Lok Jagruti Kendra University
University with a Difference

Diploma in Civil Engineering

Course Code:025050404

Irrigation and Water Resources Engineering

Programme / Branch Name	Diploma in Civil Engineering					
Course Name	Irrigation and Water Resources Engineering				**Course Code**	025050404
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	2	4	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Environmental Studies

3. Rationale

Water Resources Management emphasizes the development and management of water, land and related resources, to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. Also, the groundwater table is declining rapidly due to its excessive use and also due to insufficient rainfall every year. The management of water resources, surface runoff, water losses and groundwater is very important. The knowledge of the availability of water resources, the requirement of cross drainage works like dams, weir and the methods of irrigation are covered in this syllabus. This course is designed in such a way that the water requirements of crops, dams and canal networks for water distribution, the types of distribution works and diversion headworks can be understood for the development of water resources.

4. Objectives

- ✓ To understand the hydrology and hydrologic cycle.
- ✓ To learn about the various surface and groundwater resources.
- ✓ To calculate rainfall and runoff for any catchment.
- ✓ To impart knowledge of various irrigation techniques and water requirements of the crop.
- ✓ To study various storage structures and diversion headworks.
- ✓ To study the stages of planning of any water resources development project.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcomes	% Weightage	Hours
1.	**Hydrology**	1.1. Importance of IWRE 1.2. Definition 1.3. Hydrologic Cycle 1.4. Precipitation 1.5. Measurement of Precipitation 1.6. Evaporation, Transpiration and Evapotranspiration 1.7. Infiltration 1.8. Mean Annual Rainfall 1.9. Average Depth of Rainfall over an Area 1.10. Runoff 1.11. Factors Affecting Runoff	• Understand the Importance of Hydrology and Effect of Hydrologic Cycle on Water Resources. • Learn the Movement of Water by Evaporation and Transpiration. • Calculate Rainfall and Runoff.	20	8
2.	**Reservoir Planning, Dams and Diversion Headworks**	2.1. Types of Reservoirs 2.2. Selection of Site for Reservoir 2.3. Zones of Storage in a Reservoir 2.4. Reservoir Losses 2.5. Determination of Reservoir Capacity Required for a Specified Yield using Mass Curve 2.6. Definition- Dams 2.7. Classification of Dams 2.8. Factors Governing Selection of Type of Dam 2.9. Selection of Site for a Dam 2.10. Types of Diversion Headworks 2.11. Location of Canal Headworks 2.12. Components of Diversion Headworks 2.13. Weir 2.14. Barrage	• Students will Gain Knowledge about Reservoir, Dam, Weir and Barrage, Diversion Headwork Components for Storage of Water. • Understand the Reservoir Losses and Reservoir Capacity.	25	12
3.	**Ground Water Hydrology**	3.1. Aquifer, Aquiclude, Aquifuge and Aquitard 3.2. Porosity, Specific	• Understand the Concept of Ground-Water Flow.	20	8

		Yield and Specific Retention 3.3. Types of Aquifers 3.4. Ground Water Movement-Darcy's Law 3.5. Other Sources of Ground Water			
4.	**Methods of Irrigation and Water Requirements of Crop**	4.1. Definition 4.2. Necessity of Irrigation 4.3. Benefits of Irrigation 4.4. Factors Affecting Choice of Method of Irrigation 4.5. Classification of Irrigation Methods 4.6. Surface Irrigation Methods 4.7. Sprinkler Irrigation Method 4.8. Depth of Water Applied During Irrigation and Frequency of Irrigation 4.9. Crop Seasons and Crops of India 4.10. Crop Period and Base Period 4.11. Duty of Water and Delta 4.12. Factors Affecting Duty of Water 4.13. Methods of Improving Duty of Water 4.14. Command Areas and Intensity of Irrigation 4.15. Examples of Duty and Delta	• Students will learn about the Artificial Method of Irrigation for Crops. • Understand Water Requirements of Crops, Duty and Delta.	25	10
5.	**Planning for Water Resources Development**	5.1. Purposes Served by WRDP 5.2. Classification of WRDP 5.3. Steps Involved in Planning of a WRDP	• Gain Knowledge about the Stages of Planning for any Water Resources Development Project (WRDP).	10	4
				Total Hours	**42**

6. List of Practicals / Exercises

The practicals/exercises have been properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practicals/exercises.

Sr. No.	Practical / Exercises	Key Competency	Hours
1.	**Sketch Work:** Hydrological cycle, Raingauges, Symon's rain gauge, IMD standard rain gauges, Weighing bucket type rain gauge, Tipping bucket type rain gauge, Zones of storage in a reservoir, Components of diversion headworks, Classification of dams, Check dam.	Develop their Drawing skill.	14
2.	Prepare a detailed report on major dams of India.	Knowledge of Dams.	2
3.	Visit a dam or any storage structure and prepare a report on it.	Knowledge of Dam or Any Storage Structure.	4
4.	To conduct a visit to a rain gauge station.	Understand the Methods of Measurement of Rainfall and Types of Rain Gauges.	2
5.	Seminar (Each group of students will prepare a presentation on any given topic & explain it)	To develop their software skill.	4
6.	Prepare a report on sources of water available in the Ahmedabad district.	Sources of Water and Management of Water Requirement.	2
		Total Hours	**28**

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1.	Hydrology	30	30	35	0	0	5
2.	Reservoir Planning, Dams and Diversion Headworks	45	40	15	0	0	0
3.	Ground Water Hydrology	40	40	20	0	0	0
4.	Methods of Irrigation and Water Requirements of Crop	35	25	30	0	0	10
5.	Planning for Water Resources Development	25	50	0	25	0	0

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbooks

1) Irrigation Water Resources and Water Power Engineering by Dr. P.N. Modi, Standard Book House. Pvt. Ltd.

9. Reference Books

1) Hydrology & Water Resources Engineering by S.K Garg, Khanna Publication, Delhi.
2) Irrigation and Water Power Engineering by Dr. B.C. Punmia, Laxmi Publications (P) Ltd.
3) Ground Water by H.M. Raghunath, New Age International Ltd.
4) Hydrology & Water Resources by R.K. Sharma, Dhanpat Rai & Sons, Delhi.

10. Open Sources (Website, Video, Movie)

1) www.nptel.ac.in
2) LJP-Civil-Water Resources Management (YouTube)