VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Department of Metallurgy& Materials Engineering

LESSON PLAN-Composite Materials

Subject Name : Composite materials

Credits : 3-1-0

Department : Metallurgy & Materials Engineering

Session : 2016-17 (Even Semester)

Level : Undergraduate (VIII-Semester)

Course Instructor : Renu Prava Dalai

Category : Compulsory course for all B.Tech VIII Semester students of MME Department.

Class Schedule			
Monday – B321	Tuesday – B321	Thursday – B321	Friday – B321
8:50-9:40 AM	8:50-9:40 AM	4:10-5:00 PM	3:20-4:10 PM

Marks Distribution		
End Term	Mid Term	Assignments + Class Test
70	**20**	**10**
Total -100 Marks		

Required Text book

1. Cost-free, PowerPoint visuals & extended notes are furnished to students by Instructor
2. Composite materials science and engineering by Krishna K chawla

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Course Coordinator

COURSE CONTENTS

Sl. No	TOPIC	HOURS
	Module-I	
1.	**Introduction to Composites and Matrices**	**1**
2.	**Reinforcements**	**1**
3.	**Classifications of Composites, its applications and advantages**	**1**
4.	**Fundamental concept of reinforcement**	**1**
5.	**Review of current developments; design & fabrication and economic considerations**	**1**
6.	**Basic mechanics of reinforcement**	**1**
7.	**Stiffness of parallel arrays of fibres in a matrix**	**1**
8.	**Discontinuous and particulate reinforcement**	
	Module–II	
9.	**Fibres and resin materials**	**1**
10.	**Rule of Mixtures**	**1**
11.	**Critical Fiber Length**	**1**
12.	**Short and Continuous Fibers**	**1**
13.	**Fiber Orientation Matrix and Reinforcement Materials**	**1**
14.	**Polymeric Matrices, Metallic Matrices, Ceramic Matrices**	**1**
15.	**Particulates, Flakes, Whiskers**	**1**
16.	**Fibers: C, B, Glass, Aramid, Al2O3, SiC,**	**1**
17.	**Nature and manufacture of glass, carbon and aramid fibres**	**1**
18.	**Review of the principal thermosetting and thermoplastic polymer matrix systems for composites**	**1**
19.	**Polymer Matrix Composites (PMCs), Metal Matrix Composites (MMCs)**	**1**
20.	**Ceramic Matrix Composites (CMCs), CFRP & Carbon/Carbon Composites (CCCs)**	**1**
	Class Test-I	
	Module –III	
21.	**Types of Manufacturing, Processing methods**	**1**
22.	**Interfaces, Properties, Applications**	**1**
23.	**Toughening Mechanisms**	**1**
24.	**Fiber Forms, Prepregs, Molding Compounds-Processes**	**1**
25.	**Lay-Ups**	**1**
26.	**Filament Winding**	**1**
27.	**Pultrusion, Recycling**	**1**
28.	**Matrix– Reinforcement Interface, Wettability**	**1**
29.	**Interactions at Interface, Interfacial Bonding Types, Interfacial Strength Tests, The role of the interface**	**1**
30.	**The nature of fiber surfaces, wetting and adhesion**	
	Module –IV	
31.	**Strength, Stiffness, Fracture Toughness of Composites**	**1**

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32.	**Toughening mechanisms of composites**	**1**
33.	**Strengths of unidirectional composites**	**1**
34.	**Multiple fracture in laminates**	**1**
35.	**Macroscopic fracture and energy dissipating processes**	**1**
36.	**Application of fracture mechanics to composite materials**	**1**
37.	**Fracture Mechanics and Fracture Toughness in Composites**	**1**
38.	**Linear Elastic fracture mechanics, Toughness, Fiber matrix de-bonding**	**1**
39.	**FiberPullout Buckling and Post-Buckling. Failure criteria, Fatigue and Creep in composites**	**1**
40.	**Environmental effects in Composites, Green composites. Synthesis and Properties of Nanocomposites**	**1**
	Class Test-II	
	Total	**40**

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