Program: **Diploma in Electrical & Electronics Engineering**	
Course Code: **3039**	Course Title: **Mechanical Engineering Lab**
Semester : **3**	Credits: **1.5**
Course Category: **Program Core**	
Periods per week: **3 (L:0 T:0 P:3)**	Periods per semester: **45**

Course Objectives:

- To develop performance characteristics of turbines and pumps.
- To gain knowledge in performance testing of internal combustion engines.

Course Prerequisites:

Topic	Course code	Course Title	Semester
Engineering Mathematics		Mathematics- 1 & 2	1 & 2
Basic physics		Applied physics-1	1

Course Outcomes

On completion of the course, the students will be able to:-

COn	Description	Duration (Hours)	Cognitive level
CO1	Develop experimental setup to understand the applications of Bernoulli's theorem.	12	Applying
CO2	Make use of pipe friction apparatus to calculate different parameters such as coefficient of friction, major and minor losses.	6	Applying
CO3	Apply performance tests on hydraulic turbines and pumps to plot characteristics curves.	12	Applying
CO4	Experiment with petrol and diesel engines to test their performance	9	Applying
	Lab Exam	6	

CO-PO Mapping

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

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

Course Outline

Module Outcome	Description	Duration (Hours)	Cognitive level
CO1	**Develop experimental setup to understand the applications of Bernoulli's theorem.**		
M1.01	Interpret Bernoulli's theorem and identify the use of Bernoulli's theorem apparatus.	3	Applying
M1.02	Apply Bernoulli's equations in flow experiments to determine the coefficient of discharge and plot graphs: Head Vs. discharge and head Vs. Coefficient of discharge (Orifice meter, Venturi meter,)	6	Applying
M1.03	Apply Bernoulli's equations in open channel experiments to determine the coefficient of discharge and plot graphs: Head Vs. discharge and head Vs. Coefficient of discharge (Notches)	3	Applying
• Verification of Bernoulli's theorem. • Determination of Coefficient of Discharge of Orifice meter/Venturi meter and Notches.			
CO2	**Make use of pipe friction apparatus to calculate different parameters such as coefficient of friction, major and minor losses.**		
M2.01	Summarize major and minor losses in pipes and infer the applications of pipe friction apparatus.	3	Understanding
M2.02	Identify the major losses in pipes of varying diameters due to friction using Chezy's and Darcy's equation and interpret their results. Determine the constants of Chezy's and Darcy's equation.	3	Applying
	Lab Exam 1	3	

• Study of major and minor losses in pipes. • Determine the coefficient of friction of flow through pipes. • Determine the Chezy's and Darcy's constants in pipe flow due to friction			
CO3	**Apply performance tests on hydraulic turbines and pumps to plot characteristics curves.**		
M3.01	Study the constructional features and working of impulse turbine (Pelton turbine)and reaction turbines(Francis turbine/ Kaplan turbine)	3	Understanding
M3.02	Apply performance test on Pelton turbine/ Francis turbine/ Kaplan turbine and plot its characteristics curves.	3	Applying
M3.03	Study the constructional features and working of a centrifugal pump and reciprocating pump.	3	Understanding
M3.04	Develop the characteristics curve of closed circuit centrifugal/reciprocating pump by performing efficiency test.	3	Applying
• Study the components and working principle of turbines and pumps. • Experiment with Pelton wheel to determine overall efficiency. • Experiment with Francis/Kaplan turbine to determine overall efficiency. • Experiment with centrifugal pump / reciprocating pump to determine overall efficiency.			
CO4	**Experiment with petrol and diesel engines to test their performance**		
M4.01	Illustrate various components of an IC engine.	3	Understanding
M4.02	Develop an experimental setup to carryout performance test on single cylinder petrol engine.	3	Applying
M4.03	Apply performance test on a single cylinder diesel engine.	3	Applying
• Study the components and working principles of two stroke and four stroke engines. • Experiment with diesel and petrol engines to determine indicated power, Brake power and thermal efficiencies.			

Text / Reference:

T/R	Book Title/Author
T1	A textbook of Fluid mechanics and hydraulic machines – Dr. R.K. Bansal.
T2	A textbook of Thermal Engineering- R.S. Khurmi and J.K.Gupta
R3	Hydraulic, Fluid mechanics and Hydraulic machines– R.S.Khurmi and N Khurmi
R4	Hydraulic, Fluid mechanics including Hydraulic machines- Dr. P.N.Modi and Dr. S. M. Seth
R5	Internal combustion engines- V. Ganesan

Online resources

Sl.No	Website Link
1	https://nptel.ac.in/courses/105/103/105103192/
2	https://nptel.ac.in/courses/105/103/105103095/
3	https://nptel.ac.in/courses/112/103/112103277/
4	https://nptel.ac.in/courses/112103262/