

18MTOE03		DESIGN AND SELECTION OF MATERIALS	L	T	P	C
			3	0	0	3
Course Objectives:						
1.	To know different types of materials and properties and to select better materials for Different applications.					
UNIT I DESIGN PROCESS						
			9	+	0	
Materials in Design, Evolution of Engineering Materials, Design process, Types of design, Design flow chart-tools and material data, Interaction between Function, Material, Shape and Process						
UNIT II MATERIAL PROPERTIES						
			9	+	0	
Revision of engineering materials and properties, Material properties interrelationship charts such as Young's modulus-density, Strength-density, Young's modulus-Strength, wear rate-hardness, Young's modulus – relative cost, strengthrelative cost and others.						
UNIT III MATERIAL SELECTION						
			9	+	0	
Materials selection, selection strategy: material attributes, attribute limits, selection procedure, computer aided selection, structural index; Case studies: table legs, flywheel, springs, pressure vessels, bearings, heat exchangers, airframes, ship structures, automobile structures						
UNIT IV PROCESSES AND PROCESS SELECTION						
			9	+	0	
The processes: shaping, joining and finishing, Process selection, ranking processes, cost, computer based process selection, Case studies: fan, pressure vessel, optical table, economical casting.						
UNIT V MULTIPLE CONSTRAINS AND OBJECTIVES						
			9	+	0	
Selection under multiple constraints, conflicting objectives, penalty-functions, exchange constants, Case studies: connecting rods for high performance engines, windings of high field magnets.						
Total (L+T) = 45 Hours						
Course Outcomes:						
Upon completion of this course, the students will be able to:						
CO1	:	Explain the physical, chemical and electrical properties of metals and their selection criterion				
CO2	:	Suggest the materials for corrosion and wear resistance process.				
CO3	:	Suggest the materials for high and low temperature process.				
CO4	:	Suggest the materials for auto and aero industry				

CO5	:	Suggest the materials for nuclear and mining industries.
Text Books:		
1.		Michael F. Ashby, Materials Selection in Mechanical Design, third edition, Butterworth-Heinemann, 2005
2.		J. Charles, F.A.A. Crane, J. A.G. Furness, Selection and Use of Engineering Materials, third edition, Butterworth-Heinemann, 2006
Reference Books:		
1.		ASM Metals Handbook, Vol.20: Materials Selection and Design, ASM International, 1997
2.		Myer Kutz, Handbook of Materials Selection, John Wiley & Sons, Inc., New York, 2002