

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Civil Engineering			
Semester	IV				Version	1.0.0.0			
Effective from Academic Year			2019-20		Effective for the batch Admitted in			June 2019	
Subject code	1CI2403		Subject Name		WATER RESOURCES & MANAGEMENT				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

**Pre-requisites:**

The students should know basic knowledge for hydraulics (1CI303).

**Course Learning 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.

CO1. Discuss basic concepts of “Water Resources Management”.

CO2. Estimate the surface runoff from given precipitation data.

CO3. Describe various types of survey investigations for reservoir planning.

CO4. Design the appropriate rain water harvesting scheme and required structures for given conditions.

CO5. Describe necessity and importance of watershed management.

**Course Content**

Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
<b>UNIT – 1 INTRODUCTION</b>	1.1 Scope of W.R.M. 1.2 Necessity of W.R.M. 1.3 Forms of Precipitation, Intensity, average, mean annual rainfall. Method of determining them. Theision's polygon, Isohytel, Arithmetical average method.	1a. Discuss the concepts and importance of Water Resources Management (WRM). 1b. Identify various agencies associated with Water Resource Management.	06	04
<b>UNIT – 2 HYDROLOGY</b>	2.1 Define Hydrology, Hydrological Cycle. 2.2 Forms of Precipitation, Intensity, average, mean annual rainfall. Method of determining them. Theision's polygon, Isohytel, Arithmetical average method. 2.3 Peak flood. Concept, Computation. formula, frequency studies, hydrograph and unit hydrograph and applications, their sketches, assumption and applications Empirical formula and their limitations.	2a. Explain Hydrological cycle. 2b. Describe various forms and types of precipitation. 2c. Explain various types of rain gauges. 2d. Compute average precipitation by various methods. 2e. Compute runoff using empirical formula. 2f. Describe evaporation process and factors affecting it.	12	08

	<p>2.4 Run - off, Definition - Factors affecting runoff, computation of runoff.</p> <p>2.5 Infiltration, Concept and importance</p>			
<b>UNIT – 3 GROUND WATER</b>	<p>3.1 Sources of water, Importance of underground water in Gujarat. Terms related to groundwater engineering. -Aquifer, Aquiclude, Aquifuge, Aquifer porosity Specific yield, -Specific retention, storage coefficient, coefficient of permeability, coefficient of transmissibility, Yield, specific yield.</p> <p>3.2 Types of well, Open, (water table) Tube and flowing well. Concept, location and importance.</p> <p>3.3 Construction methods of above well (steps only), Recuperation tests pumping and recuperation.</p> <p>3.4 Recharging of wells. Importance and methods of recharging.</p>	<p>3a. Identify various sources of water.</p> <p>3b. Describe various terms related to “ground water”</p> <p>3c. Explain various types of wells with their features.</p> <p>3d. Discuss necessity of recharging ground water.</p> <p>3e. Describe various methods of recharging ground water.</p>	12	08
<b>UNIT – 4 RESERVOIR PLANNING</b>	<p>4.1 Survey and investigations, Investigations for hydrologic data, Demand of water, rainfall, crop pattern.</p> <p>4.2 Stream flow, flood flow, losses, sedimentation, water quality, tail water curves.</p> <p>4.3 Investigation of reservoir site, Topographic investigations. Catchment at dam site, Survey of borrow area. Geological data. , Reservoir site, dam site, construction materials, Water tightness, suitability of foundation, ground water condition, location of quarry site etc., storage elevation , Economical data - Benefit cost ratio.</p> <p>4.4 Zones of storage, Dead, live &amp; flood storages.</p> <p>4.5 Reservoir losses, Evaporation, seepage and others.</p> <p>4.6 Selection of site for reservoir on the bases of above, Methods of estimating reservoir capacity Trapezoidal, cone, prismoidal formula.</p>	<p>4a. Describe various surveys / investigations to be carried out in storage works including their classification.</p> <p>4b. Compute reservoir capacity and losses.</p> <p>4c. Discuss purpose of various storage zones of reservoir.</p> <p>4d. Draw cross-sections of gravity and earthen dam at various points.</p>	08	08

