FLUID MACHINERY AND IC ENGINE LABORATORY

IV Semester: ME

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AMEB13	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

OBJECTIVES:

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

I. Understand the basic principles of fluid meters.
II. Apply Bernoulli equation for fluid flow.
III. Evaluate the performance of hydraulic turbines and pumps
IV Evaluate the functioning and characteristic curves of I.C.engine

COURSE OUTCOMES (COs):

CO1: Ability to measure flow rate by using flow meters and measure friction factor.
CO2: Able to perform operation of turbines and find its efficiency.
CO3: Determine the performance operation of pumps and find its efficiency
CO4: Can find efficiency of four stroke petrol and diesel engines
CO5: Can analyze performance of air compressor.

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 Calculate the performance analysis in turbines can be used in power plants.
7 Draw and analysis of performance characteristic curves of turbines.
8 Evaluate the performance of hydraulic turbines.
9 Explain the working principle of various types of hydro turbines and know their application range.
10 Calculate the performance analysis in pumps.
11 Draw and analysis of performance characteristic curves of pumps.
12 Evaluate the performance of hydraulic pumps.
13 Explain the working principle of various types of pumps and know their application range.
14 Understand the concept of Drawing valve and port timing diagram for 4-stroke diesel and 2-stroke petrol engine respectively.
15 Know the Performance test for 4-stroke SI engine and draw performance curves.
16 Performance Test on 4-stroke CI engine and to draw the performance curves.
17 Performance of Machining practice on balancing of heat losses and heat input in SI/CI engines.
18 Understand the Performance Test on CI engine when the compression ratio is changing.
19 Understand the Performance of air compressor Unit.
20 Explains the working principle of air compressor.

LIST OF EXPERIMENTS	
Week-1	**CALIBRATION OF FLOW METERS**
Determination of coefficient of discharge (C_d) and generation of various characteristic curves for water flowing through venturimeter Determination of coefficient of discharge (C_d) and generation of various characteristic curves for water flowing through Orifice meter.	
Week-2	**DETERMINATION OF FRICTION FACTOR**
Determination of friction factor for a given pipe line.	
Week-3	**BERNOULLI'S THEOREM**
Verification of Bernoulli"s theorem.	
Week-4	**PERFORMANCE TEST ON REACTION TURBINES**
Performance Test on Francis Turbine and generate various characteristic curves. Performance Test on Kaplan wheel and generate various characteristic curves.	
Week-5	**PERFORMANCE TEST ON IMPULSE TURBINE**
Performance test on Pelton wheel and generate various characteristic curves.	
Week-6	**PERFORMANCE TEST ON POSITIVE DISPLACEMENT PUMP**
Performance Test on Reciprocating Pump and generate various characteristic curves	
Week-7	**PERFORMANCE TEST ON ROTODYNAMIC PUMPS**
Performance Test on Centrifugal Pumps and generate various characteristic curves	
Week-8	**IC Engines Valve/Port timing diagram**
Drawing valve and port timing diagram for 4-stroke diesel and 2-stroke petrol engine respectively.	
Week-9	**IC Engine performance test for 4-stroke SI Engine**
Performance test for 4-stroke SI engine and draw performance curves	
WeeK-10	**IC Engine performance test on 4-Stroke CI engine**
Performance Test on 4-stroke CI engine and to draw the performance curves	
Week-11	**Performance Test on Air Compressor Unit**
Volumetric Efficiency of Reciprocating Air compressor unit	
Week-12	**Performance test on Variable Compression Ratio(VCR) engine**
Performance Test on CI engine when the compression ratio is changing.	

Week-13	Examination

Reference Books:

1. D.S. Kumar,"Fluid Mechanics and Fluid Power Engineering", Kotaria & Sons, Reprint, 2013.
2. D. Rama Durgaiah, "Fluid Mechanics and Machinery", New Age International, 1st Edition, 2002.
3. Banga, Sharma, "Hydraulic Machines", Khanna Publishers, 6th Edition, 2001.
4. Dr. R K Bansal, "A Text Book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, 9th Edition, 2015.
5. V. Ganesan, "I.C. Engines", Tata McGraw-Hill, 3rd Edition, New Delhi, India. 2011.
6. B. John Heywood, "Internal combustion engine fundamentals", Tata McGraw Hill, 2nd Edition, New Delhi. 2011
7. R. K. Rajput , "Thermal Engineering", Lakshmi Publications, 18th Edition, 2011.

Web References:

1. https://docs.google.com/document/d/1UaDrm0pnHgd8GnN7dAcXM6EikgqAD7BU-0d52VFZz1w/edit
2. http://www.iare.ac.in
3. https://en.wikipedia.org/wiki/Internal_combustionengines.
4. https://en.wikipedia.org/wiki/Compression_Ignitionengines

Course coordinator

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HOD, MECH