Program: **Diploma in Electrical & Electronics Engineering**	
Course Code: **3035**	Course Title: **Mechanical Engineering**
Semester : **3**	Credits: **No credit**
Course Category: **Program Core**	
Periods per week: **3 (L:2 T:1 P:0)**	Periods per semester: **45**

Course Objectives:

- To identify the properties of fluids and various pressure measurement techniques.
- To impart knowledge on the science of fluid flow and apply the same to solve engineering problems.
- To familiarize the construction and working of water turbines and pumps and achieve the knowledge to test their performance.
- To acquire knowledge on the construction and working principles of Steam boilers, Internal combustion engines and steam turbines.

Course Prerequisites:

Topic	Course code	Course name	Semester
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	Identify various fluid properties and distinguish the pressure measurement techniques.	10	Applying
CO2	Identify the ways to find out the losses in pipe flow.	11	Applying
CO3	Illustrate the construction and working of water turbines, water pumps and their testing performance.	11	Understanding
CO4	Explain the construction and working of steam boilers, Steam turbines and Internal combustion Engines	11	Understanding
	Series Test	2	

CO - PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3						
CO2	3						
CO3	2						
CO4	2						2

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

Course Outline

Module Outcome	Description	Duration (hours)	Cognitive Level
CO1	**Identify various fluid properties and distinguish the pressure measurement techniques.**		
M1.01	Summarize various properties of fluids.	1	Understanding
M1.02	Illustrate different types of pressure with line diagram	2	Understanding
M1.03	Explain Pascal's law of fluid pressure and its uses.	2	Understanding
M1.04	Illustrate the measurement of pressure and solve problems	5	Applying
Contents: Introduction-Properties of Fluid- Density- specific weight-specific volume-specific gravity –viscosity- simple problems-Various types of pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure.-Concept of Pressure and pressure head and its unit, -Pascal's law of fluid pressure and its uses-Fluid pressure measurements-Piezometer – manometer – U tube – Inverted U tube- differential manometer – Simple problems			
CO2	**Identify the ways to find out the losses in pipe flow.**		
M2.01	Explain various types of fluid flow	1	Understanding
M2.02	Illustrate the energy in fluid motion with continuity equation	2	Understanding
M2.03	Illustrate Bernoulli's theorem and solve simple problems using Bernoulli's equation.	4	Applying

M2.04	Identify different losses in pipe flow and solve simple problems	4	Applying
	Series Test 1	1	

Contents:

Flow of Fluids -Types of flow - Uniform- non-uniform- Steady- Unsteady flow- Laminar- Turbulent Reynolds number-Discharge and its unit, continuity equation of flow-Energy in fluid motion- datum head - pressure head - velocity head -Bernoulli's theorem - limitations – assumptions- Practical application of Bernoulli's theorem Venturi meter -Simple problems-Flow through pipes- major losses- Frictional loss in a pipe- Chezy's and Darcy's formula -Simple problems.

CO3	**Illustrate the construction and working of water turbines, water pumps and their testing performance.**		
M3.01	Outline the features of hydroelectric power plant	1	Understanding
M3.02	Illustrate the construction, working and performance of various turbines.	5	Understanding
M3.03	Explain the classification of water pumps.	4	Understanding
M3.04	Explain the selection on KW rating of various pumps.	1	Understanding

Contents:

Hydraulic machines- hydroelectric power plant- features- Water Turbines- Classifications of turbines – impulse and reaction turbines – Pelton wheel – working- Reactions turbines - Francis turbine - Kaplan turbines – specific speed of turbine- water power - brake power - efficiencies – hydraulic-mechanical- overall- Pumps Classifications- reciprocating pump working-components-air vessel- centrifugal pump -working – components - Multistage pumps-Selection of kW rating motor- pump set based on head, quantity of discharge and discharge pressure.

CO4	**Explain the construction and working of steam boilers, Steam turbines and Internal Combustion Engines**		
M 4.01	Explain the classification and working of steam boilers and discuss their applications.	2	Understanding
M 4.02	Explain the working of steam turbines and their application.	2	Understanding

M 4.03	Illustrate the working of internal combustion engines and their classifications.	5	Understanding
M 4.04	Compare IC engines based on fuel used and number of strokes	2	Understanding
	Series Test 2	1	

Contents:

Steam Boilers- Functions – applications-classifications – fire tube -water tube – –Brief explanation with line sketches – steam turbines – types – working principles of impulse and reaction turbines (use line sketches) - IC Engines – classification- working of two stroke and four stroke (petrol and diesel) engines- comparison of -petrol and diesel engine- Two stroke and Four Stroke.

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