

# GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

## Food Processing & Technology

Subject Code 131404

Subject Name FOOD ENGINEERING THERMODYNAMICS

Sr.No	Course contents
1.	Fundamental Concepts: Definitions related to Thermodynamics, Dimensions.
2.	Ideal and Real Gases: Concept of ideal gas, Characteristic equation of gas. Universal and Characteristic gas constant. Enthalpy and Specific heat. Deviation of real gas from ideal gas, Compressibility factor and the Van der Waal's equation of state for real gas.
3.	Laws of Thermodynamics: Zeroth Law, Concept of temperature. Equality of temperature, Zeroth Law of thermodynamics.
4.	First Law of Thermodynamics: First law of thermodynamics. Concept processes, Flow processes and control Volume, Flow work, Steady flow energy equation, Mechanical, Mechanical work in a steady flow process, Throttling process, Application of first law to open systems.
5.	Second Law of Thermodynamics : Essence of second law, Thermal reservoir, Heat engines and thermal efficiency, COP of heat pump and refrigerator, Definition of available and unavailable energy, Statement of second law, Carnot cycle, Carnot theorem, Clausius inequality, Concept of entropy, Entropy change for ideal gases.
6.	Thermodynamics Relations: Maxwell's equations, thermodynamic property relations for a pure substance, Joule-Kelvin effect, Clausius-Clapeyron equation, Gibbs phase rule, types of equilibrium, and conditions of stability.
7.	Properties of Pure Substance: Steam & Water Tables & Chart
8.	Psychrometric Chart: Psychrometric parameters and their relationships, Psychrometric properties of air. Mixing of air streams, Heating and cooling processes, Humidification and dehumidification processes

### Reference Books:

1. Engineering Thermodynamics by P. K. Nag (TMH)
2. Thermodynamics and Heat Engines - Vol I by Yadav, R (Central Publishing House, Allahabad)
3. Engineering Thermodynamics by Rogers, P H and Mayhew, H
4. Thermodynamics by Holman, J P (TMH)
5. An Introduction to Thermodynamics, Y.V.C. Rao, New Age International (P) Ltd., Publishers.

