

GANPAT UNIVERSITY					
FACULTY OF DIPLOMA ENGINEERING					
Programme	Diploma in Civil Engineering				
Semester	III		Version	1.0.0.0	
Effective from Academic Year		2026-27	Effective for the batch Admitted in		JULY 2025
Course code	1CI3103	Course Name	Hydraulics		

I. TEACHING-LEARNING AND ASSESSMENT SCHEME																			
Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1CI3103	Hydraulics	3	0	1	4	3	0	2	3	8	40	60	100	30	20	50	20	170

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	NLH - Notional Learning Hours	SLA - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		SA - Summative Assessment

II. PRE-REQUISITES				
The students should know the basic fundamental and terminology used in physics and mathematics.				
III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES				
Able to apply fundamental hydraulics principles to analyze, measure, and solve practical water-related problems in pipes, channels, and hydraulic systems at site and laboratory level.				
IV. COURSE LEARNING OUTCOMES				
At the end of the course, students will be able to achieve the following course learning outcomes: CO1. Define key hydraulic terms and describe the properties of fluids (viscosity, density, etc.). CO2. Classify pressures, measure pressure differences, and relate pressure to depth in fluids. CO3. Analyze fluid flow types and apply Bernoulli's equation to solve for pressure and discharge. CO4. Calculate hydraulic coefficients for orifices and design systems for discharge through notches and weirs. CO5. Analyze and design open channel flow, and measure velocity and discharge using various techniques.				
V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:				
Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
Unit-1 Introduction	TLO 1.1 State the terms associated with Hydraulics. TLO 1.2 Describe different properties of Liquid.	1.1 Technical terms used in Hydraulics – Fluid Mechanics, Hydrostatics, Hydro-kinematics, Hydro-Dynamics-Ideal and Real Fluid. 1.2 Properties of liquid – Viscosity, Density-Specific-Gravity-Surface Tension-Capillarity – Vapour Pressure-Elasticity.	04	03
Unit-2 Liquid Pressure and its Measurement	TLO 2.1 Describe different types of pressure and methods of Measurement.	2.1 Various types of pressure – Atmospheric Pressure, Gauge Pressure-Absolute Pressure, Vacuum Pressure Separation Pressure.	06	05

		2.2 Measurement of pressure/s by different methods. 2.3 Measurement of difference of pressure using “U” tube Manometer and inverted “U” tube Manometer.		
Unit-3 Hydrostatics	TLO 3.1 State the Relationship Between pressure and depth of liquid. TLO 3.2 Compute total Pressure and Centre of pressure.	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.	06	05
Unit-4 Hydro Kinematics	TLO 4.1 State different types of flow TLO 4.2 Derive Continuity Equation.	4.1 Types of flow - Laminar – Turbulent – Uniform - Non uniform – Steady-Un-steady Rotational and rotational – One, Two and Three Dimensional flow. 4.2 Reynold’s number. 4.3 Continuity Equation.	07	04
Unit-5 Hydro Dynamics	TLO 5.1 Explain different kinds of energy TLO 5.2 Apply Bernoulli’s theorem to measure the pressure and Discharge	5.1 Types of Energy – Potential, Pressure and kinematics 5.2 Bernoulli’s Equation and its applications. 5.3 Momentum Equation.	07	05
Unit-6 Hydraulic Coefficients	TLO 6.1 Compute different Hydraulic Coefficients for different types of orifice.	6.1 Definition and types of orifice. 6.2 Various Hydraulic Coefficients and its relation Coefficient of Contraction, Velocity, Discharge.	07	04
Unit-7 Notches and Weirs	TLO 7.1 Identify types of Notches and weirs. TLO 7.2 Calculate discharge through notches and weirs.	7.1 Types of notches and weirs 7.2 Computation of discharge through notches Rectangular Notch & V –Notch. 7.3 Computation of discharge through weirs, Discharge through narrow crested and broad Crested Weir, Discharge through Cipolletti Weir.	06	06
Unit-8 Flow Through Pipes	TLO 8.1 Explain Energy (Head) losses TLO 8.2 Draw Hydraulic Gradient Line (HGL) and Total Energy Line (TEL) TLO 8.3 Design Pipeline network using Formula and nomogram.	8.1 Characteristics of flow through pipes 8.2 Major and Minor Energy (Head) losses in pipe Flow frictional loss, loss of head at entry , exit, Sudden Enlargement and contraction and at bend.	09	06

