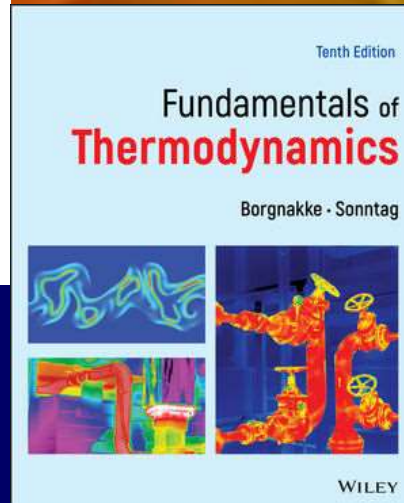
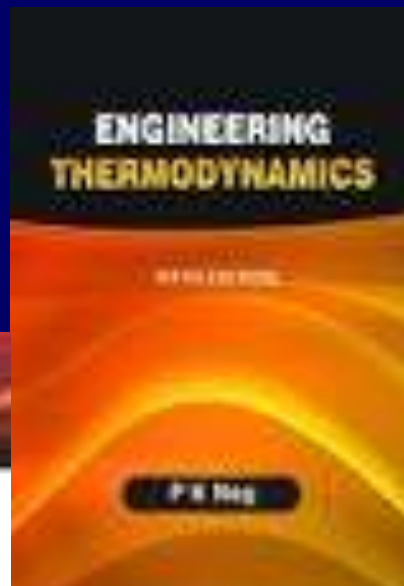


THERMODYNAMICS (BAV 303)



OBJECTIVES

- **Basic ideas of understanding of concepts & First Law of Thermodynamics**
- **Understand the concepts of second Law & Entropy**
- **Definition & Laws pertaining to Ideals Gas Properties and process**
- **Knowledge of Gas Power Cycles**
- **Evaluate heat & Work Transfer for Ideal gas process**

APPROACH

- **Basic Ideas & Definitions**
- **Laws of Thermodynamics**
- **Ideal Gas Properties and Process**
- **Gas Power Cycle**

BASIC IDEAS & DEFINITIONS

- **Thermodynamic System**
 - **Types of systems**
 - **State of Systems**
 - **Properties of Systems**
 - **Classification of properties**
- **Thermodynamic Process & Cycle**
- **Work Transfer and Heat Transfer**

Definition of Thermodynamics

- Thermodynamics is the science of energy transfer and its effect on the physical properties of substances.
- Greek Words *therme* (heat) + *dynamics* (power)
- It includes all aspects of energy and energy transformation, including Heat, Work, power generation, refrigeration & relationships among the properties of matter.

ROLE OF THERMODYNAMICS

- In Engineering it plays important Role in the Design of
 - Automobile Engines
 - Compressors and Turbines
 - Refrigerators
 - Rockets
 - Jet Engines
 - Solar Collectors
 - Conventional and Nuclear Power plants
 - Energy Efficient Home

APPROACH

- Substance consists of a large number of particles *molecules*
- Properties depend on behavior of particles e. g. pressure of a gas in a container
 - Classical Approach
 - Statistical Approach

Classical Thermodynamics

- It does not require a knowledge of the behavior of individual particles. Structure of the matter is not considered
- It concern with effects of action of many molecules, only a few variables are needed to describe the state of the system
- Values of these variables can be measured. Effects can be perceived by human senses e. g pressure
- Independent of assumptions regarding nature of matter
- It is macroscopic approach to study of Thermodynamics
- Direct and Easy way to solve problem

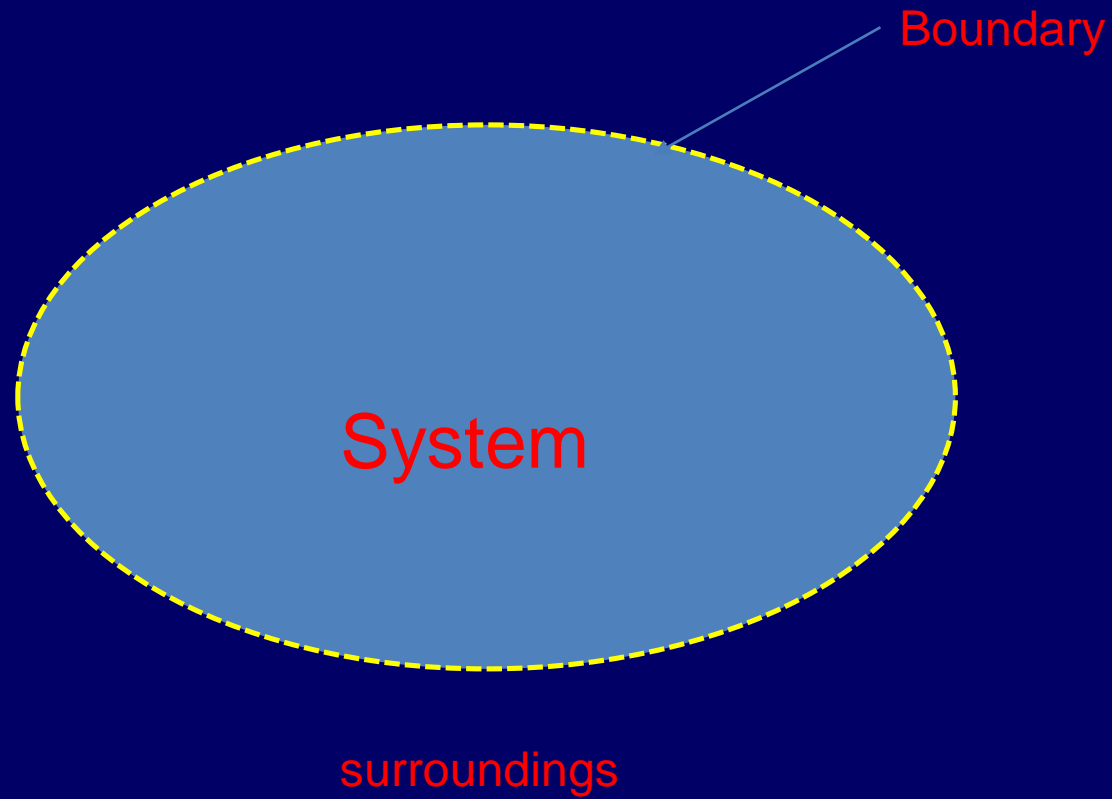
Statistical Thermodynamics

- Approach based on the average behavior of large group of individual particles
- It concern with effects of action of each molecule
- Here nature of matter is important, knowledge of the structure of the matter is necessary
- A large number of variables are needed to describe the state of the system. Values of the variables cannot be measured easily.
- It is microscopic approach to study Thermodynamics
- All results of macroscopic Thermodynamics can be derived from microscopic studies

Thermodynamics Study

- **Approach based on understanding Thermodynamic System**
 - **Consider Certain region in space or**
 - **Consider quantity of matter**
 - **Imagine system with its surroundings and Boundaries**

System



Thermodynamic System

- It is defined as a quantity of matter or a region in space upon which attention is concentrated in the analysis of a problem
- Everything external to the system is surroundings or the environment
- The real or imaginary surface that separates the system from its surroundings is called the Boundary
 - Boundary can be fixed or movable
 - Boundary is Shared by both the system & surroundings
 - Boundary has zero thickness
 - It can neither contain any mass nor occupy any volume in space

JAI HIND