

Branch Name:	Mechanical Engineering
Semester/Year:	Semester V / Third Year
Subject Title:	Fluid Power Engineering
Subject Code:	1ET1010504
Pre-requisite:	Fluid Mechanics, Elements of Mechanical Engineering

Course Objectives:

1. To give students an elementary idea about applications of fluid mechanics concepts.
2. To develop analytical abilities for evaluating the working of fluid machines.
3. To understand the benefits and limitations of fluid power compared with other power transmission technologies.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
04	00	02	05	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Hydro Power Plant: Introduction, Applications of hydropower plant, Classification, Essential components of hydropower plant, Advantages and disadvantages of hydropower plant, selection of site for a hydropower plant.	03	5
2	Principle of working of Turbo – Machinery: Introduction, Force exerted on stationary plate held normal and inclined to jet, Force exerted on curved plate, force exerted on moving plate held normal and inclined in direction of moving jet, Force on a plate when vane is moving in direction of jet, jet striking on curved vane tangentially at one tip and leaving at other end, jet propulsion in ships.	09	15
3	Hydraulic Turbines: Introduction, Classification of turbines, Impulse and reaction turbines, construction, working and performance of Pelton, Francis and Kaplan Turbines, Draft tube, Governing of hydraulic turbines.	12	20
4	Centrifugal Pumps: classification and selection criterion, Centrifugal pumps, Velocity vector diagrams, Pump losses and efficiencies, Net positive suction head, Pressure rise in impeller, Characteristic curves of centrifugal pumps, priming, maximum suction limit - minimum starting speed to deliver the discharge, Multistage pumps. Reciprocating Pumps: Operation of Reciprocating pumps, discharge co-efficient, volumetric efficiency, slip, work done and power required to drive	12	20

	reciprocating pumps, effect of air vessels, effect of friction on performance of reciprocating pump.		
5	Reciprocating Compressors: Construction and working, Multistage conditions for minimum work, Inter cooling, Efficiency and control of air compressors. Centrifugal Compressors: Essential parts, Static and total head properties, Velocity diagram, Degree of reaction, surging and choking. Axial Flow Compressor: Construction, Aerofoil blading, Lift and Drag in axial flow compressor. Rotary Compressors: Introduction, Classification, roots blower, Vane type, Screw compressor, Scroll compressor.	18	30
6	Hydraulic Machines: Construction and working of hydraulic press, Hydraulic accumulator, Hydraulic intensifier, Hydraulic crane, Hydraulic jack, hydraulic lift, Hydraulic ram, Fluid couplings, Fluid torque converter and air lift pump	04	10

Course Outcomes:

The student will be able to

1. Understand the fundamentals of the hydroelectric power plant & functions of its various components with detail exposure to its construction & operation.
2. Predict the complete performance of the turbines theoretically and experimentally.
3. Understand the classification, working, construction, and various essential parameters about the system of the hydraulic pumps used in the industry.

List of Reference Books:

1. Patel, R.N. and Patel, V.L. "Fluid Power Engineering." Mahajan Publication
2. Bansal, R. K. "A Text Book of Fluid Mechanics and Hydraulic Machines: In MKS and SI Units." Laxmi publications, 1989
3. Rajput, R. K. "Fluid Mechanics and Hydraulic Machines, Part-2." by S. Chand Publication (1998).
4. Yahya, S. M. "Turbines compressors and fans." Tata McGraw-Hill Education, 2010.
5. Kumar, D.S, "Fluid Mechanics and Fluid Power Engineering." S K Kataria and Pub.

List of Practicals:

1. To study about hydropower plant.
2. To Verify Impulse-momentum principle for impact of jet on stationary vane.
3. Performance test on Pelton wheel turbine.
4. Performance test on Radial Flow Kaplan turbine.
5. To Study and working of the Francis turbine.
6. Performance test on Centrifugal pump.
7. Performance test on Reciprocating pump.
8. Performance on two stage Reciprocating type compressor test rig.
9. Performance on Rotary type compressor test rig.
10. Assignment.

E-Resources:

1. nptel.ac.in/courses/112106175/