ENGINEERING THERMODYNAMICS

III Semester

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
A5AE07	PC	3	1	0	4	30	70	100

COURSE OBJECTIVES:

The course should enable the students to:

1. Analyze laws of thermodynamics.
2. Analyze changes in entropy in various thermodynamic processes.
3. Analyze the thermodynamic properties of pure substances undergoing various thermodynamic processes.
4. Evaluate the thermodynamic properties of gases and mixture of gases.

Realize the working of different power cycles

UNIT-I FIRST LAW OF THERMODYNAMICS

Basic Concepts: Macroscopic and Microscopic viewpoints, Quasi static Process, various flow and non-flow process, energy in State and in Transition, Work and Heat, Point and Path function. Zeroth Law of Thermodynamics, First law of Thermodynamics, PMM-I, Corollaries, First law applied to a Process, applied to a flow system.

UNIT-II SECOND LAW OF THERMODYNAMICS AND ENTROPY PRINCIPLES

LIMITATIONS OF THE FIRST LAW: Thermal Reservoir, Heat Engine, Heat pump Refrigerator. Parameters of performance, Second Law of Thermodynamics-Kelvin Planck and Clausius Statements and their Equivalence / Corollaries, PMM of Second kind, Carnot's principle, Carnot cycle and its specialties, Clausius Inequality, Entropy, Principle of Entropy Increase, Elementary Treatment of the Third Law of Thermodynamics

UNIT-III AIR STANDARD CYCLES

POWER CYCLES: Otto, Diesel, Dual Combustion cycles, Description and representation on P-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis, comparison of Cycles.

UNIT-IV VAPOR POWER CYCLE

PURE SUBSTANCES: P-V-T surfaces, T-S and h-s diagrams, Mollier Charts, Phase transformations, Triple point at critical state properties during change of phase, Dryness Fraction. Various thermodynamic processes and energy transfer, Steam calorimetry. Simple Rankine cycle and Reheat

UNIT-V BASICS OF JET PROPULSION AND HEAT TRANSFER

Basics of Jet propulsion: Brayton cycle for gas turbine engines and its actual process, P-V and T-S diagram and its performance characteristics-Thrust equation

Basics of Heat transfer: conduction, convection and radiation basic concept and equations.

Text Books:

1. Engineering Thermodynamics, P.K. Nag, 6th Edition, Mc Graw Hill Education.
2. Thermodynamics an engineering approach, Yunus A. Cengel& Michael A. Boles, 8th Edition, Mc Graw Hill Companies.

Reference Books:

1. Fundamentals of engineering thermodynamics, Rathakrishnan. E, 2nd Edition, Prentice hall of India Pvt Ltd., 2006.
2. Thermodynamics, Arora.C.P, Tata Mc Graw Hill, New Delhi.

COURSE OUTCOMES:

Students should able to

1.Apply first law of thermodynamics to real time applications
2. Evaluate the performance parameters of energy transfers
3. Evaluate the properties of gases during phase changes
4. Compare the process parameters in mixture of gases
5. Distinguish the processes of various power cycles