



CVM
UNIVERSITY

Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: Bachelor of Technology (Mechanical Engineering)

Semester: V

Course Code: 202090502

Course Title: Fluid Machines

Course Group: Professional Core Course-XI

Course Objectives: The course is designed to give detailed understanding of fluid power and various equipment to produce power from fluid.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50 / 18	50 / 17	25 / 9	25 / 9	150/53

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Hydropower Plant: Introduction, Major applications of hydropower plant, Classification of hydropower plant, Essential components of hydropower plant, Advantages and disadvantages of hydropower plant, site selection for a hydropower plant	2
2	Basic of Turbomachinery: 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	10
3	Hydraulic Machines - 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, Cavitation	11



4	Hydraulic Machines – Pumps: Centrifugal Pump: Pump 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, cavitation, pump selection. Reciprocating Pump: Operation of Reciprocating pumps, discharge co-efficient, volumetric efficiency, slip, work done and power required to drive reciprocating pumps, effect of air vessels, effect of friction on performance of reciprocating pump	11
5	Hydraulic Machines – Compressor: Reciprocating Compressor: Construction & working, Multistage condition for minimum work, Intercooling, Efficiency and control of air compressor, Introduction of Rotary, Centrifugal & Axial Flow Compressor.	07
6	Fluid System: Introduction, Hydraulic Press, Hydraulic Accumulator, Hydraulic Intensifier, Hydraulic Ram, Hydraulic Lift, Hydraulic Crane, Fluid Coupling, Hydraulic Torque Converter, Air lift Pump	04
Total		45

List of Practicals / Tutorials:

1	To study about hydropower plant.
2	To Verify Impulse-momentum principle for impact of jet on stationary vane.
3	Performance test on Pelton turbine.
4	Performance test on Francis turbine.
5	Performance test on Kaplan turbine.
6	Performance test on Reciprocating Pump.
7	Performance test on Centrifugal Pump.
8	Performance test on Reciprocating Compressor.
9	Performance test on Centrifugal Compressor.
10	To study the constructional details of the axial flow compressor and draw its characteristics curve.

Reference Books:

1	Fluid Mechanics and Hydraulic Machines by R.K. Rajput, S.Chand & Co.
2	Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications
3	Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S.K.Kataria & Sons
4	Turbines, Compressors and Fans by S. M. Yahya, TMH Publishers
5	Fluid Mechanics and Turbomachines by Das, Madan Mohan, PKI Learning



Supplementary learning Material:

1	NPTEL Resources
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Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits

Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						R: Remembering; U: Understanding; A: Applying; N: Analyzing; E: Evaluating; C: Creating
R	U	A	N	E	C	
25	25	20	25	5	0	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Learn the working and limitations of hydropower plant.	10
CO-2	Understanding of operation and use of hydraulic turbines.	30
CO-3	Understanding of operation and use of hydraulic pumps.	30
CO-4	Understanding of operation and use of hydraulic compressors.	20
CO-5	Understand the operation and use of different fluid systems.	10

Curriculum Revision:

Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	--
Next Review on (Month-Year):	June-2025