		8.3 Computation of major head by Darcy Weisbach Equation. 8.4 Hydraulic Gradient Line (HGL) and Total Energy Line (TEL) 8.5 Design of Pipeline-using Formula & Nomo gram		
Unit-9 Flow Through Open channel	TLO 9.1 Analyse uniform flow TLO 9.2 Understand Specific Energy Diagram TLO 9.3 Describe Procedure for Measuring Velocity of flow TLO 9.4 Calculate discharge.	8.1 Characteristics of open channel flow 8.2 Comparison of pipe flow and channel flow. 8.3 Field examples of open Channel. 8.4 Analyse uniform flow 8.5 Froud's number, 8.6 Hydraulic mean depth concept & computation 8.7 Use of Chezy's and Manning's Formula. 8.8 Most economical sections of channel 8.9 Rectangular, Trapezoidal and circular shapes. 8.10 Specific Energy diagram 8.11 River Gauging 8.12 Measurement of mean velocity using surface float, velocity rod and current meter.	08	07

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL			
Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO 1.1 Understand and demonstrate key fluid properties (viscosity, density) and their effect on hydraulic systems.	Introduction to Hydraulics and study of fluid properties	CO1
2	LLO 1.2 Measure pressure in pipes using piezometer and manometers; analyze pressure distribution.	Measure the pressure of water in pipe using (a) Piezometer (b) Different types of Manometers.	CO2
3	LLO 1.3 Calculate discharge using a venturimeter and apply Bernoulli's equation.	Determine discharge through a given venturimeter.	CO3
4	LLO 1.4 Classify flow as laminar or turbulent using Reynold's number.	Demonstrate use of Reynold's number.	CO3
5	LLO 1.5 Verify Bernoulli's equation and energy conservation in fluid flow.	Demonstrate functioning of Bernouli's apparatus	CO3

6	LLO 1.6 Calculate hydraulic coefficients (Cc, Cv, Cd) for different orifices.	Determine coefficient such as Cc, Cv and Cd for different types of orifices	CO4
7	LLO 1.7 Determine the coefficient of discharge for a V-notch and prepare calibration graphs.	Compute coefficient of discharge for V notch and preparation of calibration graph for interpolation and extrapolation	CO4
8	LLO 1.8 Measure and analyze head loss in pipes of varying diameters and materials.	Determine loss of head in various diameter of pipes and effect of material of pipe on loss of head.	CO2,CO3

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Create flashcards for hydraulic terms and properties, and test yourself with quizzes.
- Measure pressure using manometers and piezometers, and calculate discharge via a Venturimeter.
- Simulate flow types and calculate Reynold's number.
- Compute hydraulic coefficients for orifices and discharge through notches and pipes.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD

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

IX. LIST OF REFERENCE BOOKS

Sr.No.	Title	Author	Publication
1	Hydraulics, Fluid Mechanics and Hydraulic machine	R K Bansal	S.Chand
2	Fluid Mechanics	A K Jain	Khanna Publishers
3	Hydraulics, Fluid Mechanics and Hydraulic machine	R. S. Khurmi	S.Chand
4	Hydraulics, Fluid Mechanics and Hydraulic machine	S.Ramamrutham	Dhanpat Rai

X. LINK OF LEARNING WEB RESOURCE

1	https://nptel.ac.in/books_on_nptel.php
2	https://www.tudelft.nl/en/ceg/about-the-faculty/departments/hydraulic-engineering/
3	https://www.shiksha.com/

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R- Level	U- Level	A- Level	Total Marks
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