

## LESSON PLAN 2023-24

SUBJECT : THERMAL ENGINEERING I (3RD SEM)

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Class No.	Topic	Subtopics	Teaching Aids/Activities
<b>Unit 1: Thermodynamic Concept &amp; Terminology (12 Classes)</b>			
1	Introduction to Thermodynamics	Concept, relevance, applications	Chalkboard, diagrams
2	Thermodynamic Systems	Open, closed, isolated systems	Diagrams, examples
3	Thermodynamic Properties	Pressure, Volume, Temp., Entropy, Enthalpy, Internal Energy	Charts, unit tables
4	Intensive & Extensive Properties	Definitions and examples	Comparison tables
5	Thermodynamic Process Terminology	Process, path, cycle, state, path & point function	Flow diagrams
6	Thermodynamic Equilibrium	Thermal, mechanical, chemical equilibrium	Lecture with examples
7	Quasi-static Process	Definition, examples	Graphs, explanation
8	Energy & its Sources	Renewable and non-renewable energy	Media presentation
9	Work & Heat	Concepts, differences	Table format, examples
10	Mechanical Equivalent of Heat	Joule's experiment	Animation or video
11	Work Transfer	Displacement work, area under P-V curve	Solved examples
12	Recap & Test	Quick revision	Quiz, MCQs
<b>Unit 2: Laws of Thermodynamics (12 Classes)</b>			
13	Zeroth Law	Statement, application	Thermometer demo
14	First Law of Thermodynamics	Concept and energy conservation	Derivation
15	First Law (Math Form)	$Q = \Delta U + W$	Problem solving
16	Limitations of First Law	Direction, quality of energy	Conceptual explanation
17	Steady Flow Energy Equation (SFEE)	Introduction	Real-world examples
18	SFEE in Turbine	Application and numerical	Turbine diagrams
19	SFEE in Compressor	Application and numerical	Compressor diagram
20	Second Law (Clausius Statement)	Heat flow from cold to hot	Animated explanation

21	Second Law (Kelvin-Planck Statement)	Heat to work conversion limitations	Heat engine diagram
22	Heat Engines, Heat Pumps	Efficiency, COP	Animated visuals
23	COP & Efficiency – Numericals	Solve problems	Worksheet
24	Recap & Test	Revision on Laws	Class test
<b>Unit 3: Properties &amp; Processes of Perfect Gas (10 Classes)</b>			
25	Boyle's & Charles' Law	Gas behavior	Demonstration, graphs
26	Avogadro's, Dalton's, Guy-Lussac Laws	Gas mixtures, pressure, volume	Visual aids
27	Gas Equations	General gas equation, constants	Boardwork
28	Specific Heats	Cp and Cv	Diagrams
29	Cp & Cv Relation	Mayer's formula	Derivation
30	Enthalpy of Gas	Internal energy relation	Calculation problems
31	Work in Non-Flow Process	$W = \int P dV$	Equations, numericals
32	Isothermal & Isobaric Process	Laws and application	P-V diagrams
33	Isentropic & Polytropic Process	Comparison and derivations	Graphs & derivations
34	Free Expansion & Throttling	Joule-Thomson effect	Animation or charts
<b>Unit 4: Internal Combustion Engine (08 Classes)</b>			
35	I.C. Engine Classification	CI & SI engine	Engine models
36	Terminology – I	Bore, stroke, clearance	Engine parts display
37	Terminology – II	Piston speed, RPM	Calculation
38	2-Stroke S.I. Engine	Working principle	Animation
39	4-Stroke S.I. Engine	Working cycle	Diagram, video
40	2-Stroke C.I. Engine	Working cycle	Sectional models
41	4-Stroke C.I. Engine	Working principle	Demonstration
42	Engine Comparison	CI vs SI, 2-stroke vs 4-stroke	Comparative chart
<b>Unit 5: Gas Power Cycles (10 Classes)</b>			
43	Introduction to Power Cycles	Classification	Cycle chart
44	Carnot Cycle	Working, efficiency	P-V, T-S diagrams
45	Otto Cycle	SI engine cycle	Graphical explanation
46	Diesel Cycle	CI engine cycle	Derivation
47	Dual Cycle	Mixed characteristics	P-V diagrams
48	Cycle Comparisons	Otto vs Diesel vs Dual	Efficiency table
49	Otto Cycle Numericals	Simple problem solving	Board practice
50	Diesel Cycle Numericals	Problem solving	Worksheet
51	Dual/Carnot Cycle Problems	Solve numericals	Review problems

52	Revision	Cycle recap	Group test
<b>Unit 6: Fuels &amp; Combustion (08 Classes)</b>			
53	Introduction to Fuel	Definition, need	Fuel samples
54	Types of Fuel	Solid, liquid, gas	Fuel classification chart
55	Applications	Domestic, IC engine, power plants	Real-world examples
56	Heating Values	HHV and LHV	Charts
57	Octane Number	Petrol quality	Test standards, comparison
58	Cetane Number	Diesel quality	Fuel testing video
59	Revision	Quick recap of fuel concepts	Discussion quiz
60	Model Test	Full syllabus mock	MCQs, sample paper