

22MEHO302		ADVANCED MATERIALS TECHNOLOGY						
PREREQUISITES		CATEGORY	L	T	P	C		
		PE	3	0	0	3		
COURSE OBJECTIVES:								
1.	To understand knowledge of crack and failure of metals							
2.	To know different types of coatings							
3.	Apply knowledge of composites							
4.	To understand properties of modern alloys							
5.	To know about advanced aerospace alloys							
UNIT I	REVIEW OF MECHANICAL BEHAVIOUR OF MATERIALS				9	0	0	9
Plastic deformation in poly phase alloys – Strengthening mechanism –Griffith’s theory of failure modes- brittle and ductile fractures- damping property of materials- fracture toughness –initiation and propagation of fatigue cracks – Creep mechanism –Hydrogen embrittlement of metals								
UNIT II	SURFACE MODIFICATION OF MATERIALS				9	0	0	9
Mechanical surface treatment and coating –Case hardening and hard facing –thermal spraying –Vapour deposition –Ion implantation- diffusion coating –electroplating and electroforming –conversion coating –Ceramic and organic coating –Diamond coating – Advanced surface modification of steels								
UNIT III	ADVANCED HEAT TREATMENT OF MATERIALS				9	0	0	9
Composite- Types- Natural composites- Metal matrix composites- Ceramic matrix composites- Applications								
UNIT IV	MODERN MATERIALS AND ALLOYS				9	0	0	9
Super alloys Hastelloy, Inconel, Invar, and Monel and uses.–Refractory materials - Fireclay refractories. High alumina refractories, Silica brick, Magnesite refractories Ceramic and their applications - Low melting alloys Mercury, Cadmium, Zinc, Lead– Shape memory alloys -Copper – Aluminium-Nickel and Nickel -Titanium								
UNIT V	APPLICATION OF ADVANCED MATERIALS				9	0	0	9
Ti and Ni based alloys for gas turbine applications –Maraging (Low carbon and high Nickel) and cryogenic steels – Newer materials and their treatment for automobile applications – Materials for aerospace (AL6061,AL 7075), Marine(AH36, DH36, and EH36)and nuclear systems								
TOTAL (45L): 45 PERIODS								
TEXT BOOKS:								
1.	Dowling, ”Mechanical Behaviour Of Materials, Engineering Method Of Determination, Fracture”,Mcgraw Hill,1999							
2.	Dieter, ’Engineering Design, A materials And Processing Approach’’, Third Edition, Mcgraw Hill,1999							
REFERENCES:								
1.	P.Rama Rao, ”Advances In Materials And Their Applications”, Willey Eastern Ltd.,1993.							
2.	Serope Kalpakjian, “Manufacturing Engineering And Technology’ Third Edition, Addison Wisley Publishing Co.,1995.							
3.	Kenneth G . Budinski, ‘‘Surface Engineering For Wear Resistance’’, Prentice Hall,1998.							
4.	Dieter, ‘‘Mechanical Metallurgy’ ’Mcgraw Hill, 1989							
5.	D.R.Gabe, ‘Principles Of Metal Surface Treatment And Protection’, Pergamon Press1978.							

COURSE OUTCOMES: Upon completion of this course, the students will be able to:		Bloom Taxonomy Mapped
CO1	Impart knowledge of crack and failure of metals	Understand
CO2	Identify the different types of coatings	Understand
CO3	Apply knowledge of composites	Apply
CO4	Define the properties of modern alloys	Remember
CO5	Provide information of advanced aerospace alloys	Remember

COURSE ARTICULATION MATRIX

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	0	1	0	0	1	0	0	0	0	2	1	2	2
CO2	1	3	1	1	0	0	1	0	0	0	0	2	0	1	1
CO3	3	3	1	1	2	0	1	0	0	0	0	3	0	1	3
CO4	3	2	1	2	2	0	1	0	0	0	0	3	2	1	3
CO5	2	3	0	3	1	0	1	0	0	0	0	3	0	1	2
Avg	2.2	2.6	0.6	1.6	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2.6	0.6	1.2	2.2

3/2/1 – indicates strength of correlation (3 – high, 2- medium, 1- low)