

<b>Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering &amp; Technology</b>				<b>II Year B. Tech. (Mechanical Engineering) Full Time</b>	
<b>Course Code &amp; Name</b>	<b>Instructions Hours per Semester and Credits</b>				
<b>3RMPC5  APPLIED THERMODYNAMICS</b>	<b>Classroom Instruction (CI)</b>	<b>Lab Instruction (LI)</b>	<b>Term Work (TW) and Self Learning (SL)</b>	<b>Total no. of Hours Per semester</b>	<b>Total Credits  (Total Hours/30)</b>
	<b>L</b>	<b>T</b>	<b>P</b>	<b>TW+SL</b>	<b>60</b>
	<b>00</b>	<b>00</b>	<b>40</b>	<b>20</b>	

**Course Objective:**

The course is designed

1. To understand Practical of thermal systems and their processes.
2. To understand the Practical applications of thermodynamics

**Prerequisite(s):** Engineering Physics and Elements of Mechanical Engineering.

**COURSE CONTENTS**

**UNIT- 1**

**Second Law of Thermodynamics:**

1. Finding out the Coefficient of Performance of a refrigerator.
2. Finding out Energy Performance Ratio of a refrigerating plant used as a heat pump.
3. Establishing the relation between EPR and COP.

**UNIT- II**

**Entropy:**

1. Verifying the entropy principles in generalized fluid flow.

**UNIT- III**

**Fuels and Combustion:** Introduction, Classifications of fuels, Combustion Equations, Theoretical Air and Excess Air, Stoichiometric Air-Fuel Ratio, Weight of Carbon in Flue Gases, Weight of Flue Gases per kg of Fuel Burnt, Analysis of Exhaust and Flue Gases .

## **UNIT-IV**

### **Thermodynamic Relations:**

1. Derive the Maxwell equation in Thermodynamic relations.
2. Derive the Tds equation in Thermodynamic relations.

## **UNIT- V**

### **Gas Compressors:**

1. Finding out the Isothermal, Volumetric Efficiency of the Reciprocating Air Compressor.
2. Finding out the effectiveness of the intercooler in two stage compressor.

### **BOOKS RECOMMENDED :**

- [1] Yunus A Cengel , *Thermodynamics-An Engineering Approach*, Tata Mc-Graw Hill Publishing House, New Delhi, V Edition
- [2] Sonntag R E, Van Wylen G J, Borgnakke C, *Fundamentals of Thermodynamics*, John Wiley & Sons Pte Limited , Singapore, V Edition
- [3] Nag P K , *Engineering Thermodynamics*, Tata Mc-Graw Hill, New Delhi, V Edition.

**Course Outcome:**

Students earned credits will develop ability to

<b>Course Out Come (CO)</b>	<b>After completion of the course, students will be able to:</b>
CO1	Explain Second Law of Thermodynamics, reversibility, Carnot cycle, and heat engine concepts.
CO2	Apply entropy principles to reversible and irreversible thermodynamic processes
CO3	Analyze combustion equations, air–fuel ratios, and flue gas composition
CO4	Apply Maxwell relations, TdS equations, and thermodynamic property relations
CO5	Evaluate performance of single and multistage gas compressors with calculations

**CO-PO- PSO Relationship**

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PSO-1	PSO-2	PSO-3
CO 1	3	3	3	2	2	0	0	1	0	1	1	3	1	1
CO 2	3	2	2	3	3	0	0	1	0	1	2	3	1	1
CO 3	3	2	2	3	1	0	2	0	0	1	1	3	1	0
CO 4	2	2	2	2	2	0	2	0	0	1	0	3	0	0
CO 5	2	2	1	3	2	0	3	0	0	1	0	3	0	0

\* CO (rows) mention nil/very small/insignificant contribution to the PO(column)

1 → relevant and small significance    2 → medium or moderate    and 3 → strong