

Devi Ahilya University, Indore, India Institute of Engineering & Technology			BE II Year (Mechanical Engineering) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
MER1G1 APPLIED THERMODYNAMICS	L	T	P	L	T	P	Total
<b>Duration of Theory Paper: 3 Hours</b>	3	1	-	3	1	-	4

**Learning Objectives:**

The basic objectives of the subject are:

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

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

### COURSE CONTENTS

**UNIT- I**

**Second Law of Thermodynamics:** Cyclic Heat Engine, Kelvin Planck Statement, Clausius Statement, Equivalence of Kelvin Planck and Clausius Statements, Reversibility and Irreversibility, Carnot Cycle, Carnot's Theorem, Absolute Thermodynamic Temperature Scale, Efficiency of the Reversible Heat Engine, Illustrative Problems .

**UNIT- II**

**Entropy:** Introduction, Clausius Theorem, Property of Entropy, Inequality of Clausius, Entropy change in an Irreversible Processes, Entropy Principle, Applications of Entropy Principle, Entropy Transfer with Heat Flow, Entropy and Disorder, Absolute Entropy Illustrative Problems .

**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:** Mathematical Theorems, Maxwell's Equations, TdS Equations, Difference in Heat Capacities, Ratio of Heat Capacities, Energy Equation, Joule-Kelvin Effect, Illustrative Problems.

**UNIT- V**

**Gas Compressors:** Compression Processes, Work of Compression, Single Stage Reciprocating Air Compressor, Volumetric Efficiency, Multi Stage Compression, Illustrative Problems .

**Learning Outcomes:**

Upon Completing the Course, Student will be able to:

1. Develop the ability to apply the basic principles of Classical Thermodynamics in a systematic way.
2. To understand the basic concepts of heat transfer and work transfer involved in the process.
3. Equip them with tremendous useful set of tools for thermal analysis of any thermodynamic system

**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.