GANPAT UNIVERSITY

FACULTY OF ENGINEERING& TECHNOLOGY

Programme	Bachelor of Technology				Branch/Spec	Mechatronics Engineering			
Semester	IV				Version	2.0.0.0			
Effective from Academic Year			2025-26		Effective for the batch Admitted in				July 2025
Subject code	2MC4103		Subject Name		FLUID MECHANICS & MACHINES				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	4	0	1	0	5	Theory	40	60	100
Hours	4	0	2	0	6	Practical	30	20	50

Pre-requisites:

1. Basics of Physics
2. Engineering Mathematics

Course Outcomes:

CO 1	The students should be able to clearly distinguish the concept of intensity of Pressure and pressure head and different fluid property.
CO 2	The students should be able to compare different types of fluid flow and evaluate the velocity and acceleration of the flowing fluids.
CO 3	The students should be able to measure the total energy of a flowing fluid.
CO 4	The students should be able to illustrate the use of various flow measuring devices like venture meter, pitot tube, orifice meter and nozzle meter.
CO 5	The students should be able to discuss the working principle of each hydraulic turbine and calculate the power developed by the machine.
CO 6	The students should be able to classify the hydraulic pumps based on the working principle and evaluate their performance characteristics

Theory syllabus

Unit	Content	Hrs
	Part -1 (Fluid Mechanics)	
1	**Property of Fluid:** Type of fluid, law of continuum, property of fluid, viscosity, surface tension, cohesion & adhesion, capillarity / bulk modulus compressibility, compressibility, evaporability & vapor pressure	8
2	**Fluid Static:** Pressure & its measurement, Hydrostatic law, Hydrostatic forces on submerged surfaces, vertical, horizontal, inclined & curved surface, buoyancy and flotation, Met- centric height, Center of Pressure and Center of buoyancy, Types of Equilibrium of Floating Bodies.	9
3	**Fluid Kinematic:** Type of fluid flow and Fluid lines, Continuity Equation in Cartesian coordinate, Circulation and Vortices, Flow Nets, Velocity and potential functions.	6
4	**Fluid Dynamics:** Euler's equation, Bernoulli's equation, Venturimeter, Orifice meter, Pitot tube.	6
5	**Dimensional and Model Analysis** Dimensional Homogeneity, Methods of Dimensional analysis. Similitude, Dimensionless Numbers and its significance.	6

	Part – 2 (Fluid machine)	
6	**Impact of Jet:** Impulse momentum principal force exerted by a jet on fixed flat plate, hinged flat plate, Curve plate, moving flat plate, moving curved plate.	6
7	**Hydraulic turbine:** Impulse reaction turbine, Pelton wheel, Francis Turbine, Propeller & Kaplan turbine, Effective head, available power & efficiencies for above turbines, draft tube, specific speed of turbine, cavitation, and performance characteristics of turbines.	7

8	**Centrifugal Pumps:** Types, construction, velocity diagram, work done, Pump losses & efficiency, Min. speed of pump, Specific speed, cavitation & maximum suction lift, NPSH performance characteristics of C.F pump.	6
9	**Reciprocating Pump:** Classification and main components, Discharge, Work done and power for reciprocating pump, Indicator Diagram and Air vessel.	6

Practical content:	
The Practical/term work shall be based on the topics mentioned above and will be defended by the candidates.	
Text Books:	
1	R. K. Rajput, “A Textbook of Fluid Mechanics and Hydraulic Machines”, S.Chand.
2	R. K. Bansal, “A Textbook of Fluid Mechanics and Hydraulic Machines”, Laxmi Publications (P) Ltd.
Reference Books:	
1	Yunus A. Cengel, “Fluid Mechanics: Fundamentals and Applications”, Tata McGraw Hill Education Private Limited.
2	Frank M White, “Fluid Mechanics”, Tata McGraw Hill Education Private Limited.
3	Jagdish Lal, “Hydraulic Machines Including Fluidics”, MP Publications.
ICT/MOOCs References:	
1	https://nptel.ac.in/courses/112105183/
2	https://nptel.ac.in/courses/112105182/

Mapping of CO with PO and PSO:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	1	0	0	2	0	0	0	1	0	1	1	1	2
CO2	2	3	0	0	0	0	0	0	0	1	0	0	2	1	1
CO3	2	3	0	2	0	2	0	0	0	1	1	0	1	1	1
CO4	3	3	2	1	2	1	0	0	1	0	2	2	3	2	1
CO5	3	2	3	0	2	0	2	0	0	0	0	1	1	1	1
CO6	3	3	3	2	2	0	0	0	0	0	0	1	1	1	1