

**ME382: FLUID MACHINES**  
**CREDITS = 5 (L=3, T=0, P=2)**

**Course Objective:** To apply principles of fluid mechanics for design and analysis of fluid machines for efficient energy transfer.

**Teaching and Assessment Scheme:**

Teaching Scheme			Credits	Assessment Scheme				
L	T	P		Theory		Practical		Total Marks
			ESE	CE	ESE	CE		
3	0	2	5	70	30	30	20	150

**Course Contents:**

Sr. No	Topics	Teaching Hours
1	<p><b><u>Ideal Fluid Flow:</u></b></p> <p>Superposition of basic flows to obtain flow around cylinder, Concept of circulation and coefficient of lift.</p> <p><b>Impact of Jet:</b> Force exerted by jet on stationary flat plate and curved plate, Force exerted and work done by jet striking on moving plate, introduction of jet propulsion.</p>	08
2	<p><b><u>Hydropower plant:</u></b></p> <p>Introduction and classification of hydropower plants, components, advantages and disadvantages of hydropower plant.</p> <p><b>Hydraulic Turbines:</b> Classification; moment of momentum equation to estimate work done on blade; Construction, working and analysis of Pelton, Francis and Kaplan turbine; Efficiencies of turbine; Governing, Performance, Cavitation and Scale effect of hydraulic turbine.</p>	10
3	<p><b><u>Hydraulic Pumps:</u></b> Classification; Construction of rotodynamic pumps, manometric head, efficiencies and performance of centrifugal pump; pressure rise in pump impeller; multistage pump; cavitation in pump.</p>	07
4	<p><b><u>Reciprocating Pump:</u></b> Construction and working; discharge coefficient, slip and energy transfer in pump; effect of air vessels.</p>	04

5 **Centrifugal Compressor:**

Working principle and components; Work done and pressure rise; Enthalpy-Entropy diagram of compressor stage; influence of impeller blade shape; surging and choking. 09

**Axial flow compressor:**

Working principle; Blade arrangement, velocity triangles and performance of Axial flow compressor

6 **Hydraulic System:**

Construction, working and application of hydraulic press, hydraulic accumulator, hydraulic intensifier and hydraulic crane; Fluid coupling and torque converter. 04

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**Total 42**

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**List of References:**

1. D.S.Kumar, “*Fluid Mechanics and Fluid Power Engineering*”, Sixth Edition, S. K. Kataria & Sons.
2. Frank M. White, “*Fluid Mechanics*”, McGraw Hill Book Company Ltd.
3. S. M. Yahya, “*Turbines, Compressors and Fans*”, Fourth Edition, Tata McGraw Hill.
4. B. K. Venkanna, “*Fundamentals of Turbomachinery*”, First Edition, PHI Learning Pvt. Ltd.
5. B. F. Massey, “*Mechanics of Fluid*”, Seventh Edition, ELBS.

**Suggested Web pages:**

1. <http://nptel.ac.in>

**Course Outcomes (COs):**

At the end of this course students will be able to ...

- 1) To analyze ideal fluid flow and impact of jet.
- 2) To illustrate hydro-power plant and to analyze performance of hydraulic turbines and sizing.
- 3) To investigate rotodynamic pumps for construction, operation, performance and sizing.
- 4) To examine reciprocating pumps for its construction and working.
- 5) To analyze compressors for their construction and performance.
- 6) To interpret hydraulic systems for their working and applications.