Year & Sem: E2S2	Course Code: ME2204	Course Name: **Heat Transfer**	No. of Credits: 4	L	T&PS	P
				2	2	0

Unit-I: Introduction: Modes of heat transfer, thermal conductivity, combined modes of heat transfer, concept of thermal contact resistance. Derivation of heat conduction equation, steady state one-dimensional heat conduction with and without generation of heat in simple geometries: plane wall, cylindrical and spherical walls, critical thickness of insulation, heat transfer from extended surfaces, IID steady state heat conduction.

Unit-II: Unsteady conduction: Lumped heat capacity system, transient heat conduction in infinite and semi-infinite walls, concept of Heisler chart, heat conduction from a moving heat source. Introduction to concepts of Finite difference approach for solving conduction problems.

Unit-III: Forced convection: Derivation of energy equation, concept of thermal boundary layer and derivation of thermal boundary layer equation, flat plate in parallel flow (solution by energy integral method), cylinder in cross flow, internal flows: concept of thermally fully developed flow and its corollaries, fully developed pipe flow, fully developed channel flow with constant wall heat flux, turbulent flow in pipes, Reynolds analogy.

Unit-IV: Free convection: Vertical plate at constant temperature, derivation of governing equation, recognition of dimensionless terms, and solution by integral method.

Unit-V: Heat exchangers: classification of heat exchangers, overall heat transfer coefficient, concept of fouling factor, LMTD and NTU methods. Boiling and Condensation: regimes of boiling heat transfer, correlations for critical heat flux in boiling, laminar film condensation over a vertical plate and horizontal circular tube.

Unit-VI: Thermal radiation: Radiation properties, blackbody radiation, Planck's law, Stefan-Boltzman law, Kirchoff's law, radiation exchange between black surfaces, concept of view factor, radiation exchange between non-black surfaces, two surface enclosure, three surface enclosure, concept of radiation shield. Computer aided heat transfer analysis with cases dealt in the class and visualize temperature distribution.

References/Text Books:

1. F.P. Incropera and D.P. Dewitt, Fundamentals of Heat and Mass Transfer,
2. J.P. Holman, Heat Transfer,
3. P.K. Nag, Heat and Mass transfer,
4. S. P. Sukathme, A Text book on Heat Transfer.

Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations.