Program : **Diploma in Mechanical Engineering / Manufacturing Technology**	
Course Code : **5028**	Course Title: **Hydraulic Machines Lab**
Semester : **5**	Credits: **1.5**
Course Category: **Program Core**	
Periods per week: **3 (L:0, T:0, P:3)**	Periods per semester: **45**

Course Objectives:

- To apply their knowledge in hydraulic machineries for various practical experiments.
- To familiarize with the various applications of fluid mechanics and achieve the proficiency to test the performance of Pumps and Turbines

Course Pre-requisites:

Topic	Course Code	Course Name	Semester
Basic Mathematics		Engineering Mathematics	1 & 2
Basic physics			1 & 2
Basic theoretical concepts in fluid mechanics and hydraulic machines		Fluid mechanics and hydraulic machines	4

Course Outcomes:

On completion of the course, the student will be able to

COn	Description	Duration (Hours)	Cognitive Level
CO1	Apply the theoretical knowledge of hydraulic turbines to perform the constant speed load test on impulse turbines and plot the characteristic curves.	6	Applying
CO2	Apply the theoretical knowledge of hydraulic turbines to perform the constant speed load test on reaction turbines and plot the characteristic curves.	9	Applying
CO3	Apply the theoretical knowledge of hydraulic pumps to conduct the performance tests of various pumps and plot the characteristic curves.	18	Applying

CO4	Describe the construction and working of Hydraulic Ram, hydraulic lift. Hydraulic Jack, Hydraulic press and test the performance of hydraulic Ram.	9	Applying
	Lab Exam	3	

CO-PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3					1
CO2	3	3					1
CO3	3	3					1
CO4	3	3					1

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Apply the theoretical knowledge of hydraulic turbines to perform the constant speed load test on impulse turbines and plot the characteristic curves.**		
M1.01	Identify the Pelton turbine and its component parts.	2	Understanding
M1.02	Carryout the experiment on Pelton Turbine. Find the efficiency at constant speed Plot the characteristics curves. Interpret the curves.	4	Applying
Contents: Components and working of Pelton turbine. Conduct the performance test of Pelton Turbine.			
CO2	**Apply the theoretical knowledge of hydraulic turbines to perform the constant speed load test on reaction turbines and plot the characteristic curves.**		
M2.01	Identify the Francis and Kaplan turbines and their component parts.		Understanding
M2.02	Carryout the experiment on Francis Turbine. Find the efficiency at constant speed Plot the characteristics curves.		Applying

	Plot the graph, discharge Vs head Comments on curve.		
M2.03	Carryout the experiment on Kaplan Turbine. Find the efficiency at constant speed Plot the characteristics curves. Plot the graph, discharge Vs head Comments on curve.		Applying
	Series Test – I	1.5	
Contents: - Reaction turbines (Francis and Kaplan) Conduct the performance test of Francis Turbine Conduct the performance test of Kaplan Turbine.			
CO3	**Apply the theoretical knowledge of hydraulic pumps to conduct the performance tests of various pumps and plot the characteristic curves**		
M3.01	Identify the Centrifugal Pump, Reciprocating Pump, Gear Pump, lobe Pump, Self-priming pump, stage pump, deep well pump.	3	Understanding
M3.02	Conduct an experiment on Centrifugal pump and find out hydraulic efficiency and overall efficiency. Plot the characteristic curves and comment on it.	3	Applying
M3.03	Conduct an experiment on Reciprocating pump and find out volumetric efficiency and overall efficiency. Plot the characteristic curves and comment on it.	3	Applying
M3.04	Conduct an experiment on Gear pumps and find out volumetric efficiency and overall efficiency. Plot the characteristic curves and comment on it.	3	Applying
M3.05	Conduct an experiment on Lobe pump and find out volumetric efficiency and overall efficiency. Plot the characteristic curves and comment on it.	3	Applying
M3.06	Conduct an experiment on Stage Pump and find out volumetric efficiency and overall efficiency. Plot the characteristic curves and comment on it.	3	Applying
Contents: Experiment on Centrifugal pump and find out hydraulic efficiency and overall efficiency. Experiment on Reciprocating pump and find out volumetric efficiency and overall efficiency. Experiment on Gear Pump and find out volumetric efficiency and overall efficiency. Experiment on Lobe pump and find out volumetric efficiency and overall efficiency. Experiment on Stage pump and find out volumetric efficiency and overall efficiency.			

CO4	**Describe the construction and working Hydraulic Ram, hydraulic lift. Hydraulic Jack, Hydraulic press. Test the performance of hydraulic Ram.**		
M4.01	Identify the Hydraulic Ram and Hydraulic Lift State the function of hydraulic ram Explain the working of hydraulic ram	3	Understanding
M4.02	Conduct the experiment on hydraulic ram Construct the graph – discharge versus efficiency of hydraulic ram Interpret the above curve.	3	Applying
M4.03	Comprehend the hydraulic Jack, hydraulic press. State the functions of hydraulic lift Explain the working of hydraulic lift. State the function of hydraulic jack and press Explain the working of hydraulic jack and press	3	Understanding
	Series Test – II	1.5	
Contents: Conduct the performance test of Hydraulic Ram. Working of hydraulic lift. Working of hydraulic jack and press			

Text / Reference

T/R	Book Title/Author
T1	K C John, Hydraulics Lab Manual
R2	R K Bansal, Fluid mechanics & Hydraulic Machines
R3	P M Modi & S M Seth, Hydraulics & Fluid mechanics including Hydraulic machines.
R4	Damodara Reddy Annapureddy, Fluid Mechanics and Hydraulic Machines Lab, LAP Lambert Academic Publishing Manual.

Online Resources

Sl.No	Website Link
1	https://www.cambridge.org/core/books/an-introduction-to-fluid-dynamics/18AA1576B9C579CE25621E80F9266993
2	https://nptel.ac.in/courses/112105183/