

Course No	: PFE122	Course Title	: Heat and Mass Transfer
Semester	: II	Credits	: 2 (1+1)

Syllabus

Theory

Concept, modes of heat transfer, thermal conductivity of materials, measurement. General differential equation of conduction. One dimensional steady state conduction through plane and composite walls, cylinder and spheres. Electrical analogy. Insulation materials. Fins, Free and forced convection. Newton's law of cooling, heat transfer coefficient in convection. Dimensional analysis of free and forced convection. Combined free and forced convection. Introduction. Absorptivity, reflectivity and transmissivity of radiation. Black body and monochromatic radiation, Planck's law, Stefan-Boltzman law, Kirchoff's law, grey bodies and emissive power.

Radiation exchange between black surfaces. Heat transfer analysis involving conduction, convection.

Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units. Heat exchanger analysis restricted to parallel and counter flow heat exchangers. Steady state molecular diffusion in fluids at rest and in laminar flow, Fick's law, mass transfer coefficients. Fundamental transport processes.

Practical

Study of thermal conductivity apparatus, Determination of thermal conductivity of solid metal rod, Determination of thermal conductivity of solid composite wall, Numerical on thermal conductivity of cylinder and sphere, Study of tubular type heat exchanger, Study of plate type heat exchanger, Study of overall heat transfer coefficient in parallel flow heat exchanger and counter flow heat exchanger and numerical, Determination of heat transfer through insulated pipe, Determination of Stefan-Boltzman constant, Determination of emissivity of a given material, Study of mass transfer coefficient of solid and liquid, Visit to nearby dairy and food processing industry.

