GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Food Processing & Technology

Subject Code 131403
Subject Name FOOD ENGINEERING TRANSPORT PHENOMENON

Sr.No	Course contents
1.	Fluid Properties: Definition of a fluid, continuum, properties of fluid density, specific eight, specific volume, specific gravity bulk modulus of elasticity, Vapour pressure, Surface tension, capillarity, viscosity, dynamic & Kinematic viscosity.
2.	Fluid Statics: Pressure at a point, basic equation of fluid statics, Units and scales of pressure measurement, Pressure measurements, Forces on immersed plane and curved surface, Buoyant force, Stability of floating and submerged bodies. Relative equilibrium.
3.	Fluid-Flow Concepts And Basic Equations: Flow characteristics, definitions, Continuity equation. Velocity potential and stream function, Euler's equation of motion along a streamline, Integration of Euler's equation of motion. Bernoulli equation; Reversibility Irreversibility and losses. Application of Energy equation to steady Fluid-Flow situations. Orifice meter, Venturi meter, Nozzle meter, pitot tube, Notches and Weirs. Momentum equation orifice and mouthpiece, Applications of Linear-Momentum equation, Moment of Momentum equation.
4.	Dimensional Analysis And Dynamic Similitude: Dimensions and units, Dimensional homogeneity and dimensionless ratios. The Pi Theorem, Discussion of Dimensionless Parameters, Similitude, Model Studies.
5.	Viscous Effects: Laminar incompressible steady flow, through circular tubes. Reynolds's Number. Velocity distribution in Turbulent flow. Resistance to turbulent flow in closed and open conduits, steady in compressible flow through simple pipe systems. Steady uniform flow in open channels, Boundary layer concepts, Boundary layer thicknesses, Drag on immersed bodies.
6.	Diffusivity and Mechanism Of Mass Transfer: Definitions of Concentrations, Mass fluxes, Fick's Law of Diffusion, Theories if Ordinary Diffusion in Liquids.

Reference Books:

1. Transport Phenomena by R.Byron Bird, Warron E. Stewart & Edwin N. Lightfoot, Wiley International Edition, John Wiley & Sons.
2. Transport Process & Unit Operations, Christie J. Geankoplis, Prentice Hall of India Private Limited.
3. Modi P. N. and Seth S. M Hydraulics and Fluid Mechanics, Standard Book House.
4. Streeter V. L. and Wylie E. B. Fluid Mechanics, McGraw Hill, SI Edition
5. Bansal R K. Fluid Mechanics and Hydroulics, Laxmi publications, New Delhi.