GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Diploma Engineering		Branch	Mechanical	
Semester	III		Version	1.0.0.0	
Effective from Academic Year	2019-20		Effective for the batch Admitted in		June 2018
Subject code	1ME2303	Subject Name	Fluid Mechanics and Machinery		

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:
Definitions and basic laws of physics with unit system are requirement.

Course Learning Outcomes:
The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes: CO1. To understand fluid properties, fluid flow patterns and flow through pipes in real flow situation. CO2. To apply and explain fluid equations in simple industrial situations. CO3. To develop an understanding of hydraulic machine generally used in industries. CO4. To implement with the aim to develop different types of skills to select, operate and maintain fluid machineries based on fluid laws and characteristics. CO5. To Verify fluid flows, fluid characteristics and types of fluid.

Course Content

Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
UNIT – 1 Fluid and fluid properties	1.1 Concept and classification of fluid 1.2 Properties of fluid 1.3 Newton's law of viscosity 1.4 Simple numerical examples	1a Explain the effect of fluid properties on a flow system.	6	4
UNIT – 2 Fluid statics	2.1 Laws of fluid statics 2.2 Classification, working and applications of pressure measuring devices-Different types of Manometers and Mechanical gauges 2.3 Selection criteria of pressure measuring devices 2.4 Simple numerical examples	2a Select and use pressure measuring devices.	9	7

UNIT – 3 **Fluid kinematics and dynamics**	3.1 Concept of control volume 3.2 Proof of continuity and energy equation 3.3 Momentum equation without proof 3.4 Types of fluid flow 3.5 Flow patterns for ideal, laminar, turbulent and compressible fluid flow 3.6 Fluid energy-types 3.7 Euler's equation (Concept and definition without derivation) 3.8 Bernoulli's equation i. Concept and definition ii. Limitations and assumptions iii. Derivation with and without use of Euler's equation	3a Identify type of fluid flow patterns. 3b Describe and use Continuity equitation to one dimensional fluid flow situations. 3c Explain and Apply Fluid equations (Energy, Momentum and Bernoulli's) in simple Industrial situations.	9	6
UNIT – 4 **Flow measurement**	4.1 Classification of flow measuring devices 4.2 Flow measurement-parameters and units of measurements 4.3Classification, principle, working, application of devices i. Pitot tube ii. Venturimeter iii. flow nozzle iv. rotameter v. orifice vi. notch 4.4 Selection criteria of flow measuring devices 4.5 Simple numerical examples on all of the above	4a Select and use flow measuring devices based on given situation.	12	9

UNIT – 5 Flow through pipes	5.1 Introduction to pipe and pipe flow 5.2 Reynold's experiment 5.3 Friction factor, Darcy's equation, Moody's chart 5.4 Water hammer effect 5.5 Selection criteria for pipe and pipe sizes 5.6 Simple numerical examples	5a Explain water hammer and surge tank 5b Select pipe of appropriate size based on given situation.	9	7
UNIT – 6 Hydraulic pump and prime movers	**Pumps** 6.1 Concept and classification of pumps 6.2 Construction, working and applications of Centrifugal pump, Reciprocating pump, submersible pump, rotary positive displacement type pump like gear pump, vane pump 6.3 Performance (efficiency, discharge, head, specific speed and power consumption) of centrifugal pump and reciprocating pump with simple numerical examples 6.4 Characteristic curves of centrifugal pump and reciprocating pump 6.5 Need of priming of centrifugal pump 6.6 Selection of pump **Hydraulic Prime Movers** 6.7 Classification, construction, working principle and applications of i. Pelton wheel turbine ii. Kaplan turbine iii. Francis turbine	6a Select and use an appropriate pump with reference to given application. 6b Estimate performance parameters of a given Centrifugal and Reciprocating Pump. 6c Interpret characteristic curves of a given pump. 6d Select an appropriate turbine with reference to given situation.	15	12

List of Practical

The practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate course learning outcomes.

No.	Unit	Name of Practical
1	1	Demonstrate various fluid properties.

2	2	Demonstrate and Measure pressure using: i. Various manometers. ii. Various Pressure gauges.
3	3	Verify Bernoulli's theorem.
4	4	Measure fluid flow by Venturimeter.
5	4	Measure fluid flow by Nozzle.
6	4	Measure fluid flow by Orifice meter.
7	4	Measure fluid flow by "V" Notch.
8	5	Estimate Reynolds number using given test rig.
9	5	Determine major and minor head loss through pipes.
10	6	Perform testing of centrifugal pump as per BIS.
11	6	Find faults and remedies for Centrifugal pump. Prepare trouble shooting chart of Centrifugal pump.
12	6	Perform testing of Reciprocating pump as per BIS.
13	6	Perform testing of Pelton wheel turbine

14	6	Study and write a report on working of different types of water turbines.
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

List of Reference Books			
No	**Title of Reference Books**	**Authors**	**Publication**
1	Fluid mechanics& hydraulic Machines.	R. K. Bansal	Lakhsmi publication
2	Fluid mechanics& hydraulic Machines. (in S.I. units)	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	DHANPAT RAI&

5	Fundamental of fluid mechanics(in S.I. units)	Dr. D.S. Kumar	Ketson Pub. house
6	Fluid mechanics& hydraulic machines	S.C. Gupta	PERSON Education

Link of Learning Web Resource	
1	www.youtube.com/watch?v=VyR8aeioQrU
2	http://www.youtube.com/watch?v=R6_q5gxf4vs
3	howstuffworks.com
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

CO'S AND PO'S MAPPING

PO'S/CO'S		CO1	CO2	CO3	CO4	CO5
PO1	Proficiently applies concepts, theories and techniques of the relevant natural, physical sciences and knowledge in mathematics.	**SUB**	**SUB**	**SUB**	**SUB**	**SUB**
PO2	Use basic principles of statics, dynamics, fluid mechanics, engineering materials, strength of materials engineering standards and manufacturing processes to aid in the design, characterization, analysis and troubleshooting of mechanical system.	**SUB**	**SUB**	**SUB**	**SUB**	**SUB**
PO3	Apply their engineering knowledge, critical thinking and problem solving skills in professional engineering practice or in non-engineering fields, such as law, medicine or business.	**SUB**	**SUB**	**SUB**	**SUB**	**SUB**
PO4	Continue their intellectual development, through, for example, graduate education or professional development courses	**MED.**	**MED.**	**MED.**	**MED.**	**MED.**
PO5	Use of appropriate computer languages, modern tool and application software that pertain to Mechanical engineering technology systems.	**MED.**	**MED.**	**MED.**	**MED.**	**MED.**
PO6	Ability to identify problems, conducts experiments, gather data, analyze data and produce results.	**MED.**	**MED.**	**MED.**	**MED.**	**MED.**
PO7	Retain the intellectual curiosity that motivates lifelong learning and allows for a flexible response to the rapidly evolving challenges of the 21st century	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**
PO8	Design a system component or process to meet desired need within realistic constraints, such as economic, environmental and social.	**MED.**	**MED.**	**MED.**	**MED.**	**MED.**
PO9	Values the need for, and demonstrates, ethical conduct and professional accountability.	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**
PO10	Demonstrates effective communication to professional and wider audiences.	**SLI**	**SLI**	**SLI**	**SLI**	**SLI**
PO11	Appreciates entrepreneurial approaches to engineering practice.	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**
PO12	Apply commitment to quality, timeliness, and continuous improvement.	**SLI**	**SLI**	**SLI**	**SLI**	**SLI**