

Course Number and Name													
BME603 - HEAT AND MASS TRANSFER													
Credits and Contact Hours													
2 & 30													
Course Coordinator's Name													
Mr.Ravi													
Text Books and References													
TEXT BOOKS:													
1. Sachdeva.R.C-Fundamentals of Heat&Mass Transfer-NewAgeInternational(P)Ltd, 2003													
REFERENCES:													
1. OzisikN.M-heat transfer-McGraw hill Book Company, 1985													
2. Holman.J.P-heat transfer –McGraw hill Book Company, 2002													
3. Dr.D.S.Kumar,Heat and Mass Transfer,S.K.Kataria& sons,2003													
4. P.K.Nag, Heat transfer, McGraw Hill Book Company,2002.													
5. bookboon.com/en/momentum-heat-and-mass-transfer-ebook													
1.													
Course Description													
To understand the mechanisms of heat transfer under steady and transient conditions.													
To understand the concepts of heat transfer through extended surfaces.													
To learn the thermal analysis and sizing of heat exchangers and to understand the basic concepts of mass transfer. (Use of standard HMT data book permitted)													
Prerequisites							Co-requisites						
Thermal Engineering-II							Nil						
required, elective, or selected elective (as per Table 5-1)													
Required													
Course Outcomes (COs)													
CO1	Learn steady state state of systems												
CO2	Learn unsteady state of systems												
CO3	Understand the principles of convection												
CO4	Understand the principles of radiation												
CO5	Learn the design concepts in mass transfer												
CO6	Learn evaporation process in atmosphere												
Student Outcomes (SOs) from Criterion 3 covered by this Course													
	COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
	CO1	H	M					M			M		

CO2	H							L		M		
CO3	H							L		M		L
CO4											L	
CO5							M					
CO6					M							L

List of Topics Covered

UNIT I STEADY STATE HEAT CONDUCTION

12

Fourier law of conduction, general equation in Cartesian, cylindrical and spherical co-ordinates, One dimensional steady state conduction across plane wall-Composite wall-composite cylinder-composite sphere with convection boundaries, Overall heat transfer co-efficients, critical thickness of insulation, conduction with generation, conduction and convection systems-fins with direct boundary conditions(Derivations not included)

UNIT II UNSTEADY STATE HEAT CONDUCTION

12

Unsteady state conduction-Lumped capacity systems, semi-infinite solids, infinite solids and multi dimensional systems, Numerical solution of 2-dimensional steady and unsteady condition

UNIT III CONVECTION

12

Principles and governing equations, Natural convection from vertical, inclined and horizontal surface, Forced convection-Heat transfer from a flat plate, flow through pipes, condensation and boiling processes-Heat exchangers-Type of heat exchangers-Overall heat transfer co-efficient, LMTD & NTU methods, Fouling factor

UNIT IV RADIATION

12

Black body concept, Grey body, Radiation shape factor, relation between shape factors, radiation heat transfer between two surfaces, Radiation shields, Gas radiation,Solar radiation

UNIT V MASS TRANSFER

12

Fick's law of diffusion, Stefan's law, Mass transfer co-efficient, Non-dimensional number used in mass transfer, evaporation process in the atmosphere.