



**National Institute of Technology Meghalaya**  
An Institute of National Importance

**CURRICULUM**

Programme	<b>Bachelor of Technology in Mechanical Engineering</b>	Year of Regulation	<b>2018</b>
Department	<b>Mechanical Engineering</b>	Semester	<b>IV</b>

Course Code	Course Name	Credit Structure				Marks Distribution				
		L	T	P	C	INT	MID	END	Total	
<b>ME 220</b>	<b>Fluid Machines</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>200</b>	
Course Objectives	To understand basic principles of fluid machines and apply relevant flow equations.	Course Outcomes	CO1	The student will be able to explain the basic concepts of fluid machines and apply dimensional analysis to generate suitable non-dimensional parameters.						
			CO2	The student will be able to describe the working principle of hydraulic turbines (Pelton, Francis and Kaplan) and solve problems to calculate different performance parameters.						
	CO3		The student will be able to interpret the working principle of hydraulic pumps (centrifugal and reciprocating) and solve problems to calculate different performance parameters.							
	CO4		The student will be able to determine the effect of cavitation in turbines and pumps							
	CO5		The student will be able to illustrate the operation of compressors (centrifugal and axial), fans and blowers.							
To develop the skills to compare various fluid machines and select a suitable one for a particular operation.										

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0
2	CO2	3	2	0	0	0	0	0	0	0	0	0	0	2	0	0
3	CO3	3	2	0	0	0	0	0	0	0	0	0	0	2	0	0
4	CO4	2	1	0	0	0	0	0	0	0	0	0	0	2	0	0
5	CO5	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0

**SYLLABUS**

No.	Content	Hours	COs
I	<b>Principles of Fluid Machines:</b> Classification of Fluid Machines, Rotodynamic Machines, Basic Equation of Energy Transfer in Rotodynamic Machines, Principle of Similarity and Dimensional Analysis in Rotodynamic Machines	<b>06</b>	<b>CO1</b>
II	<b>Hydraulic Turbines:</b> Application and Classification, Heads and Efficiencies, Pelton Wheel, Reaction Turbine, Francis Turbine, Kaplan Turbine, Draft Tube, Runaway Speed, Surge Tanks, Performance Characteristics, Governing	<b>08</b>	<b>CO1 CO2 CO4</b>
III	<b>Centrifugal Pumps:</b> Applications and Classification, Priming of Pumps, Components, Pressure Changes, Heads and Efficiencies, Characteristic Curves, Multi-Stage Pumps, Net Positive Suction Head, Cavitation	<b>08</b>	<b>CO1 CO3 CO4</b>
IV	<b>Reciprocating Pumps:</b> Classification, Components, Working Principle, Indicator Diagram, Effect of Acceleration, Effect of Air Vessel, Multiple Cylinder Pumps	<b>04</b>	<b>CO1 CO3 CO4</b>
V	<b>Compressors, Fans and Blowers:</b> Centrifugal and Reciprocating Compressors, Axial Flow Compressors, Fans and Blowers	<b>06</b>	<b>CO5</b>
VI	<b>Miscellaneous Hydraulic Machines</b> Hydraulic Ram, Air Lift Pump, Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Crane, Hydraulic Coupling	<b>05</b>	<b>CO2 CO3</b>
<b>Total Hours</b>		<b>37</b>	

**Essential Readings**

1. J. Lal, "Hydraulic Machines including Fluidics", Metropolitan Book, 1994
2. Ojha, Berndtsson and Chandramouli, "Fluid Mechanics and Machinery", Oxford University Press, 2010

**Supplementary Readings**

1. Som, Biswas and Chakraborty, "Introduction to Fluid Mechanics and Fluid Machines", TMH, 3rd Edition, 2011
2. D. S. Kumar, "Fluid Mechanics and Fluid Power Engineering", Kataria and Sons, 2012 Edition
3. Cengel and Cimbala, "Essentials of Fluid Mechanics : Fundamentals and Applications", McGraw Hill, 4th Edition, 2017