

Branch Name:	Civil engineering
Program Code:	ET401
Course Name:	Hydraulics
Course Code:	2ET4010303
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. Measure the pressure and flow of water in different conditions using various measuring devices
2. To understand parameters associated with fluid flow and hydrostatic pressure.
3. Compute discharge and loss of head through pipes, open channels, notches and other hydraulic structures.

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	00	02	04	60	40	20	30

DETAILS OF COURSE CONTENTS:

S. NO.	TOPIC	Total Hrs.	WEIGHTAGE (%)
1	Pressure measurement and Hydrostatic pressure 1.1 Technical terms used in Hydraulics – Fluid Mechanics, Hydrostatics, Hydro kinematics, Hydrodynamics -Ideal and Real Fluid. 1.2 Properties of liquid – Viscosity, Density, Specific Gravity, Surface Tension, Capillarity, Vapour Pressure 1.3 Various types of pressure – Atmospheric Pressure- Gauge Pressure-Absolute Pressure Vacuum Pressure 1.4 Measurement of difference of pressure using “U” tube Manometer and inverted “U” tube Manometer 1.5 Relationship between pressure and depth of liquid 1.6 Pressure diagram for different conditions 1.7 Computation of Total Pressure and depth of the center of pressure	10	20
2	Hydro kinematics & Hydrodynamics 2.1 Discharge & its units 2.2 Continuity Equation 2.3 Types of flow: - Laminar, Turbulent, Uniform, Non-	08	20

	uniform, Steady, Un-steady, Rotational and ir-rotational. 2.4 Reynold's number 2.5 Types of Energy – Potential, Pressure, and kinematics 2.6 Bernoulli's theorem: statement, assumptions, derivation & limitations.		
3	Hydraulic Coefficients & Notches And Weirs : 3.1 Different types of orifice 3.2 Compute different Hydraulic Coefficient 3.3 Identify types of Notches and weirs 3.4 Calculate discharge through notches and weirs	08	20
4	Flow Through Pipes : 4.1 Explain Energy (Head) losses 4.2 Draw Hydraulic Gradient Line (HGL) and Total Energy Line (TEL) 4.3 Pipeline network using formula :- compound & Equivalent Pipe	08	20
5	Flow Through Open Channel : 5.1 Analyse uniform flow 5.2 Understand Specific Energy Diagram 5.3 Describe Procedure for measuring Velocity of flow 5.4 Calculate discharge of open channel: - rectangular & trapezoidal channel.	08	20

LIST OF PRACTICAL:

Sr. No.	Experiment
1	Measure the pressure of water in pipe using (a) Piezometer (b) Different types of manometers
2	Determine discharge through a given venturimeter.
3	Determine coefficient such as C _c , C _v , and C _d for different types of orifices
4	Compute coefficient of discharge for V notch.
5	Compute coefficient of discharge for Rectangular notch.
6	Determine loss of head in various diameter of pipes on loss of head

LIST OF REFERENCES:

Sr.no.	Title	Author
1	Hydraulics, Fluid Mechanics and Hydraulic machine	R. S. Khurmi
2	Hydraulics, Fluid Mechanics and Hydraulic machine	R K Bansal

3	Fluid Mechanics	A K Jain
4	Hydraulics, Fluid Mechanics and Hydraulic machine	S.Ramamrutham

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITE:

1. <http://www.nptel.iitm.ac.in/video>
2. www.waterbouw.tudelft.nl/
3. www.learnrstv.com
4. www.blackwellpublishing.com
5. www.hrpwa.org

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Measure the pressure and flow of water in different conditions using various measuring devices	3 Applying 5 Evaluating
CLO2	To understand parameters associated with fluid flow and hydrostatic pressure.	2 Understanding
CLO3	Compute discharge and loss of head through pipes, open channels, notches and other hydraulic structures.	3 Applying 5 Evaluating
CLO4	Determine head loss of fluid flow through pipes	5 Evaluating
CLO5	Find the fluid flow parameters in open channels	5 Evaluating 6 Designing

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

H: High, M: Medium, L: Low