

▪ SEMESTER:- II

▪ COURSE NO.:- FE-124

▪ COURSE TITLE:- HEAT AND MASS TRANSFER

▪ CREDIT:- 2(1+1)

➤ THEORY

NO. OF UNITS	TOPICS	NO. OF LECTURES
1	<i>Basic heat transfer process, thermal conductivity, Overall heat transfer coefficient, physical properties related to heat transfer</i>	2
2	<i>One-dimensional steady state conduction : Theory of heat conduction, Fourier's law, Derivation of Fourier's equation in Cartesian co-ordinates, Heat flow through slab, cylinder and sphere with non-uniform thermal conductivity</i>	2
3	<i>Heat transfer through composite walls and insulated pipelines</i>	1
4	<i>Steady-state heat conduction with heat dissipation to environment: Introduction to extended surfaces (FINS) of uniform area of cross-section. Equation of temperature distribution with different boundary conditions. Introduction to unsteady state heat conduction</i>	1
5	<i>Convection : Forced and free convection, use of dimensional analysis for correlating variables affecting convection heat transfer, concept of Nusselt number. Prandtl number, Reynolds number,</i>	2
6	<i>Radiation : emissivity, absorptivity, transmissivity, radiation through black and grey surfaces, determination of shape factors</i>	2
7	<i>Heat Exchangers : General discussion, fouling factors, jacketed kettles, LMTD, parallel and counter flow heat exchangers, shell and tube and plate heat exchangers,</i>	2
8	<i>Application of different types of heat exchangers in dairy and food industry</i>	1
9	<i>Mass transfer : Fick's law of diffusion, steady state diffusion of gases and liquids through solids, isothermal evaporation of water into air, mass transfer coefficient, applications in dairy and food industry</i>	2
	TOTAL	15

➤ PRACTICALS

NO. OF UNITS	TOPICS	NO. OF EXPT.
1	<i>To study various types of heat exchangers used in dairy & food Industry</i>	2
2	<i>Preparation and calibration of thermocouples</i>	2
3	<i>Determination of thermal conductivity: milk, solid dairy & food products.</i>	2
4	<i>Determination of overall heat transfer co-efficient of : Shell and tube, plate heat exchangers Jacketted kettle used in dairy & food Industry</i>	3
5	<i>Studies on heat transfer through extended surfaces.</i>	2
6	<i>Studies on temperature distribution and heat transfer in HTST pasteurizer</i>	2
7	<i>Design problems on heat exchangers</i>	2
	TOTAL	15

➤ *Reference Books:*

- *A course in Heat & Mass Transfer* *S. Domkundwar, (1993), Danpat Rai and Sons, New Delhi*
- *Heat Transfer* *C.P. Gupta (1964), Prentice hall of India, New Delhi*
- *Principles of Heat Transfer* *F. Kretith, and M.S. Bohn, (1986),
Harper and Row Publishers, New York*