SCHEME OF COURSE WORK

Course Title	MECHANICS OF COMPOSITE MATERIALS		
Course Code	19ME2154	L T P C	3 0 0 3
Program:	M.Tech.		
Specialization:	CAD/CAM		
Semester	I		

Course Outcomes (COs):

At the end of the course, the student will be able to

CO1	Classify Composites, Types of reinforcement and Matrix Phases
CO2	Determine Stress and Strain , Elastic Constants of Composites
CO3	Explain Different Fabrication methods to Prepare Composite Materials
CO4	Describe Methods to Characterize composite Properties
CO5	Analyses Different Types of Composite Laminates using thin plate Theory

Program Outcomes (POs)

At the end of the program, the students in CAD/CAM will be able to

1. acquire fundamentals in the areas of computer aided design and manufacturing
2. apply innovative skills and analyze computer aided design and manufacturing problems critically
3. identify, formulate and solve design and manufacturing problems
4. carry out research related to design and manufacturing
5. use existing and recent CAD/CAM software
6. collaborate with educational institutions, industry and R&D organizations in multidisciplinary teams
7. apply project and finance management principles in engineering projects
8. prepare technical reports and communicate effectively
9. engage in independent and life-long learning and pursue professional practice in their specialized areas of CAD/CAM
10. exhibit accountability to society while adhering to ethical practices
11. act independently and take corrective measures where necessary

Course Outcome versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	S	S	M								
CO-2	S	S	S	M					M			
CO-3	S	S	S	S		M			M			
CO-4	S	M	S						M			
CO-5	S		S	M	M	M			M			

S - Strongly correlated, *M - Moderately* correlated, *Blank - No correlation*

Teaching-Learning and Evaluation

Week	Topic / Contents	Course Out Comes	Sample Questions	Teachi ng - Learning Strategy	Assessment Method & Schedule
1	Definition of composite materials, classification based on matrix and topology, constituents of composites and distribution	CO1	1.Define a composite material 2. Classify the Composite materials. 3.What is role of a matrix and reinforcement? Explain 4. Enumerate the desirable characteristics of fibers in fiber reinforcement composites	Lecturing, and class room Seminars Teaching aids: Black board and chalk, PPTs, You Tube videos, NPTL lectures	Seminar (week 3-7)
2	Mechanical behavior of composites, Nano composites and Applications	CO1			
3	Resins, polyester, epoxy,, Metal matrices, Reinforcement, Different types of fibers such as glass, boron, carbide etc.	CO1			
4	Whiskers, fillers and parting agents.	CO1			
5	Fabrication methods: Hand lay-up molding, bag molding , mating molds	CO2	1. Explain the manufacturing methods Bag molding and Spray up Molding	Lecturing, and class room Seminars Teaching aids: Black board and chalk, PPTs, You Tube videos, NPTL lectures	
6	Spray up molding, matched-die molding , perform molding, filament molding	CO2			
7	Winding patterns and winding machines, pultrusion, liquid composite molding	CO2			
8	Mid-Test 1	CO1 CO2	Descriptive Test covering CO1 and CO2		
9	Micromechanics : weight and volume fractions, properties of lamina, representative volume element	CO3	1. Describe Volume and weight fraction of composites. 2. Derive longitudinal and transverse stiffness/ Modulus by method of mixtures.	Lecturing, and class room Seminars Teaching aids: Black board and chalk, PPTs, You Tube videos, NPTL lectures	
10	Micromechanical behavior of lamina: stress- strain relation for anisotropic materials, stiffness, compliances,				

11	Engineering constants, restriction on engineering constants, stress –strain relation for plain stress in orthotropic materials	CO3			Seminar (week 11-16)
12	Macro mechanical behavior of laminates and plate theories, Elastic approach to stiffness,	CO4	1. State the various failure theories of laminates. 2. Explain the coefficient of thermal and moisture expansions of composite 3.Explain behavior of composite under tension and compression	Lecturing, and class room Seminars Teaching aids: Black board and chalk, PPTs, You Tube videos, NPTL lectures	
13	Mechanics of materials approach to stiffness and strength, classical laminate theory	CO4			
14	Special cases of laminate stiffness, strength of laminates, inter laminate stresses	CO4			
15	Strength of unidirectional lamina: Micromechanics of failure, failure mechanisms, strength of an orthotropic lamina	CO5	1. Explain single and multi facture mode in composites. 2.Explain failure envelope and De-bonding	Lecturing, and class room Seminars Teaching aids: Black board and chalk, PPTs, You Tube videos, NPTL lectures	
16	Strength of a lamina under tension and shear, Max. stress and strain criterion,	CO%			
17	Tensile and compressive strength of unidirectional fiber composites, facture modes in composites	CO5			
18	.Single and Multiple fracture, de-bonding, fiber pull out and de-lamination failure, fatigue of laminate composite, failure envelope.	CO5			
19	Mid-Test 2	CO-3, CO-4, CO-5	Descriptive Test covering CO3,CO4,CO5		
20/21	END EXAM	All Cos	End Examination for 60 marks covering all CO,s		