

Subject Code: 01ME1502
Subject Name: Fluid Power Engineering
B. Tech. Year - III (Semester - 5)

Type of course : Core

Prerequisite : Elements of Mechanical Engineering, Fluid Mechanics

Rationale : Fluid Power Engineering is a subject that deals with the study of fluids and the application of this knowledge to various mechanical and industrial systems.

Course Outcome :

After completion of this course, student will be able to

1. To understanding the behavior of fluids and the basic principles of fluid power transmission.
2. To demonstrate the applications of impact of jet for various hydraulic machines.
3. To evaluate the performance of hydraulic machine.
4. To differentiate the compressors and evaluate their performance.
5. To understand the working of various hydraulic systems.

Teaching and Examination Scheme :

Teaching Scheme			Credits C	Examination Marks					Total Marks
THEORY	TUTORIAL	PRACTICAL		Theory Marks			Practical Marks		
				ESE(E)	IA	CSE	Viva (V)	Term Work (TW)	
3	0	2	4	50	30	20	25	25	150

Content :

Sr. No.	Content	Total Hrs.
1	Impact of Jet: Introduction, impact of jet on fixed and moving vane flat and curved vane.	06
2	Hydraulic Turbines: Introduction & Classification of turbines, construction, working and performance of Pelton, Francis, and Kaplan Turbines, Unit quantities, specific speed and model relationships.	07
3	Hydraulic Pump: Pump classification, Pump losses and efficiencies, priming, maximum suction limit - minimum starting speed to deliver the discharge, cavitation, NPSH, Operation of Reciprocating pumps, performance parameters of reciprocating pumps.	07

4	<p>Positive displacement compressors: Reciprocating Compressors: Construction and working, Multistage, conditions for minimum work, Intercooling, Efficiency and control of air compressors Rotary Compressors: Introduction, Classification, roots blower, Vane type, Screw compressor, Scroll compressor</p>	10
5	<p>Roto-Dynamic Compressors: Centrifugal Compressors: Essential parts, Static and total head properties, Velocity diagram, Degree of reaction, surging and choking, Losses in centrifugal compressor Axial Flow Compressors: Construction of an axial flow compressor, Lift and drag, Performance characteristics.</p>	08
6	<p>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.</p>	04

Distribution of Theory Marks

R Level	U Level	A Level	N Level	E Level	C Level
20	30	25	15	10	--

Legends: R: Remember; U: Understand; A: Apply; N: Analyze; E: Evaluate; C: Create

Reference books :

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S.K. Kataria & Sons
2. Fluid Power Engineering by R.N. Patel and V.L. Patel Mahajan Publication
3. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Prakashan
4. Fluid Mechanics and Hydraulic Machines by R.K. Rajput , S.Chand & Co.
5. Turbines, Compressors and Fans by S.M. Yahya., TMH Publishers
6. Fluid Mechanics and Turbomachines by Das, Madan Mohan, PHI Learning

List of the Experiment :

1. To Verify Impulse-momentum principle for impact of jet on stationary vane.
2. To perform experiment on Pelton Turbine
3. To perform experiment on kaplan Turbine.
4. To perform experiment on francis Turbine
5. To perform experiment on centrifugal pump
6. To perform experiment on Reciprocating pumps.
7. To perform experiment on a double stage reciprocating air compressor
8. To perform experiment on a centrifugal air compressor/blower.

9. To perform experiment on Hydraulic ram.
10. To determine the equivalent length of the different fitting arrangements in pipe flow.
11. To determine the bursting pressure of PVC pipe
12. To determine the frictional losses encountered in a hydraulically smooth pipe under laminar and turbulent flow situations.

List of Open Base Software / learning website :

1. <http://nptel.iitm.ac.in>
2. <http://media.efluids.com/galleries/all>