

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	5 th Semester

1. RATIONALE

Knowing scarcity of water, we must appreciate water as 'God' Gift'. Our 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., it is essential to store the water in appropriate manner for anticipated requirement.

An attempt has been made to develop theoretical knowledge with significance of investigation planning & designing irrigation structures like dam & spillway, advance water application methods, water logging and evaluation of irrigation projects

2. 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 competency:

- 1) Understand the section of different types of dams.
- 2) To make the students to understand the concept advance water application methods.
- 3) To calculate the capacity of reservoir using area elevation curves
- 4) To Understand the importance and prevention of water logging.
- 5) To evaluate the irrigation project

3. TEACHING AND EXAMINATION SCHEME

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

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

Note: It is the responsibility of the institute heads that marks for **PA of theory & ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit: I. Introduction	1.1 Discuss the importance of irrigation engineering 1.2 Explain various methods of irrigation	1.1 Definition 1.2 Scope of irrigation and irrigation engineering 1.3 Advantages of irrigation 1.4 Ill effects of over irrigation 1.5 Types of irrigation projects purpose wise and administration wise 1.6 Methods of irrigation
Unit: II Water Requirement Of Crops	2.1 Explain suitability of soils for crops 2.2 Explain duty and delta 2.3 Compute water requirement for crops	2.1 Suitability of soils for crops. 2.2 Water holding capacity of soil 2.3 Quality of Irrigation water 2.4 Soil moisture 2.5 Term related to Irrigation: Duty, Delta, Base period, Crop period, Kor period, Core depth, Demand, Gross command area, Culturable Command area, Intensity of Irrigation, Time factor, Capacity factor, Overlap allowance. 2.6 Values of duty, base period , crop period for major crops 2.7 Relation between Duty, Delta & Base period: 2.8 Factors affecting duty 2.9 Methods of reckoning duty and place at which duty is measured. 2.8 Problems on water requirement and capacity of Canal 2.9 Consumptive use of water. 3.0 Assessment of irrigation water
Unit:III Advanced Irrigation Methods	3.1 Explain advanced Irrigation methods 3.2 Design sprinkler irrigation system 3.3 Design drip irrigation system	3.1 Enlist Advanced Irrigation Methods 3.2 Sprinkler Irrigation - Merits & Demerits -Suitability -Types -Components parts. -Installation, operation, Precaution & maintenance -Design 3.3 Drip Irrigation - Merits & Demerits -Suitability -Types -Components parts. -Installation, operation, Precaution & maintenance -Design

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit: IV Reservoir Planning	<p>4.1 Understand surveys required for irrigation project</p> <p>4.2 Explain the methods to control the level</p> <p>4.3 Explain the area capacity curve</p>	<p>4.1 Survey for irrigation project.</p> <p>4.2 Data collected for irrigation project.</p> <p>4.3 Area Capacity curve.</p> <p>4.4 Silting of reservoir</p> <p>4.5 Rate of silting</p> <p>4.6 Factors affecting silting</p> <p>4.7 Fixing control valves.</p> <p>4.8 Methods of calculating capacity of reservoir.</p>
Unit: V Dams & Spillways	<p>5.1 Explain various types of dam</p> <p>5.2 Discuss various factors affecting on site selection of dam</p> <p>5.2 Discuss the comparison of earthen and gravity dam</p> <p>5.3 Describe various type of spillway and its function and location</p> <p>5.4 Discuss types of failure of dam and its remedial measure</p>	<p>5.1 Types of dams</p> <p>5.2 Earthen & Gravity dams</p> <ul style="list-style-type: none"> -Comparison -Components & their function -Methods of construction. -Types of failure & Remedial measures <p>5.3 Spillways</p> <ul style="list-style-type: none"> -Definition -Function -Location & components -Emergency and services -Ogee spillway and bar type spillway -Discharge over spillway -Spillway with & without gates.
Unit:-VI Water logging & land reclamation	<p>6.1 Understand causes of water logging</p> <p>6.2 Describe reclamation of land</p>	<p>6.1 Water logging</p> <ul style="list-style-type: none"> -Ill-Effects of water logging -Causes of water logging -Preventive measures -Reclamation of land
Unit: VII Evaluation of Irrigation Project	<p>7.1 Understand importance of evaluation of irrigation project</p> <p>7.2 Explain process of evaluation of irrigation project</p>	<p>7.1 Introduction</p> <p>7.2 Basic theory of water valuation for farming use.</p> <p>7.3 Methodology to value water & evaluate hydraulic investment</p> <p>7.4 Application of methodology</p> <p>7.5 Results of applied methodology</p> <p>7.6 Case study of major irrigation project.</p>

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	02	2	2	0	04
II	Water Requirement of crops	06	2	4	6	12
III	Advanced Irrigation Methods	14	4	6	10	20
IV	Reservoir Planning	06	4	4	4	12
V	Dams and Spillway	06	4	2	4	10
VI	Water logging & Land reclamation	04	0	6	0	06
VII	Evaluation of Irrigation Project	04	0	4	2	06
		42	16	28	26	70

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

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

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

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

Following is the list of practical exercises for guidance.

Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain

S. No.	Unit No.	Practical/Exercise (Outcomes' in Psychomotor Domain)	Hrs. Required
		SKETCHES	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	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	

S. No.	Unit No.	Practical/Exercise (Outcomes' in Psychomotor Domain)	Hrs. Required
10	IV	Calculate the reservoir capacity	
		FIELD VISIT AND REPORT	08
11		Arrange field visit to irrigation department	
12		Arrange field visit to nearby irrigation project	
		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 & students.	
			28

7. SUGGESTED STUDENT ACTIVITIES

1. Prepare prototype/ model of Spillway and advanced irrigation methods.

8. SUGGESTED LEARNING RESOURCES

S. No.	Title of Books	Author	Publication
1.	Irrigation theory & practice	A.M.Mitchel	Vikas Pub. House Pvt. Ltd, Delhi.
2	Irrigation, Water Resources & Water Power Engg.	Dr. P.N. Modi	Standard Book House, Delhi.
3.	Hydrology & Water Resources	R.K. Sharma	Dhanpat Rai & Sons, Delhi.
4.	Ground water assessment, Development & 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 & 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 & Practice	C. Satyanarayan Murthy	New Age International Ltd., New Delhi

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

1. M. J. Zala, Lecturer, Civil Engg Dept., BBIT, V.V.Nagar
2. R.M. Patel, Lecturer, Civil Engg Dept. G.P. Dahod
3. A. K.Popat, Lecturer, Civil Engg Dept. G.P. Dahod
4. D. V. Jariwala, Lecturer, Civil Engg Dept., G.P.Valsad
5. H.K.Rana, Lecturer, Civil Engg Dept., G.P.Valsad