir, barrage, canals, drains and other supporting system etc. This course has been designed to develop theoretical and practical knowledge in order to implement the irrigation designs and operate irrigation systems.

2. LIST OF COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competencies:

- **Implement the irrigation designs and operate irrigation systems.**

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Explain various methods of irrigation
- Compute water requirement for crops
- Implement sprinkler irrigation system and drip irrigation system
- Explain the methods to control the level in Reservoir Planning
- Explain process of evaluation of irrigation project

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
3	0	2	5	70	30	20	30	

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** - Practical; **C** - Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit: I. Water Requirement of Crops	1a. Justify the need and scope of irrigation engineering 1b. Differentiate the terms related to irrigation engineering 1c. Differentiate the various methods of irrigation and ill-effects of over-irrigation	1.1 Need and scope of irrigation Engineering, related terms: Duty, Delta, Base period, Crop period, Kor period, Core depth, Demand, Gross command area, Cultivable Command area, Intensity of Irrigation, Time factor, Capacity factor, Overlap allowance. 1.2 Types of irrigation projects 1.3 Methods of irrigation 1.4 Ill effects of over irrigation
	1d. Explain suitability of soils for crops 1e. Distinguish Duty, base period, crop period for major crops 1f. Compute water requirement for crops	1.5 Soil characteristics: Suitability for crops, Water holding capacity, Soil moisture, Quality of Irrigation water 1.6 Duty, base period, crop period for major crops 1.7 Consumptive use of water 1.8 Assessment of irrigation water
Unit: II Advanced Irrigation Methods, water logging and land reclamation	2a. Differentiate between sprinkler and drip 2b. Irrigation methods 2c. Describe the use sprinkler and drip irrigation system with sketches 2d. State the precautions and maintenance of sprinkler and drip irrigation system	2.1 Advanced Irrigation Methods: <ul style="list-style-type: none"> • Sprinkler Irrigation, • Drip Irrigation
	2e. Explain the causes of water logging, its ill-effects and the Preventive measures 2f. Describe reclamation of land	2.2 Water logging: causes, ill-effects, Preventive measures 2.3 Reclamation of land
Unit: III Reservoir Planning	3a. Interpret surveys required for irrigation project 3b. Describe the methods to calculate the capacity of Reservoir and control the level 3c. Explain the area capacity Curve	3.1 Survey for irrigation project. 3.2 Methods of calculating capacity of Reservoir. 3.3 Data collected for irrigation project. 3.4 Area Capacity curve. 3.5 Silting of reservoir 3.6 Rate of silting, Factors affecting

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
		silting 3.7 Fixing control valves.
Unit: IV Dams and Spillways	4a. Describe the various types of dams and the various factors affecting their site selection. 4b. Differentiate the earthen and gravity dams 4c. State types of failures of dams and their remedial measures	4.1 Types of dams: Earthen and gravity dams
	4d. Distinguish the major features of different types of spillways and their appropriate locations. 4e. State types of failures of Spillways and their remedial measures	4.2 Spillways: features, location, causes failures
Unit: V Evaluation of Irrigation Project	5.1 Describe the main criteria for evaluation of irrigation project 5.2 Explain process of evaluation of irrigation project 5.3 Evaluate a case study	5.1 Theory of water evaluation for Farming use. 5.2 Methodology to value water and evaluate hydraulic investment 5.3 Results of applied methodology 5.4 Case study of irrigation project.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS and MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Water Requirement of crops	08	4	6	6	16
II	Irrigation Methods, Water logging and Land reclamation	18	4	12	10	26
III	Reservoir Planning	06	4	4	4	12
IV	Dams and Spillway	06	4	2	4	10
V	Evaluation of Irrigation Project	04	0	4	2	06
		42	16	28	26	70

Legends: R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table. The actual distribution of marks in the question paper may vary slightly from above table

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (*outcomes in psychomotor and affective domain*) so that students are able to acquire the competencies/course outcomes. Following is the list of practical exercises for guidance.

Note: outcomes in psychomotor domain are listed here as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of Course Outcomes related to affective domain. Thus over all development of Programme Outcomes (as given in a common list at the beginning of curriculum document for this programme) would be assured.

Faculty members should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes

S. No.	Unit No.	Practical/Exercise (Outcomes' in Psychomotor Domain)	Hrs. Required
		Draw Sketches of	06
1.	I	Methods of Irrigation	
2.	III	Layout of drip irrigation	
3.	III	Layout of sprinkler irrigation	
4	V	Types of Dams	
5	V	Types of Spillways	
		Solve Numerical From Given Data to	10
6	II	Compute base period, duty and delta	
7	II	Calculate CCA, GCA, IA	
8	III	Design sprinkler Irrigation system	
9	III	Design drip Irrigation system	
10	IV	Calculate the reservoir capacity	
		Visit Field and Prepare Report	08
11	I to VII	Arrange field visit to irrigation department	
12	I to VII	Arrange field visit to nearby irrigation project	
		Present in a Seminar	04
13	I to VII	Select one topic as a Seminar in group of two or three students and present it using modern teaching aids before teachers and students.	
		Total	28

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Prepare prototype/ model of Spillway and advanced irrigation methods.

9. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

- i. Some live examples of estimation
- ii. Visit to architectural firms

10. SUGGESTED LEARNING RESOURCES

S. No.	Title of Books	Author	Publication
1.	Irrigation theory and practice	A.M.Mitchel	Vikas Pub. House Pvt. Ltd, Delhi.
2	Irrigation, Water Resources and Water Power Engg.	Dr. P.N. Modi	Standard Book House, Delhi.
3.	Hydrology and Water Resources	R.K. Sharma	Dhanpat Rai and Sons, Delhi.
4.	Ground water assessment, Development and management	K.R. Karanth	Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.
5.	Ground water	H.M.Ragunath	New Age international Ltd., New Delhi.
6.	Hydrology and Water Resources Engg.	S.K.Garg	Khanna Pub., Delhi.
7.	Watershed management in India	J.V.S. Moorthy	Willey Eastern Ltd.
8.	Design of small dams.	U.S.B.R.	
9.	Water Resources Engg- Principles and Practice	C. Satyanarayan Murthy	New Age International Ltd., New Delhi

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- **Prof. M. J. Zala**, Lecturer, Civil Engg Dept., BBIT, V.V.Nagar
- **Prof. R.M. Patel**, Lecturer, Civil Engg Dept. G.P. Dahod
- **Prof. A. K. Papat**, Lecturer, Civil Engg Dept. G.P. Dahod
- **Prof. D. V. Jariwala**, Lecturer, Civil Engg Dept., G.P.Valsad
- **Prof. H. K .Rana**, Lecturer, Civil Engg Dept., G.P.Valsad

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. A. K. Jain**, Professor, Department of Civil and Environmental Engineering