MECHANICS OF FLUIDS AND HYDRAULIC MACHINES LABORATORY

IV Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AME108	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 48				Total Classes: 48		

OBJECTIVES:

The **course should enable the students to:**

I. Understand the basic principles of fluid mechanics.
II. Apply Bernoulli equation for fluid flow.
III. Determine co-efficient of discharge.
IV. Evaluate the performance of hydraulic turbines.
V. Understand the functioning and characteristic curves of pumps.

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:

1. Understand basic units of measurement, convert units, and appreciate their magnitudes.
2. Utilize basic measurement techniques of fluid mechanics.
3. Measure fluid pressure and relate it to flow velocity.
4. Demonstrate practical understanding of the various equations of Bernoulli.
5. Demonstrate practical understanding of friction losses in internal flows.
6. Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
7. Calculate the performance analysis in turbines can be used in power plants.
8. Calculate the performance analysis in pumps.
9. Draw and analysis of performance characteristic curves of pumps.
10. Draw and analysis of performance characteristic curves of turbines.
11. Draw and analysis of characteristic curves of flow meters.
12. Determine the coefficient of impact of different types of vanes.
13. Determine the coefficient of discharge of different types of flow meters.
14. Determine the friction factor of different types of cross section of pipes.
15. Draw the characteristic curves of friction apparatus.
16. Determine the friction factor using moody's chart.
17. Applying the Darcy's Weisbach equation for the measurement of coefficient of friction.
18. Evaluate the performance of hydraulic turbines.
19. Evaluate the performance of hydraulic pumps.
20. Analyze flow in closed pipes, and design and selection of pipes including sizes.
21. Explain the working principle of various types of hydro turbines and know their application range
22. Demonstrate the various types of major and minor losses in pipes and explain flow between parallel plates.

LIST OF EXPERIMENTS

Week-1	VENTURIMETER

Determination of coefficient of discharge (C_d) and generation of various characteristic curves for water flowing through Venturimeter

Week-2	**ORIFICE METER**
Determination of coefficient of discharge (C_d) and generation of various characteristic curves for water flowing through Orifice meter.	
Week-3	**PIPE FRICTION**
Determination of friction factor for a given pipe line.	
Week-4	**BERNOULLI'S THEOREM**
Verification of Bernoulli's theorem.	
Week-5	**IMPACT OF JET ON VANES**
Determination of Impact of jet on various types of Vanes.	
Week-6	**PELTON WHEEL TURBINE**
Performance test on Pelton wheel and generate various characteristic curves.	
Week-7	**FRANCIS TURBINE**
Performance Test on Francis Turbine and generate various characteristic curves.	
Week-8	**KAPLAN TURBINE**
Performance Test on Kaplan wheel and generate various characteristic curves.	
Week-9	**CENTRIFUGAL PUMP**
Performance Test on Centrifugal Pump and generate various characteristic curves	
Week-10	**MULTI-STAGE CENTRIFUGAL PUMP**
Performance Test on Multistage Centrifugal Pump and generate various characteristic curves	
WeeK-11	**RECIPROCATING PUMP**
Performance Test on Reciprocating Pump and generate various characteristic curves	
Week-12	**MINIOR LOSSES**
Determination of losses of head due to sudden contraction in a pipe line.	

Text Books:

1 H Modi, Seth, "Hydraulics, Fluid Mechanics and Hydraulic Machinery", Rajsons Publications, 20th Edition, 2013.
2 Rajput, "Fluid Mechanics and Hydraulic Machines", S.Chand & Co, 6th Edition, 1998.

Reference Books:

1. Dr. R K Bansal, "A Text Book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, 9th Edition, 2015.
2. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering", Kotaria & Sons, 2013.
3. D. Rama Durgaiah, "Fluid Mechanics and Machinery", New Age International, 1st Edition, 2002.
4. Banga, Sharma, "Hydraulic Machines", Khanna Publishers, 6th Edition, 2001