	<p>4.7 Reservoir sedimentation, method of controlling.</p> <p>4.8 Classification of storage works.</p> <p>4.9. Factors for selecting type of dam</p> <p>4.10. Concept of low and high dam</p> <p>4.11. Component parts of gravity and earthen dam</p>			
<b>UNIT – 5 DISTRIBUTION WORKS</b>	<p>5.1 Purpose of distribution works</p> <p>5.2 Component parts &amp; sketches.</p> <p>5.3 Barrage, Weir ,Comparison of weir and barrage, Causes of failure of weir and remedial measures</p> <p>5.4 Control of silt entry Scouring sluices, silt excluder, silt ejector, head regulator.</p> <p>5.5 Classifications of canal -Ridge and contour Functions of each according to network. Line diagram of network of canal.</p> <p>5.6 Canal Alignment Factors influencing canal alignment.</p> <p>5.7 Canal lining, a. Advantages. b. Types of canal lining materials c. Methods of canal lining.</p> <p>5.8 Regulation works.</p> <p>5.9 C.D. Works. -Types , functions &amp; sketches</p> <p>5.10 Outlets. - types, situation, functions &amp; sketches</p> <p>5.11 Water-logging, effects, causes &amp; prevention.</p>	<p>5a. Explain purpose of distribution works</p> <p>5b. Differentiate between barrage and weir by means of a diagram</p> <p>5c. Describe silt control structures</p> <p>5d. Classify canals based on their functions.</p> <p>5e. Explain factors affecting canal alignment</p> <p>5f. Discuss suitable construction techniques, materials &amp; equipments for "canal lining."</p> <p>5g. Explain the causes, effects &amp; prevention of water logging</p>	10	08
<b>UNIT – 6 WATERSHED DEVELOPMENT</b>	<p>6.1 Concept of 'watershed'</p> <p>6.2 Characteristic of watershed, size, shape, physiographic, slope, climate, drainage, land use, vegetation, geology, hydrology, hydrogeology, socio-economics.</p> <p>6.3 Watershed management &amp; people's participation.</p> <p>6.4 Role of co-operative society in watershed management .</p>	<p>6a. Describe important characteristics of "water shed".</p> <p>6b. Evolve strategies of enhancing people's participation in watershed management.</p>	06	05
<b>UNIT – 7 WATER RESOURCE PROJECT PLANNING</b>	<p>7.1 Necessity of Rain water harvesting</p> <p>7.2 Importance of Rain water harvesting</p> <p>7.3 Rain water harvesting methods - Check dams. - Nala / Gully plugging - Percolation tank. - Khet-talawadi - Roof harvesting - Vegetation .</p>	<p>7a. Describe necessity and importance of rain water harvesting.</p> <p>7b. Discuss various 'rain water harvesting' methods, structures and their suitability in various conditions.</p>	06	04

		Total	60	45
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List of Practical		
No.	Unit	Name of Practical/Exercise
1		<b>Draw the following Sketches :</b>
	II	Hydrological Cycle
	II	Types of Precipitation
	II	Rain gauges
	III	Various methods of artificial recharge
	IV	Component parts of earthen and Gravity dam
	V	Diversion head works
	V	Cross Drainage Works
	VII	Various types of rainwater harvesting structures
2		<b>Solve Numerical from given data:</b>
	II	Calculate average precipitation for given catchment area using various methods.
	II	Calculate Runoff for given catchment area using empirical formula.
	II	Compute optimum number of rain gauges for given catchment area.
3		<b>Seminar</b>
	I to VII	Select one topic as a Seminar and present it using modern teaching aids before teachers & students.
4		<b>Field Visit and Report :</b>
		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 WRM

List of Instruments / Equipment / Trainer Board	
1	Rain gauge
2	Working models of storage works
3	Models of cross drainage works
4	Models of rain water harvesting structures.

List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Irrigation, Water Resources & Water Power Engg.	Dr. P.N. Modi	Standard Book House, Delhi.
2	Hydrology & Water Resources	R.K. Sharma	Dhanpat Rai & Sons, Delhi.
3	Ground water assessment, Development & management	K.R. Karanth	Tata Mc Graw Hill Pub. Co. Ltd., New Delhi.
4	Water Resources Management	Dr.R.P.Rethaliya	Atul Prakashan

Link of Learning Web Resource	
1	<a href="http://nptel.ac.in">nptel.ac.in</a>

## PO & CO Mapping

Sr. No.	Name of PO	Description	Co1	Co2	Co3	Co4	Co5
1	PO 1	Acquire fundamental knowledge of mathematics, science, and civil engineering.	None	Slight	Moderate	Slight	None
2	PO 2	Design and conduct experiments, as well as analyze and interpret data.	Moderate	Moderate	Moderate	Substantial	Moderate
3	PO 3	Use the techniques, skills, and modern engineering tools necessary for engineering practice	None	None	Slight	Slight	None
4	PO 4	Function in multi-disciplinary teams and identify, formulate, and solve engineering problems.	Slight	Substantial	Slight	Slight	Slight
5	PO 5	Clear understanding of his duties and responsibilities as a civil engineer.	Substantial	None	Moderate	Slight	None
6	PO 6	Develop effective communication skill and provide leadership for professional development.	Slight	Moderate	Slight	Slight	None
7	PO 7	Engage in life-long learning in civil engineering field and comprehend issues related to environment and sustainable development.	Moderate	Moderate	Moderate	Slight	None
8	PO 8	Graduate will demonstrate knowledge of professional and ethical responsibilities.	Slight	None	Slight	None	None
9	PO 9	Incorporate economics and business practice including project and risk management.	Slight	Slight	Substantial	Moderate	Moderate
10	PO 10	Graduated are able to share their knowledge to the industries as well as society.	Moderate	None	Slight	None	Slight
11	PO 11	Graduated will be able to apply their skill and knowledge for the sustainable development of nation.	Moderate	None	Moderate	Slight	Slight
12	PO 12	Graduated are able to learn to work with the team and also with the inter discipliners.	Slight	None	Slight	Slight	Slight