Course Type	Course Code	Name of Course	L	T	P	Credit
DP	NMEC517	Thermo-Fluids Lab II	0	0	3	1.5

Course Objectives

To make the students understand the performance and emission of the I C Engines (Petrol and Diesel) by performing the trail for the measurements of different parameters of the engines like, Speed, load on the engines, air flow rate, fuel flow rate, water flow rate, temperatures etc.To make the students accustomed to biofluid experiments.To make the students accustomed to different types of measurements in a wind tunnel.

Learning Outcomes

On successful completion of this course, students will learn:

- To understand the performance of the I C Engines in terms of Brake power, Frictional Power, Mechanical efficiency, Thermal efficiency, volumetric efficiency
- To make heat balance sheet for finding losses of thermal energy and useful energy
- about different turbines and heat pump.
- about dynamics of blood mimicking fluid.
- about the design of wind tunnel and its measurements

Unit No.	Topics to be Covered	Contact hours	Learning Outcome
1	General introduction to the lab	3	The students will get an overview about the lab and the experiments to be performed
2	Discussion about the list of experiments and a brief discussion about the list of experiments to be performed	3	The students will get overall idea about the list of experiments and a brief idea about each experiments to be performed
3	Computerized Morse test on petrol engine	3	Students will learn to find frictional power, indicated power and mechanical efficiency using engine soft. Students will also learn the differences between load test and Morse test.
4	Performance test on 4-cylinder 4 stroke turbocharged diesel engine	3	Students will learn the differences between naturally aspirated engines and turbo-charged diesel engines. They will also learn to find brake power, volumetric efficiency, air-fuel ratio and many other parameters of the engines.
5	Heat balance of an IC engine	3	Students will learn how to prepare Heat balance sheet of I C Engines. Heat balance sheet of IC Engines indicates how much losses of heat to different sources and how energy is available for useful wotk.

6	Combustion characteristics of a VCR engine	3	Students will learn the combustion characteristics of different fuels. The combustion characteristics of different fuels will be compared and analysed. Students will learn the ignition delay (ID) and combustion duration (CD) of different fuels. The knocking and detonation characteristics of the fuels will also be studied in this practical study.
7	Emission characteristics of a SI / CI engine	3	Students will learn the emission characteristics of different fuels. The combustion of some fuels may be poor but its emissions will be high under low loads. The emissions of CO, HC, NOx, and soot of the different fuels are different.
8	Flow visualization of blood mimicking fluid in an internal carotid artery	3	Students will learn about the dynamics of blood flow and its simulation within the vascular system
9	Wind tunnel measurements	3	Students will learn measurements of different aerodynamic aspects and parameters of fluid flowing through wind tunnel
10	Experiment on Heat pump	3	Students will learn the fundamental concepts and mechanisms of a heat pump
11	Performance of Drag based hydrokinetic turbine	3	Students will learn about the principles and performance characteristics of hydrokinetic turbines, particularly drag-based designs like the Savonius rotor.
12	Performance of lift based hydrokinetic turbine	3	Students will learn about the principles and performance characteristics of hydrokinetic turbines, particularly lift-based designs like the Darrius rotor.
13	Compensation class for the lab	3	The students will be given a compensation lab class to complete all the experiments for those who were absent in the lab
14	Practice and review	3	Evaluation

Total = 14 x 3 = 42 hrs

Text Books

1. John B. Heywood, Internal Combustion Engine Fundamentals, McGraw-Hill Education; 1st Edition, 2017.

Reference books

1. J. Twidell and T. Weir, "Renewable Energy Resources", E & F N Spon Ltd, London, 1986.

2. Stephen R. Turns, An Introduction to Combustion: Concepts and Applications, McGraw-Hill Education; 3rd Edition, 2017.