Subject Code: 1ET4010404	**Subject Title: Water Resources Engineering**
Pre-Requisite	---

RATIONALE:

Knowing extremity of water crisis, we must appreciate water as "Nature's greatest gift". We know that ground water table is declining rapidly due to its excessive use and misuse and also due to insufficient rainfall every year. To stress upon the concept of water management and simultaneously to create the awareness about the proper use and conservation of water, this course is specially designed for the students of Diploma in Civil Engineering. An attempt has been made to develop theoretical knowledge with emphasis on certain aspects of water resources engineering.

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 :** 1.1 Scope of W.R.E. 1.2 Necessity of W.R.E. 1.3 Identify various agencies associated with Water Resource Engineering.	04	08
2	**Hydrology :** 2.1 Explain Hydrological cycle. 2.2 Describe various forms and types of precipitation. 2.3 Explain various types of rain gauges. 2.4 Compute average precipitation by various methods. 2.5 Compute runoff using empirical formula. 2.6 Describe evaporation process and factors affecting on it.	08	21

3	**Ground Water:** 3.1 Identify various sources of water. 3.2 Describe various terms related to "ground water" 3.3 Explain various types of wells with their features. 3.4 Discuss necessity of recharging ground water. 3.5 Describe various methods of recharging ground water	06	13
4	**Storage Works:** 4.1 Describe various surveys / investigations to be carried out in storage works including their classification. 4.2 Compute reservoir capacity and losses. 4.3 Discuss purpose of various storage zones of reservoir. 4.4 Draw cross-sections of gravity and earthen dam at various points.	08	21
5	**Distribution Works:** 5.1 Explain purpose of distribution works 5.2 Differentiate between barrage and weir by means of a diagram 5.3 Describe silt control structures 5.4 Classify canals based on their functions. 5.5 Explain factors affecting canal alignment 5.6 Discuss suitable construction techniques, materials &equipment's for "canal lining." 5.7 Explain the causes, effects & prevention of water logging.	08	21
6	**Watershed Development:** 6.1 Describe important characteristics of "water shed". 6.2 Evolve strategies of enhancing people's participation in watershed management.	04	08
7	**Water Harvesting Structures:** 7.1 Describe necessity and importance of rain water harvesting. 7.2 Discuss various 'rain water harvesting' methods, structures and their suitability in various conditions	04	08

COURSE OUTCOME:

After completing this course, student will be able to:

1. Discuss basic concepts of "Water Resources Engineering".
2. Estimate the surface runoff from given precipitation data.
3. Describe various types of survey investigations for reservoir planning.
4. Design the appropriate rain water harvesting scheme and required structures for given conditions.

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 yourdistrict with respect to Importance and necessity ofWRE

LIST OF MAJOR EQUIPMENT/MATERIALS:

1. Rain gauge
2. Working models of storage works
3. Models of cross drainage works
4. Models of rain water harvesting structures

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