**APPLIED THERMODYNAMICS -I**

**Course Objective:**

This course is designed to teach mechanical engineering students the application of thermodynamic principles to the design and optimization of engineering systems. Specifically, students will have the ability to apply the first and second law of thermodynamics to (1) vapor power and refrigeration systems, (2) gas power systems, (3) applications concerning humidification, dehumidification, evaporative cooling, and (4) thermodynamics of combustion systems such as furnaces, flow reactors etc.

**Course Outcomes:**

1) Students will be able to analyze a vapor power cycle given a set of operational parameters and constraints, determine cycle efficiency, its power output, and required heat input.

2) Students will be able to make modifications to improve the overall cycle efficiency for the steam power cycle.

3) Students will be able to analyze and optimize a vapor refrigeration system given the requirements and constraints of a refrigeration system.

4) Students will be able to understand the second law limitation of thermodynamic efficiencies and will be able to sort out realistic and unrealistic thermodynamic system claims.

5) Students will be able to analyze and determine cycle efficiency, work output and required heat input for a spark-ignition IC engine with a given set of operating parameters.

6) Students will be able to analyze and determine cycle efficiency, work output and required heat input for a diesel engine with a given set of operating parameters.

7) Students will be able to analyze and determine cycle efficiency, work output, and required heat input for a gas turbine cycle, and determine thrust of a turbojet, for a given set of operating parameters.

8). Students will be able to understand and apply thermodynamic laws of air conditioning and humidification/ dehumidification systems.

9) Students will be able to design a thermodynamic system such as a combined cycle power system based on given constraints and availability of components and optimize its overall efficiency.

10) Students will be able to understand the design and operation of thermal engineering systems including engines, power generation systems, and refrigeration systems and apply this knowledge to the design of similar systems.