

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology			Branch/Spec.		Mechanical Engineering		
Semester		III			Version		2.0.0.0		
Effective from Academic Year				2019-20		Effective form the batch Admitted in			July 2018
Subject code		2ME3104		Subject Name		Fluid Mechanics			
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:									
<ul style="list-style-type: none"> Basics of Physics Engineering Mathematics 									
Learning Outcome:									
After learning this course, student should be able to:									
<ul style="list-style-type: none"> Understand the basic concept of fluid mechanics. Understand statics, dynamics and various approaches to fluid mechanics. Understand fundamentals of flow through pipes. Understand basics of compressible flow, behaviour of the fluid under static condition. Know about the basic fundamentals for governing equations of fluid mechanics and engineering. Understand the importance and differentiate the ideal fluid flow and real fluid flow. 									
Theory syllabus									
Unit	Content								Hrs
1	Properties of Fluid: Introduction: Fluid, liquids and gases, physical properties such as density, specific weight, viscosity, compressibility, capillarity, surface tension, vapour pressure, cavitations & it's all effects and remedies, Types of fluids, effect of temperature on viscosity of liquid and gas.								6
2	Fluid Statics: Pressure at a point, centre of pressure, pressure measurement with manometers, buoyant force, meta centre & meta centric height – analytical and experimental determination, buoyancy, equilibrium of floating bodies, stability of a submerged body, stability of floating bodies, determination of the position of the metacentre relative to the centre of buoyancy.								6
3	Fluid Kinematics: Stream line path line, streak line, stream tube, classification of flow of fluid, Reynolds number and critical velocity, Discharge, Continuity equation for three dimensional flow in Cartesian co-ordinates.								6
4	Fluid Dynamics: Euler's equation and its application, Bernoulli's equation and its application, Venturimeter, Orifice meter, pitot tube, generalized energy equation.								4

5	Viscous Flow: Flow between two parallel fixed plates, Counter flow, viscous flow through pipes, Hagen – Poisuille’s equation, friction factor, moody diagram, Darcy-Weisbach equation, stokes law, measurement of viscosity, viscosity index, water hammer & its effects and remedies, surge tanks.	5
6	Turbulent Flow: Introduction, Reynolds Experiment, Frictional loss in pipe flow, expression for loss of head due to friction in pipes, co-efficient of friction, shear stress in turbulent flow, Reynolds expression for turbulent shear stress, velocity distribution in turbulent flow in pipes.	5
7	Compressible Fluid Flow: Thermodynamic concept, speed of a sound wave, Mach number, Mach cone and Mach angle, flow with friction through pipes, adiabatic and isothermal flow, jet propulsion flow through variable area, flow through nozzle, Back pressure variation.	5
8	Dimensional Analysis: Fundamental dimension, dimensional homogeneity, Rayleigh’s method and Buckingham’s theorem for dimensional analysis, dimensionless force ratios, and Hydraulic similitude, model testing.	4
9	Flow Measurement: Measurement of flow with venturimeter, orifice plate, notch, nozzles, bends meter, flow meter and rotameter.	3

Practical content

The practical work shall be based on experimental and analytical work on the topics mentioned above and will be defended by the candidates.

Text Books

1	Dr. R.K. Bansal, “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications.
2	Dr. D.S Kumar, “Fluid Mechanics and Fluid Power Engineering ”, S.K Katariya and Sons
3	R.K. Rajput, “Fluid Mechanics and Hydraulic Machines”, S. Chand Publications.

Reference Books

1	K.L. Kumar, “Engineering Fluid mechanics”, S. Chand & Company Ltd.8th Edition.
2	P.N. Modi and S.M. Seth, “Hydraulics and Fluid Mechanics”, Standard Book House.
3	A.K. Jain , “Fluid Mechanics”, Khanna Publishers.4th edition.

ICT/MOOCs references

1	https://nptel.ac.in/courses/112105171/
2	https://nptel.ac.in/courses/112105183/
3	https://engineeringvidelectures.com/course/805