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DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Discipline: Mechanical	**Semester: 3rd**	**Name of the Teaching faculty: Suprava Behera**
Subject: Thermal Engineering-I	**No of Days/Week class alloted: 4**	**Semester from Date: 01.07.2024 To Date: 08.11.2024 No of weeks: 15**

Week	Class Day	Topics
1st	1st	Concept of Thermodynamic Systems and its classification
	2nd	Explain closed, open and isolated system
	3rd	Significance of thermodynamic properties of a system
	4th	Define pressure, volume, temperature, entropy, enthalpy, internal energy and their units.
2nd	1st	Define intensive and extensive properties,thermodynamic process,path, cycle , state,path function, point function
	2nd	Explain thermodynamic Equilibrium.
	3rd	Explain Quasi-static Process.
	4th	Conceptual explanation of energy and its sources
3rd	1st	Comparison between Work and heat and solve related topic problems.
	2nd	Define Mechanical Equivalent of Heat. Explain work transfer and displacement work
	3rd	Solve problems related to work transfer and displacement work
	4th	Solve exercise problems
4th	1st	State & explain Zeroth law of thermodynamics.
	2nd	State & explain First law of thermodynamics
	3rd	Limitations of First law of thermodynamics and its application
	4th	Derive Steady flow energy equation and its application to turbine
5th	1st	Derive Steady flow energy equation and its application to compressor
	2nd	State 2nd law of thermodynamics and Clausius statements
	3rd	State Kelvin planks statement and application of 2nd law in heat engine
	4th	Application of 2nd law in heat pump and refrigerator
6th	1st	Determine efficinecy and COP of heat engine
	2nd	Determine efficinecy and COP of heat pump
	3rd	Determine efficinecy and COP of heat refrigerator
	4th	Solve simple problems on heat engine, heat pump and refrigerator
7th	1st	Define perfect gas and laws of perfect gas to determine thermodynamic properties and State Boyle' law, Chairle's law, Dalton's law of partial pressure
	2nd	State Gaylussac law, derive general gas equation
	3rd	Define characteristic gas constant, Universal gas constant, Solve simple problems.
	4th	Explain specific heat of gas (Cp and Cv) and establish relation between Cp and Cv and define enthalpy of a gas
8th	1st	Derive workdone during non-flow process
	2nd	Application of 1st law of thermodynamics to isothermal process.
	3rd	Application of 1st law of thermodynamics to isobaric process.
	4th	Application of 1st law of thermodynamics to isentropic process.

9th	1st	Application of 1st law of thermodynamics to Polytropic process.
	2nd	Explain free expansion and throttling process.
	3rd	**Assignment evaluation/ class test**
	4th	Explain and classify I.C engine
10th	1st	Define terminolgy o IC engine such as Bore, dead centers
	2nd	Define stroke volume, piston speed, RPM and their formula.
	3rd	Explain working principle of 2-stroke C.I Engine
	4th	Explain working principle of 2-stroke S.I Engine
11th	1st	Explain working principle of 4-stroke C.I Engine
	2nd	Explain working principle of 4-stroke S.I Engine
	3rd	Differenciate between 2-stroke and 4-stroke C.I Engine and S.I Engine
	4th	Derive Carnot cycle
12th	1st	Solve problems related to Carnot cycle
	2nd	Derive Otto cycle
	3rd	Solve problems related to Otto cycle
	4th	Derive Diesel cycle
13th	1st	Solve problems related to Diesel cycle
	2nd	Derive Dual cycle
	3rd	Solve problems related to Dual cycle
	4th	Solve excercise problems on Otto and Diesel cycle
14th	1st	Solve excercise problems on Dual cycle
	2nd	Define fuel and combustuion and types of fuel
	3rd	Application of different types of fuel(solid fuel)
	4th	Application of different types of fuel(liquid fuel)
15th	1st	Application of different types of fuel(gaseous fuel), Heating values of fuels
	2nd	Define quality of fuels such as Octane number and Cetane numberof I.C engine.
	3rd	**Assignment evaluation/ class test**
	4th	Previous year questions discussion and solve problems.

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	R.S. Khurmi	Thermal Engineering	S.Chand
02	A.R.Basu	Thermal Engineering	Dhanpat Rai
03	A.S. Sarao	Thermal Engineering	Satya Prakash
04	P.K.Nag	Engineering Thermodynamics	TMH
05	Mahesh M Rathore	Thermal Engineering	TMH

Suprava Behera
29.06.2024
Signature of Faculty