GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

Course Curriculum

WATER RESOURSE ENGINEERING
(Code: 3336302)

Diploma Programme in which this course is offered	Semester in which offered
Agricultural Engineering	3rd

1. **RATIONALE.**

Knowing extremity of water crisis, we must appreciate water as 'God's greatest Gift'. Our water requirement is rapidly increasing due to vast industrial development and population growth. We are mostly dependent on rains as a predominant source of water.
The other important source of water is the ground water which is dependent on rainfall. We know that ground water table is declining very fast due to its increased use and also due to insufficient rainfall every year, the ground water table is gradually lowering down.
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 Agriculture Engineering.
An attempt has been made to develop theoretical knowledge with significance of water resources aspects. The finalization of topics viz. Hydrology, runoff, watershed management, recharging etc. have been specifically emphasized in the curriculum as per present needs.

2. COMPETENCY.

The course content should be taught and the curriculum should be implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- Design the open well and tube well for managing water resources under given conditions

3. TEACHING AND EXAMINATION SCHEME.

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
2	0	2	4	70	30	20	30	

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

4. COURSE DETAILS.

Unit	Outcomes (in cognitive domain)	Major Learning Topics and Sub-topics
Unit – I Introduction	1a. Explain Hydrological cycle 1b. State Hydrological equation 1c. Enlist Factors affecting rainfall and Rainfall Measurment Devices 1d.Explain Runoff and its estimation.	1.1 Hydrological cycle. 1.2 Hydrologic equation and its components 1.3 Geohydrological and hydrological balance. 1.4 Rainfall and its measurement. Factors affecting rainfall. 1.5 Run off, factors affecting runoff. 1.6 Estimation of runoff.
Unit– II Well Hydraulics	2a.Explain Ground water source 2b. Define different terms related to Ground water 2c. Define different terms related to Well Hydraulics 2d . Explain Ground water Recharge.	2.1 Ground water sources 2.2 Types of water bearing formations (confined, unconfined aquifer etc.) 2.3 Aquifer characteristics influencing yield of wells 2.4 Determination of aquifer constant 2.5 Specific capacity of wells 2.6 Different terms related to well hydraulic such as water tables, isobath, isobar lines, draw down 2.7 Recharge of ground water
Unit–III Open Wells and Tube Wells	3a. Enlist Different Types of Wells 3b. Explain Design parameters and construction of open well 3c. Explain methods of drilling tube well 3d. Enlist objectives and methods of well installation and well development 3e. Explain testing of tube well	3.1 Types of wells 3.2 open wells, 3.2.1 design parameters of open well 3.2.1 construction of an open well, 3.3 tube wells 3.3.1 methods of drilling tube wells-rotary drilling, core drilling and percussion drilling. 3.4 Well installation and well development-objectives and methods. 3.5 Testing of tube well.
Unit–IV Measurement of Water	4a. Various units of water measurement 4b. Various methods of water measurement	4.1 Units of water measurement 4.2 Direct and indirect methods of water Measurement. 4.3 Measurement of water in pipes and open channels.

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

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Introduction	04	08	06	00	14
2	Well Hydraulics	06	06	03	05	14
3	Open Wells and Tube Wells	10	12	06	10	28
4	Measurement of Water	8	07	03	04	14
	Total	**28**	**33**	**18**	**19**	**70**

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

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

General Notes:

1. If mid sem test is part of continuous evaluation, unit numbers I and II are to be considered.
2. Ask the questions from each topic as per marks weightage. Numerical questions are to be asked only if it is specified. Optional questions must be asked from the same topic.
3. In examination, example of same chapter is to be asked in place of example.

6. SUGGESTED LIST OF EXERCISES/PRACTICALS.

The exercises/practical/experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency. Following is the list of exercises/practical/experiments for guidance.

Sr. No.	Unit No.	Practical Exercise (Any Seven)	Teaching Hours
1	1	To study the rainfall measurement system	04
2	2	To study the types of water bearing formations	08
3	3	To study the water conveyance through open channel	04
4	2	To study the subsurface system of water conveyance	04
5	4	Measurement of water flowing through various outlets	08
		Total	**28**

7. LIST OF STUDENT ACTIVITIES:

Following is the list of proposed student activities like:

a. Seminar by Students on construction & operation of various components of engine, associate systems like cooling system, lubricating system etc.

b. Prepare Display Board such as fuel injection system etc.., & Chart like 2 & 4 Stroke engine, various cycles.

c. Study Cut section model of S.I & C.I engine.

d. Assembly and disassembly of Engine components, cooling and lubricating system etc.

e. Teacher guided self learning activities to prepare report as an assignment from industrial survey/internet/library/or group discussion on any of the automobile transmission mechanisms.

8 SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Books	Author	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.	Ground water	H.M.Ragunath	New Age international Ltd., New Delhi.
5.	Hydrology & Water Resources Engg.	S.K.Garg	Khanna Pub., Delhi.
6.	Watershed management in India	J.V.S. Moorthy	Willey Eastern Ltd.
7.	Design of small dams.	U.S.B.R.	

B. List of Major Equipment/ Instrument

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

C. List of Software/Learning Websites

1. **http://auto.indiamart.com/auto-technology/auto-tech-engine.html**
2. **http://inventors.about.com/library/weekly/aacarsgasa.htm**
3. **http://www.nextgreencar.com/lpg-cng.php**
4. **http://www.air-quality.org.uk/26.php**
5. **http://www.engineering.com/Videos/VideoPlayer/tabid/4627/VideoId/573/Internal-Combustion-Engine.aspx**
6. **http://www.youtube.com/watch?v=uB2cmkWbCMI**
7. **http://www.animatedengines.com**
8. **http://en.wikipedia.org/wiki/Internal_combustion_engine**