

**PANIPAT INSTITUTE OF ENGINEERING & TECHNOLOGY,
PANIPAT
DEPARTMENT OF MECHANICAL ENGINEERING**

Subject Name: - Thermodynamics

Year/Semester: 3rd

Subject Code: - MEC-205A

Sr No.	Lecture No.	Topics To Be Covered	Remarks
1	L1	Unit-1: Basic Concepts: Thermodynamics: Macroscopic and Microscopic Approach,	
2	L2	Thermodynamic Systems, Surrounding and Boundary, Thermodynamic Property – Intensive and Extensive,	
3	L3	Thermodynamic Equilibrium, State, Path, Process and Cycle	
4	L4	Quasi-static, Reversible and Irreversible Processes, Working Substance.	
5	L5	Concept of Thermodynamic Work and Heat, Zeroth Law of Thermodynamic and its utility	
6	L6	First Law of Thermodynamics: Energy and its Forms,	
7	L7	Energy and 1st law of Thermodynamics, Internal Energy and Enthalpy,	
8	L8	1st Law Applied to Non-Flow Process,	
9	L9	Steady Flow Process and Transient Flow Process,	
10	L10	Throttling Process and Free Expansion Process.	
11	L11	UNIT-II: Second Law of Thermodynamics: Limitations of First Law	
12	L12	Thermal Reservoir Heat Source and Heat Sink, Heat Engine, Refrigerator and Heat Pump	
13	L13	Kelvin- Planck and Clausius Statements and Their Equivalence,	
14	L14	Perpetual Motion Machine of Second Kind.	
15	L15	Carnot Cycle, Carnot Heat Engine and Carnot Heat Pump	

16	L16	Carnot's Theorem and its Corollaries,	
17	L17	Thermodynamic Temperature Scale, Numerical	
18	L18	Entropy: Clausius Inequality and Entropy, Principle of Entropy Increase	
19	L19	Temperature-Entropy Plot, Entropy Change in Different Processes,	
20	L20	Introduction to Third Law of thermodynamics.	
21	L21	Unit-III Availability, Irreversibility and Equilibrium: High and Low Grade Energy, Available Energy and Unavailable Energy,	
22	L22	Loss of Available Energy Due to Heat Transfer Through a Finite Temperature Difference	
23	L23	Availability of a Non-Flow or Closed System,	
24	L24	Availability of a Steady Flow System,	
25	L25	Helmholtz and Gibb's Functions, Effectiveness and Irreversibility	
26	L26	Pure Substance: Pure Substance and its Properties, Phase and Phase Transformation	
27	L27	Vaporization, Evaporation and Boiling , Saturated and Superheated Steam	
28	L28	Solid – Liquid – Vapour Equilibrium, T-V, P-V and P-T Plots During Steam Formation	
29	L29	Properties of Dry, Wet and Superheated Steam, Property Changes During Steam Processes,	
30	L30	Temperature – Entropy (T-S) and Enthalpy – Entropy (H-S) Diagrams, Throttling and Measurement of Dryness Fraction of Steam.	
31	L31	UNIT-IV: Thermodynamic Relations: TDS Relations	
32	L32	Enthalpy and Internal Energy as a Function of Independent Variables	
33	L33	Specific Heat Capacity Relations	

34	L34	Clapeyron Equation	
35	L35	Maxwell Relations.	
36	L36	Gas Power Cycles: Air standard efficiency	
37	L37	Otto cycle	
38	L38	Diesel cycle	
39	L39	Dual cycle	
40	L40	Atkinson cycle	
41	L41	Stirling and Ericsson cycles	
42	L42	Brayton or Joule cycle, Lenoir cycle	

Text Books:

1. Thermal Engineering – P L Ballaney, Khanna Publishers.
2. Thermodynamics and Heat Engines vol II – R Yadav, Central Publishing House
3. Engineering Thermodynamics Work and Heat Transfer - G. F. C Rogers and Y. R. Mayhew, Pearson.

Reference Books:

1. Thermodynamics An Engineering Approach-Yunus A Cengel and Michael A Boles TMH
2. Applied Thermodynamics for Engineering Technologists – T D Eastop and A. McConkey, Pearson Education
3. Heat Engineering – V P Vasandani and D S Kumar, Metropolitan Book Co Pvt Ltd.