GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Civil Engineering

Subject Code: ME02065101

Subject Name: Water Resources Parameters Field and Laboratory Tests

w. e. f. Academic Year:	2024-2025
Semester:	2
Category of the Course:	Professional Elective Course

Prerequisite :	Elementary knowledge of hydrology and hydraulics.
Rationale:	The students will develop, for measurement and estimation of water resources parameters; an in depth understanding of field measurements, laboratory tests and the principles involved thereof .

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Conceptualize basic principles of field measurements.	R,U
02	Assess the requirement of water resources field data	U,A,N
03	Capture surface water/ ground water/ hydro-meteorological data/information using appropriate instrumentation.	A,N
04	Apply principles of hydrology in flow measurements,	A,N
05	Solve real world problems,Analyzing extent of uncertainties and its quantification related to water resources field data	A,N,E,C

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	2	4	70	30	20	30	150

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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction, Experimental Design, Program Planning: Introduction, Measurement vs Calculation vs Estimation; Statistics of Field Data, Probability of Occurrence, Statistics and Probability Hypothesis Testing and Experimental Design; Uncertainty and Error Analysis.	**11**	**30**
2.	Groundwater Measurements and Methods: Groundwater Hydraulics and Principles; Well Construction; Hydraulic Tests and Measurements; Electrical Resistivity and Seismic Methods, Use of Darcy's law, Thermal Property Testing; Groundwater- quality Sampling.	**11**	**25**
3.	Surface-Water and Meteorological Measurements and Methods: Open-Channel Hydraulics; Measurement Principles; Hydro-acoustics; Electromagnetics, ,Stream flow measurements, Rating Curves, area velocity methods, Indirect Measurements Hydrometry stations,, Tracer Studies, Meteorological Measurements; Seepage water at dams and its analysis, Measurement of irrigation water, Measurement of water at water supply and waste water treatment plants, quality sampling	**17**	**30**
4.	Sediment and Water Quality Measurements and Methods: Sediment Principles; Water-quality Measurement Principles; Sample Collection. Direct and Indirect Methods of sediment measurements, Suspended ad Bed Load Measurements, Sample Preparation Concentration determination and Interpretation.	**06**	**15**
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	20	30	20	15	5

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Engineering Hydrology–K. Subramanya
2. Stochastic Hydrology–P. Jayrami Reddy
3. Applied Hydrology– V. T. Chow, D. R. Maidment, L.W. Mays
4. Ground Water –H. M. Raghunath
5. Numerical Ground Water Hydrology – A. K. Rastogi
6. Mechanics of Sediment Transport –R J Garde, K G RangaRaju
7. Statistical Methods in Hydrology- Hann, C.T

(b) Open source software and website:

https://www.fao.org/4/T0848E/t0848e-09.htm
https://www.fao.org/4/ai586e/ai586e03.pdf
https://www.weather.gov/media/epz/mesonet/CWOP-WMO8.pdf

Suggested Course Practical List: If any

1. Use of automatic weather station measurement of meteorological parameters
2. Measurement of Rainfall
3. Water quality measurements
4. Application of measured data for Civil Engineering

List of Laboratory/Learning Resources Required:

1. Weather station

Suggested Project List: Designing and Fabrication of Laboratory set upswith digital and manual measurement capabilities

Suggested Activities for Students: If any: Identifying the sources of water resources data, procurement and analysis

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