

GANPAT UNIVERSITY				
FACULTY OF DIPLOMA ENGINEERING				
Programme	Diploma in Mechanical/Agriculture Engineering			
Semester	III	Version	1.0.0.0	
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025	
Course code	1ME3104	Course Name	Fluid Mechanics and Machinery	

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
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total	
DSC	1ME3104	Fluid Mechanics and Machinery	3	0	1	4	3	0	2	3	8	40	60	100	30	20	50	20

Abbreviation:	CL- Classroom Learning	TL - Tutorial Learning	LL - Laboratory Learning
	SLH - Self Learning Hours	SLA - Self Learning Assessment	CE – Continuous Evaluation
	SEE – Semester End Examination		

II. PRE-REQUISITES
Basic knowledge of Elements of Mechanical Engineering, and Physics.
III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES
Industry and employers expect engineers proficient in fluid mechanics and machinery to be able to analyze, design, and optimize systems involving fluid flow and power generation/absorption. This includes selecting appropriate equipment, troubleshooting performance issues, and using specialized software for simulation and analysis.
IV. COURSE LEARNING OUTCOMES
At the end of the course, students will be able to achieve the following course learning outcomes: CO1. Explain fundamental properties and behaviour of fluids. CO2. Analyze fluid static and pressure measurement systems using continuity, energy, and momentum equations. CO3. Apply fluid kinematics and dynamics principles to solve flow problems. CO4. Evaluate fluid flow through pipes and apply head loss and flow measurement principles. CO5. Explain construction, working, and performance of hydraulic pump and hydraulic turbines.

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 Properties of Fluids	TLO 1.1 Explain various properties of fluids. TLO 1.2 Explain different types of fluids. TLO 1.3 Calculate fluid pressure, total pressure, density, specific weight.	1.1 Explain the history of fluid mechanics and machinery. 1.2 Definition of fluid and explain its types. 1.3 Define Mass density, specific weight, Specific gravity, Viscosity, Surface tension, Capillarity, Compressibility and Bulk modulus. Simple numerical on properties of fluids.	10	07

Unit-2 Fluid Statics	TLO 2.1 Explain Pascal's Law. TLO 2.2 Explain types of pressure measuring devices.	2.1 Pressure Force, Intensity of pressure. 2.2 Construction and working principle of piezometer, simple U-tube manometer and differential U-tube manometers, Construction and working principle of Bourdon tube pressure gauge, Numerical on manometers.	8	06
Unit-3 Fluid Kinematics	TLO 3.1 Apply Continuity equation and Bernoulli's equation. TLO 3.2 Explain different types of fluid flows and patterns.	3.1 Concept of control volume, Types of fluid flow, Continuity Equation. 3.2 Type of fluid flow, type of fluid flow patterns, simple numerical problems.	10	08
Unit-4 Fluid Dynamics and Flow Measurement	TLO 4.1 Explain and derivation of Euler's equation TLO 4.2 Explain fluid flow measuring devices. TLO 4.3 Calculate the flow rate using given flow measuring device.	4.1 Concept and derivation of Euler's equation. 4.2 Classify flow measuring devices, Principle of operation of Pitot tube, Venturi meter, Flow nozzle, Rotameter, Orifice meter, simple numerical problems based on these.	12	08
Unit-5 Flow Through Pipes	TLO 5.1 Explain Reynold's experiment. TLO 5.2 Explain Major and Minor Friction losses. TLO 5.3 Calculate frictional losses using Darcy's equation. TLO 5.4 Explain water hammers effects.	5.1 Concept of pipe and pipe flow, Reynold's number. 5.2 Darcy's equation, Friction factor, and Water hammers effect cause, and remedies. Surge tank, simple numerical problems based on these.	8	06
Unit-6 Hydraulic Pump and Prime Movers	TLO 6.1 Describe the construction and working of different types of hydraulic pumps. TLO 6.2 Explain the construction and working of given hydraulic turbine. TLO 6.3 Evaluate the performance of given hydraulic pump.	6.1 Water lifting devices used in Ancient India (IKS) 6.2 Classification of hydraulic pump (Centrifugal pump, Reciprocating pump, method of priming. 6.3 Construction and working principle, application of Pelton wheel, Francis and Kaplan turbines.	12	10

