

BLACK DIAMOND SCHOOL OF ENGINEERING, JHARSUGUDA

LESSON PLAN

Session (2022-2023)

Discipline: Mechanical Engineering	Semester: 3 rd , Winter/2022	Name of the Teaching Faculty: Sri Byomakesh Mishra Lecturer
Subject: Thermal Engineering-I, Theory-4	No. of Days/Week: 04	Start Date: 14/09/2022 End Date: 21/01/2023

Week	Class Day	Theory Topics
1st	1st	Define Thermodynamics. Define System, surroundings and boundary. Explain open closed and isolated system.
	2nd	Define Intensive and extensive properties. Differentiate between homogeneous and heterogeneous system.
	3rd	Define Microscopic and macroscopic approach of thermodynamics. Explain Continuum Approach, Quasi-static process
	4th	Thermodynamic properties of a system (Pressure, volume, temperature and units of measurement).
2nd	1st	Define thermodynamic State, path, process and cycle.
	2nd	Explain Thermodynamic equilibrium i.e. thermal mechanical and chemical equilibrium.
	3rd	Conceptual explanation of energy and its sources.
	4th	Explain work and heat, their relation, units and Work transfer,
3rd	1st	Derive the formula for the work done in a closed system.
	2nd	Explain Mechanical equivalence of heat and differentiate between heat and work.
	3rd	<i>Assignment evaluation /class test</i>
	4th	Numerical
4th	1st	State and explain Zeroth law and First law of thermodynamics. Limitation of First law.
	2nd	Application of first law for flow process. Derivation of steady flow energy equation.
	3rd	Application of SFEE in Nozzle Turbine and Compressor.
	4th	Define Thermal reservoir. Concept of heat engine, heat pump

		and refrigerator.
5th	1st	Statement of Second law of thermodynamics (Clausius and Kelvin Planck Statement)
	2nd	Application of second law in heat engine, and determination of efficiency.
	3rd	Application of second law in Refrigerator, and determine the Coefficient Of Performance.
	4th	Application of second law in Heat Pump, and determine the Coefficient Of Performance.
6th	1st	Review Class
	2nd	Classroom Problems
	3rd	Classroom Problems
	4th	<i>Assignment evaluation / class test</i>
7th	1st	Explain Laws of Perfect gas, Boyle's law, Charle's law, Avogadro's law,
	2nd	Dalton's law of Partial pressure, Gay-Lussac law, General gas equation
	3rd	Explain Characteristic gas constant, Universal gas constant and define the relation between them.
	4th	Define Enthalpy, Entropy, and Internal Energy of a Thermodynamic system.
8th	1st	Explain specific heat of gas (C_p and C_v) Relation between C_p & C_v
	2nd	Derive the work done during a non- flow process i.e. Isochoric, Isobaric.
	3rd	Application of first law in Isothermal, Isentropic and Polytrophic Process.
	4th	<i>Assignment evaluation / class test</i>
9th	1st	Classroom Problems
	2nd	Classroom Problems
	3rd	Define & classify I.C engine
	4th	Terminology of I.C Engine
10th	1st	Explain the working principle of 4-stroke S.I engine.
	2nd	Explain the working principle of 4-stroke C.I engine.
	3rd	Explain the working principle of 2-stroke S.I engine.
	4th	Explain the working principle of 2-stroke C.I engine.
11th	1st	Differentiate between S.I and C.I engine.
	2nd	Differentiate between 2-stroke & 4- stroke engine.
	3rd	Review class
	4th	<i>Assignment evaluation / class test</i>
12th	1st	Explain the Carnot cycle with P-V and T-S diagram and derive the process involved in Carnot cycle.
	2nd	Derive the efficiency of Carnot cycle.

	3rd	Explain the Otto cycle with P-V and T-S diagram and derive the process involved in Otto cycle.
	4th	Derive the efficiency of Otto cycle.
13th	1st	Explain the Diesel cycle with P-V and T-S diagram and derive the process involved in Diesel cycle.
	2nd	Derive the efficiency of Diesel cycle.
	3rd	Explain the Dual cycle with P-V and T-S diagram and derive the process involved in Dual cycle.
	4th	Derive the efficiency of Dual cycle.
14th	1st	Classroom Problems
	2nd	Classroom Problems
	3rd	Define Fuel and its types. Explain application of fuel.
	4th	Define Heating value of fuel.
15th	1st	Explain Calorific value and Quality of I C engine fuel.
	2nd	<i>Discussion on Previous year question paper</i>
	3rd	<i>Discussion on Previous year question paper</i>
	4th	<i>Discussion on Previous year question paper</i>