

Subject Code: 1ET4010303	Subject Title: Hydraulics
Pre-Requisite	----

RATIONALE:

The basic knowledge about hydraulics and fluid mechanics will be useful in subjects like Irrigation, Water Resources Management and Public Health Engineering. In this course, basics of hydraulics and its application oriented content has been kept with a focus that students should be able to solve practical problems. Competencies developed by this course would therefore be useful for students while performing his/her job in the field of Water resources / Irrigation/PHE and Environment 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. 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	01	02	05	60	40	20	30

DETAILS OF COURSE CONTENTS:

S. NO.	TOPIC	Total Hrs.	WEIGHTAGE
1	Introduction : 1.1 Explain the terms associated with Hydraulics 1.2 Clarify different properties of liquid	03	09
2	Pressure and pressure measurement: 2.1 Describe different types of pressure 2.2 Methods and equipment's of pressure measurement	04	10
3	Hydrostatics : 3.1 Relationship between pressure and depth of liquid 3.2 Pressure diagram for different Conditions 3.3 Total pressure and centre of Pressure 3.4 Computation of Total Pressure and depth of centre of pressure.	05	10

4	Hydro kinematics : 4.1 Explain different types of flow 4.2 Reynold's number 4.3 Derive Continuity Equation	04	10
5	Hydrodynamics : 5.1 Explain different kinds of energy 5.2 Apply Bernoulli's theorem to measure the pressure and Discharge. 5.3 Momentum Equation	05	10
6	Hydraulic Coefficients : 6.1 Different types of orifice 6.2 Compute different Hydraulic Coefficient	03	09
7	Notches And Weirs : 7.1 Identify types of Notches and weirs 7.2 Calculate discharge through notches and weirs	06	14
8	Flow Through Pipes : 8.1 Explain Energy (Head) losses 8.2 Draw Hydraulic Gradient Line (HGL) and Total Energy Line (TEL) 8.3 Pipeline network using formula and nomogram	06	14
9	Flow Through Open Channel : 9.1 Analyse uniform flow 9.2 Understand Specific Energy Diagram 9.3 Describe Procedure for measuring Velocity of flow 9.4 Calculate discharge.	06	14

COURSE OUTCOME:

After completing this course, student will be able to:

1. Measure pressure and determine total hydrostatic pressure for different conditions
2. Understand various parameters associated with fluid flow
3. Determine head loss of fluid flow through pipes
4. Find the fluid flow parameters in open channels

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 Cc, Cv, and Cd for different types of orifices

4	Compute coefficient of discharge for V notch and Preparation of calibration graph for interpolation and extrapolation
5	Compute coefficient of discharge for Rectangular notch and Preparation of calibration graph for interpolation and extrapolation
6	Determine loss of head in various diameter of pipes and effect of material of pipe on loss of head

LIST OF MAJOR EQUIPMENT/MATERIALS / TRAINER BOARD:

1. U tube Manometer
2. Venturimeter
3. Orifice meter
4. V-notch / Rectangular notch
5. Reynolds's Number
6. Friction losses in pipe
7. Bernoulli's Apparatus

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