



GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering

Subject Code: 3730010

Semester III

Composite Materials

Type of Course:

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE Viva (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Sr. No.	Topics	Teaching Hours
1	INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance	
2	REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions	
3	Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications	
4	Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications	
5	Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first ply failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations	

References:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition,
3. Hand Book of Composite Materials-ed-Lubin
4. Composite Materials – K.K.Chawla
5. Composite Materials Science and Applications – Deborah D.L. Chung
6. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi



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Course Outcomes:

After learning the course the students should be able to :

Sr. No.	CO statement	Marks % weightage
CO-1		
CO-2		
CO-3		
CO-4		