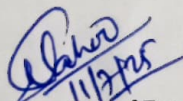
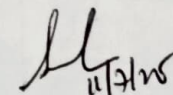


LESSON PLAN 2025-26

NAME OF THE TEACHER : SAMBIT KUMAR SAHOO, LECT.(STAGE-II, AUTOMOBILE)				
Subject: Basic Thermal Engineering (AEPC209) Program: Diploma in Automobile Engineering Semester: 3rd Total Contact Hours: 45 Total Marks: 100 Assessment: Progressive – 30, End Term – 70 Credits: 3				
COURSE OBJECTIVES: At the end of the course, the student will be able to: CO1: Explain various thermodynamic systems and properties CO2: Describe the laws of thermodynamics and air cycles CO3: State the properties and processes of ideal gases CO4: Explain the working of reciprocating air compressor and its terminology CO5: Identify the processes in gas turbines, refrigeration and various refrigeration systems				
Class No.	Topic	Subtopics	Teaching Aids/Activities	Course Objective
Unit I – Fundamentals of Thermodynamics (9 Classes)				
1	Thermodynamic Systems	Closed, open, isolated systems	PPT, examples from real systems	CO1
2	Thermodynamic Properties	Pressure, temperature, volume, enthalpy, entropy	Table/chart, visual chart	CO1
3	Extensive & Intensive Props.	Definitions with examples	Demo, quiz	CO1
4	Thermodynamic Processes	State, path, cycle, point/path functions	Process diagram	CO1
5	Thermodynamic Equilibrium	Concept, quasi-static process	Whiteboard explanation	CO1
6	Energy & Its Sources	Forms of energy, mechanical, thermal, electrical	Energy wheel chart	CO1
7	Work & Heat	Comparison, types of work	Real-life examples (e.g., piston-cylinder)	CO1
8	Mechanical Equivalent of Heat	Joule's experiment concept	Chart, demonstration	CO1
9	Practice Problems	Work transfer, displacement work	Worksheet	CO1
Unit II – Laws of Thermodynamics (9 Classes)				
10	Zeroth Law	Thermal equilibrium, temperature measurement	Thermometer, conceptual demo	CO2
11	First Law of Thermodynamics	Statement, energy balance	Examples, derivation	CO2
12	Limitations of 1st Law	Practical limitations	Real-world examples	CO2
13	Applications of 1st Law	Turbines, compressors, nozzles	Sketches, process flow	CO2
14	Steady Flow Energy Equation	SFEE derivation and explanation	Derivation on board	CO2
15	Second Law – Concepts	Heat flow direction, need for second law	Kelvin-Planck, Clausius statements	CO2
16	Heat Engines & Heat Pumps	Working, definitions	Schematic diagram, animation	CO2
17	COP and Efficiencies	Carnot efficiency, COP of refrigerator & HP	Example comparison, formula chart	CO2
18	Numerical Practice	Problems based on 1st & 2nd law	Worksheet	CO2

Unit III – Ideal Gas Properties & Processes (9 Classes)				
19	Ideal Gas Laws	Boyle's law, Charles' law, Gay-Lussac's law	Gas law animation	CO3
20	Gas Constants	R, Cp, Cv, Universal Gas Constant	Derivation, table of values	CO3
21	Relation between Cp & Cv	Derivation of $C_p - C_v = R$	Board derivation	CO3
22	Enthalpy of Gases	Concept and formula	Chart, example problems	CO3
23	Non-Flow Work Calculations	Work for isothermal, adiabatic etc.	Real-life piston-cylinder model	CO3
24	Isothermal Process	Definition, equations, graphical representation	PV diagram demo	CO3
25	Isobaric & Isochoric Process	Characteristics, heat interaction	Interactive sketching	CO3
26	Isentropic & Polytropic	Properties, equations	Board summary table	CO3
27	Throttling & Free Expansion	Conceptual understanding	Video demo of expansion valve	CO3
Unit IV – Gas and Vapor Power Cycles (9 Classes)				
28	Carnot Cycle	Working, efficiency	T-S & P-V diagrams	CO4
29	Stirling & Ericsson Cycles	Construction, working, efficiency	Cycle comparisons	CO4
30	Otto Cycle	P-V & T-S diagram, applications	Petrol engine model	CO4
31	Diesel Cycle	Process explanation, diagrams	Board sketch, video	CO4
32	Dual Cycle	Combination of Otto & Diesel	Cycle comparison chart	CO4
33	Comparison of All Cycles	Efficiency, power output, fuel used	Table, MCQ practice	CO4
34	Numerical Problems	Otto, Diesel, Dual cycle performance	Worksheet with solutions	CO4
35	Heat Engines – Applications	Use in automobiles, aircraft	Videos, case study	CO4
36	Summary of Air Standard Cycles	Revision and concept linking	Summary sheet	CO4
Unit V – Fuels and Combustion (9 Classes)				
37	Fuel – Types	Solid, liquid, gaseous, biofuels	Sample display	CO5
38	Combustion Process	Exothermic, endothermic reactions	Reaction examples, demo	CO5
39	Heating Values	HCV, LCV, calculations	Calorific value chart	CO5
40	Air-Fuel Ratio	Stoichiometric ratio, excess air	Practical example, combustion videos	CO5
41	Octane & Cetane Numbers	Importance in SI/CI engines	Fuel comparison chart	CO5
42	Calorific Value Measurement	Bomb calorimeter (theory)	Diagram + virtual lab	CO5
43	Emissions from Fuels	Combustion emissions, environmental effects	Emission charts	CO5
44	Practice on Fuel Calculations	Calorific value, combustion problems	Worksheet	CO5
45	Final Review & Mock Test	Complete syllabus revision, model questions	Full syllabus test	All COs


Signature of Teacher


Signature of HOD