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL			
Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	LLO 1.1 Conduct experiments on fluid flow and demonstrate & measure pressure using manometers and pressure gauges.	Demonstrate and measure pressure using: I. Various manometers. Ii. Various pressure gauges.	CO1
2	LLO 2.1 Verify Bernoulli's theorem experimentally by measuring pressure head, velocity head, and datum head along a flow system.	Verify Bernoulli's theorem.	CO2
3	LLO 3.1 Measure and analyze fluid discharge using a venturi meter and validate experimental results with theoretical flow equations.	Measure fluid flow by venturi meter.	CO3
4	LLO 4.1 Measure and evaluate fluid discharge using an orifice meter and compare experimental results with theoretical flow equations.	Measure fluid flow by orifice meter.	CO3
5	LLO 5.1 Measure and analyze the discharge of fluid using a V-notch weir and correlate experimental results with theoretical equations.	Measure fluid flow by "V" notch.	CO2
6	LLO 6.1 Estimate the Reynolds number using a standard test rig and identify the nature of fluid flow (laminar, transitional, or turbulent).	Estimate Reynolds number using given Test rig.	CO2
7	LLO 7.1 Determine major and minor head losses in pipe flow using experimental data and compare them with theoretical predictions.	Determine major and minor head loss Through pipes.	CO4
8	LLO 8.1 Conduct performance testing of a centrifugal pump as per BIS standards and evaluate its operating characteristics.	Perform testing of centrifugal pump as Per bis.	CO5
9	LLO 9.1 Determine performance characteristics of reciprocating pumps.	Perform testing of reciprocating pump as Per bis.	CO5
10	LLO 10.1 Study the construction and working principles of different types of water turbines.	Study and write a report on working of Different types of water turbines.	CO5

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)
• Prepare a tabulated summary of the types of pipes available in the market. (The summary includes type, specification, size, range, material, rate, and applications). • Study a residential building water supply system and calculate discharge, pressure, velocity. Solve numerical problems on pressure, discharge, density, viscosity. • Compare centrifugal and reciprocating pumps used in industries based on efficiency, discharge, head, and applications. • Visit pumping station, water treatment plant, or hydropower plant. • Select at least three problems on the manometer and prepare a report containing their solutions.

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD	
1	Different manometers.
2	Pitot tube.
3	Various mechanical pressure gauges.
4	Hydraulic test rig-comprising facilities to verify Bernoulli's theorem, to measure fluid flow by Venturimeter; nozzle; orifice meter, rota meter, "V" notch and major and minor head loss through pipes.
5	Centrifugal pump test rig
6	Reciprocating pump test rig
7	Hydraulic prime movers (Pelton wheel) test rig.
8	Reynolds's experiment test rig.

IX. LIST OF REFERENCE BOOKS			
Sr.No.	Title	Author	Publication
1	Fluid mechanics& hydraulic Machines.	R. K. Bansal	Lakshmi publication
2	Fluid mechanics& hydraulic Machines.	R. S. Khurmi	S. chand& Co. Ltd
3	Hydraulic & Hydraulic machines	R.C. Patel & A.D. Pandya	Acharya Book Depot
4	Fluid mechanics& hydraulic	A.R. Basu	Dhanpatrai
5	Fundamental of fluid mechanics	Dr. D.S. Kumar	Ketson Pub. house
6	Fluid mechanics & hydraulic machines	S.C. Gupta	Person Education
7	Fluid Mechanics & Hydraulic Machines	S. S. Rattan	Khanna Book Publishing Co.

X. LINK OF LEARNING WEB RESOURCE	
1	www.youtube.com/watch?v=VyR8aeioQrU
2	http://www.youtube.com/watch?v=R6_q5gxf4vs
3	https://me.iitp.ac.in/Virtual-Fluid-Laboratory
4	http://www.youtube.com/watch?v=0p03UTgpnDU
5	http://www.youtube.com/watch?v=A3ormYVZMXE
6	http://www.youtube.com/watch?v=TjzKpke0nSU
7	http://www.youtube.com/watch?v=vl7GteLxgdQ
8	http://www.youtube.com/watch?v=cIdMNOysMGI
9	https://nptel.ac.in/courses/112103249
10	https://nptel.ac.in/courses/112105206

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE							
Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Properties of Fluids	CO1	7	4	4	2	10
2	Fluid Statics	CO2	6	2	2	4	8
3	Fluid Kinematics	CO3	8	2	4	4	10
4	Fluid Dynamics and Flow Measurement	CO3,CO4	8	2	4	6	12
5	Flow Through Pipes	CO4	6	2	2	4	8
6	Hydraulic Pump and Prime Movers	CO5	10	4	4	4	12
Grand Total			45	16	20	24	60

XII. COs AND POs AND PSOs MAPPING

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	1	1	1	1	2	1	1
CO2	3	3	1	2	1	1	1	2	2	1
CO3	3	3	2	1	1	2	1	3	2	1
CO4	3	3	2	3	1	1	2	3	3	1
CO5	2	3	3	2	1	1	1	3	3	1
Legends: -3- High 2-Moderate/Medium 1-Slight/Low 0-None										