No	Information of every subject	
1	Unit name:	Heat and Mass Transfer
2	Code:	ME 41033
3	Classification:	Engineering subject
4	Credit value:	2.5
5	Semester/ Year Offered:	1/2
6	Pre-requisite:	Differential Calculus, Fluid Mechanics, Thermodynamics
7	Mode of delivery:	Lecture, Tutorial , Assignment
8	Assessment system and breakdown of marks:	
	Test	15%
	Mid-term/ final Examination	35%
9	Academic staff teaching unit:	
10	Course outcome of unit: In this course students will be able • to solve the heat transfer rate equation of Conduction, Convection and Radiation, and relationship to the Laws of Thermodynamics. • to solve the heat conduction transfer problems for Cartesian, Cylindrical and Spherical coordinates with boundary and initial conditions. • to compute the one-dimensional, steady-state conduction heat problems for plane wall, cylinder, sphere and their extended surfaces with boundary conditions. • to apply the finite-difference method for the two-dimensional, steady-state heat conduction problems.	
11	Synopsis of unit: The course covers the fundamentals of heat and mass transfer. The course introduces students to the various modes of heat transfer, the linkage between heat transfer and thermodynamics, the heat diffusion equation and boundary and initial conditions of conduction, one-dimensional, steady-state conduction of a substantial amount of optional material, the fundamental concepts and powerful and practical solution techniques of two-dimensional, steady-state conduction.	

Topic:

Chapter **Title**

		3.1.4 Contact Resistance 3.1.5 Porous Media **3.2** An Alternative Conduction Analysis **3.3** Radial Systems 3.3.1 The Cylinder 3.3.2 The Sphere **3.4** Summary of One-Dimensional Conduction Results **3.5** Conduction with Thermal Energy Generation 3.5.1 The Plane Wall 3.5.2 Radial Systems 3.5.3 Tabulated Solutions 3.5.4 Application of Resistance Concepts **3.6** Heat Transfer from Extended Surfaces 3.6.1 A General Conduction Analysis 3.6.2 Fins of Uniform Cross-Sectional Area 3.6.3 Fin Performance 3.6.4 Fins of Nonuniform Cross-Sectional Area 3.6.5 Overall Surface Efficiency **3.7** The Bioheat Equation **3.8** Thermoelectric Power Generation **3.9** Micro- and Nanoscale Conduction 3.9.1 Conduction Through Thin Gas Layers 3.9.2 Conduction Through Thin Solid Films **3.10** Summary
	4.	**Two-Dimensional, Steady-State Conduction** **4.1** Alternative Approaches **4.2** The Method of Separation of Variables **4.3** The Conduction Shape Factor and the Dimensionless Conduction Heat Rate **4.4** Finite-Difference Equations 4.4.1 The Nodal Network 4.4.2 Finite-Difference Form of the Heat Equation

	4.4.3 The Energy Balance Method **4.5** Solving the Finite-Difference Equations 4.5.1 Formulation as a Matrix Equation 4.5.2 Verifying the Accuracy of the Solution **4.6** Summary
14	Main references: 1. Fundamentals of Heat and Mass Transfer, 7nd Edition, by Frank P. Incropera, and David P. DeWitt
15	Additional references: 1. Heat and Mass Transfer Fundamentals and Applications, 5th Edition by Yunus A. Cengel