

B.Tech 5th Semester (Mechanical Engineering)

Lesson Plan: Heat and Mass Transfer (PCC-ME-501/21)

S.N.	Content to be Covered	Lect. No.
	UNIT-1 Introduction and Modes of Heat Transfer	
1	Introduction to three modes of heat transfer	1
2	Derivation of heat balance equation- Steady state one dimensional solution for conduction	2
3	heat transfer in Cartesian, cylindrical and spherical geometry	3
4	critical insulation thickness ,Numerical covered topic	4
5	heat transfer through extended surfaces	5
6	one dimensional conduction solutions for unsteady state	6
7	lumped system approximation and Biot number	7
8	heat transfer-approximate solution by the use of Heissler charts	8
9	Numerical Problems	9
10	UNIT-2 Heat convection	
11	Heat convection, basic equations such as continuity equation and momentum equation	10
12	introduction to boundary layer, laminar and turbulent flow, external and internal flows (flow over flat plate and circular pipes)	11
13	Natural convective heat transfer Dimensionless parameters for forced and free convection heat transfer	12
14	Correlations for forced and free convection, Numerical	13
15	Approximate solutions to laminar boundary layer equations (momentum and energy) for both internal and external flow	14
16	Estimating heat transfer rates in laminar flow situations using appropriate	15
17	correlations for free and forced convection (flat plate and circular pipes)	16
18	Numerical Problems	17
19	UNIT-3 Radiation Heat Transfer	
20	Interaction of radiation with materials	18
21	definitions of radiative properties, Stefan Boltzmann's law, black and gray body radiation	19
22	Wein's law, Kirchhoff's law, Numerical Problems	20
23	Calculation of radiation heat transfer between surfaces using radiative properties Numerical Problems	21
24	view factors and the radiosity method	22
25	Thermocouple error in temperature measurement. Numerical Problems	23

26	Numerical Problems	24
27	UNIT-4 Heat Exchanger	
28	Types of heat exchangers, uses of different types of heat exchangers,	25
29	dimensionless numbers for heat exchanger design, Analysis	26
30	design of heat exchangers using both LMTD and ϵ -NTU methods	27
31	Numerical Problems	28
32	UNIT-5 Mass Transfer	
33	Basic of Boiling and Condensation heat transfer	29
34	Pool boiling curve	30
35	introduction to heat pipe Numerical Problems	31
36	Numerical Problems	32
37	UNIT-6 Numerical Methods in Heat Transfer Analysis	
38	Introduction to numerical methods	33
39	Finite difference approximation	34
40	Steady state numerical methods	35
41	Numerical Problems	36
42	Doubt Numerical problems	37
43	Doubt Numerical problems	38

