

Branch Name:	Civil engineering
Program Code:	ET401
Course Name:	Water Resources Engineering
Course Code:	2ET4010404
Pre-requisite Course:	---

COURSE OBJECTIVE:

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

1. To learn estimation of hydrological parameters.
2. To know planning of reservoirs and dams.
3. To design irrigation projects, canals and other diversion works.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
03	-	02	04	60	40	20	30

DETAILS OF COURSE CONTENTS:

S.NO.	TOPIC	Total Hrs.	WEIGHTAGE
1	Introduction and Hydrology 1.1 Scope & Necessity of W.R.E 1.2 Identify various agencies associated with Water Resource Engineering 1.3 Explain Hydrological cycle 1.4 Describe various forms and types of precipitation 1.5 Explain various types of rain gauges 1.6 Compute average precipitation by various methods 1.7 Describe runoff process and factors affecting on it. 1.8 Describe evaporation process and factors affecting on it. 1.9 Explain hydrograph, unit hydrograph and uses in Engineering. 1.10 Discuss the interlinking of rivers and NRL projects in India.	12	20%
2	Ground Water & its Management: 2.1 Identify various sources of water 2.2 Describe various terms related to “ground water” 2.3 Explain various types of wells with their features 2.4 Discuss necessity of recharging ground water 2.5 Describe various methods of recharging GW 2.6 Explain phenomenon of Coastal aquifer intrusion.	06	20%
3	Storage Works: 3.1 Describe various surveys / investigations to be carried out in storage works.	08	20%

	3.2 Discuss reservoir capacity and losses 3.3 Discuss the storage zones of reservoir 3.4 Give Classification and types Of dams 3.5 Components of Gravity Dam and Earthen dam 3.6 Various Dams in Gujarat.		
4	Distribution Works: 4.1 Explain purpose & Components of distribution works 4.2 Explain barrage and weir 4.3 Classify canals based on their functions 4.4 Discuss suitable construction techniques, materials & equipment's for "canal lining." 4.5 Explain the causes, effects & prevention of water logging.	08	20%
5	Watershed Development & Water Harvesting Structures: 5.1 Describe important characteristics of "water shed" 5.2 Evolve strategies of enhancing people's participation in watershed management. 5.3 Explain necessity of soil erosion 5.4 Describe necessity and importance of rain water harvesting 5.5 Discuss various 'rain water harvesting' methods 5.6 Discuss water reuse.	08	20%

LIST OF PRACTICAL:

SR. No.	Experiment / Exercises
1	Draw the following Sketches : 1. Hydrological Cycle 2. Types of Precipitation 3. Rain gauges 4. Various methods of artificial recharge 5. Component parts of earthen and Gravity dam 6. Diversion head works 7. Cross Drainage Works 8. Various types of rainwater harvesting structures
2	Solve Numerical from given data : 1. Calculate average precipitation for given catchment area using various methods 2. Calculate Runoff for given catchment area using empirical formula. 3. Compute optimum number of rain gauges for given catchment area.
3	Field Visit and Report : Arrange field Visit to irrigation / W.R.I department for collecting existing W.R. data of your district with respect to Importance and necessity of WRE

LIST OF REFERENCES:

Sr.no.	Title	Author
1	Irrigation, Water Resources & Water Power Engg.	Dr. P.N. Modi
2	Hydrology & Water Resources	R.K. Sharma
3	Ground water assessment, Development & management	K.R. Karanth
4	Water Resources Management	Dr.R.P.Rethaliya

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITE:

- 1) <https://swhydrology.gujarat.gov.in/>
- 2) <https://guj-nwrws.gujarat.gov.in/>
- 3) <https://sardarsarovardam.org/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	To learn estimation of hydrological parameters.	2 Understanding
CLO2	To know planning of reservoirs and dams.	2 Understanding
CLO3	To design irrigation projects, canals and other diversion works.	5 Evaluate, 3 Applying
CLO4	Estimate the surface runoff from given precipitation data.	3 Applying, 5 Evaluate
CLO5	Describe various types of survey investigations for reservoir planning.	2 Understanding
CLO6	Design the appropriate rain water harvesting scheme and required structures for given conditions.	3 Applying, 4 Analyzing

Course Learning Outcomes	Program Outcomes(Po's)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CLO1	H				L		L					
CLO2	M											
CLO3	H		H		L						M	
CLO4	M		L									
CLO5	H						L					
CLO6	M	M	H		M						H	

H: High, M: Medium, L: Low