

		National Institute of Technology Meghalaya An Institute of National Importance											CURRICULUM						
Programme		Bachelor of Technology in Mechanical Engineering										Year of Regulation			2018				
Department		Mechanical Engineering										Semester			V				
Course Code	Course Name	Credit Structure				Marks Distribution													
		L	T	P	C	INT	MID	END	Total										
ME 303	Heat Transfer	3	1	0	4	50	50	100	200										
Course Objectives	To introduce the concept of heat transfer	Course Outcomes	CO1	Illustrate the basic laws and mechanisms of various modes of heat transfer.															
	To teach the mechanisms of heat transfer under various conditions		CO2	Analyze problems involving transient and steady state heat conduction in simple geometries.															
	To develop an ability and skill to design a thermal system		CO3	Analyze and evaluate various extended surfaces (fins) for various applications.															
	To develop an ability to analyse various industrial thermal heat exchangers, fins, etc.		CO4	Interpret and obtain solutions for conduction and radiation heat transfer problems.															
			CO5	Determine heat transfer parameters for natural and forced convection and in and over various geometries.															
CO6	Evaluate the performance parameters of different type of industrial heat exchangers.																		
Mapping with Program Outcomes (POs)																	Mapping with PSOs		
No.	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
1	CO1	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
2	CO2	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
3	CO3	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0			
4	CO4	3	0	0	0	0	0	0	0	0	0	0	0	2	0	0			
5	CO5	0	2	0	0	0	0	0	0	0	0	0	0	2	0	0			
6	CO6	0	3	0	0	0	0	0	0	0	0	0	0	2	0	0			
SYLLABUS																			
No.	Content													Hours	COs				
I	Introduction: Application areas, Importance, Basic modes of heat transfer, Units and dimensions, Conduction vs. convection vs. radiation, Laws of Heat Transfer													06	CO1				
II	Introduction to Conduction: Mechanism of conduction, Conduction rate equation, Thermal Properties of matter: thermal conductivity, Heat diffusion equation, Initial and Boundary, Conditions, 1-D steady state conduction, Conduction in slab, cylinder, sphere & composite system, 1-D transient problems, 2-D steady state systems, Lumped Capacitance Analysis, Critical thickness of insulations, Numerical methods for heat conduction													10	CO2				
III	Convective Heat Transfer : Mechanism of convection, Advection vs. convection, Boundary layers, Local & average convection coefficients, Non-Dimensional Numbers, Reynolds analogy, Heat transfer in boiling and condensation													10	CO5				
IV	Heat transfer in extended surfaces: Conduction analysis, Fins with uniform cross sectional area, Fin performance													07	CO3				
V	Heat Exchangers: Types of Heat exchangers, Overall heat transfer coefficient, LMTD and NTU method													08	CO6				
VI	Thermal Radiation: Basic Laws: Planck's law, Lattice Boltzmann law, Wien's displacement law; Emissive power, Intensity, Black and Grey surfaces, View factor.													07	CO4				
Total Hours													48						
Essential Readings																			
1. F. P. Incropera and D. P. Dewitt, "Fundamentals of Heat and Mass Transfer", John Wiley and Sons.																			
2. J. P. Holman, "Heat Transfer", McGraw Hill.																			
3. A. Bejan, "Convective Heat Transfer", John Wiley and Sons																			
Supplementary Readings																			
1. M. N. Ozisik, "Heat Transfer-A Basic Approach", McGraw Hill																			
2. Kays, "Convective Heat & Mass Transfer", McGraw-Hill Publishers																			
3. P. K. Nag, "Heat Mass Transfer", McGraw-Hill Publishers.																			