Spintronic Technology and Advance Research

MECHANICAL ENGINEERING

SUBJECT-COMPOSITE MATERIAL
SESSION-2025-26 (Summer 2025) SEM-6TH
NAME OF THE FACULTY- Er.S.S.BEHERA (Asst. prof.)

SL. NO.	NO OF PERIOD (TOPIC WISE)	TOTAL NO PERIOD	Cumulative no of periods
1	Overview of Engineering Materials	1	1
2	Concept of Composite Materials	1	2
3	Classification of Engineering Materials	1	3
4	Matrix Materials - Definition and Functions	1	4
5	Properties of Matrix Materials	1	5
6	Polymer, Metal, Ceramic, Carbon, and Glass Matrices	1	6
7	Role and Selection of Reinforcement Materials	1	7
8	Types of Fibers - Overview	1	8
9	Glass Fibers - Properties and Applications	1	9
10	Carbon Fibers - Properties and Applications	1	10
11	Aramid and Metal Fibers	1	11
12	Alumina, Boron, and Silicon Carbide Fibers	1	12
13	Quartz, Silica, and Multiphase Fibers	1	13
14	Mechanical Properties of Fibers	1	14
15	Classification Based on Matrix Material	1	15
16	Organic Matrix Composites	1	16
17	Polymer Matrix Composites (PMC)	1	17
18	Carbon Matrix and Carbon-Carbon Composites	1	18
19	Metal Matrix Composites (MMC)	1	19
20	Ceramic Matrix Composites (CMC)	1	20
21	Classification Based on Reinforcements	1	21
22	Fiber-Reinforced Polymer (FRP) Composites	1	22
23	Laminar Composites	1	23
24	Particulate Composites	1	24
25	Comparison with Metals	1	25
26	Advantages of Composites	1	26
27	Limitations of Composites	1	27
28	Application Areas of Composites	1	28
29	Industrial Uses of Composite Materials	1	29
30	Case Studies on Composite Applications	1	30
31	Geometrical Aspects - Volume and Weight Fraction	1	31
32	Unidirectional Continuous Fiber Composites	1	32
33	Discontinuous Fiber Composites	1	33
34	Short Fiber Systems	1	34
35	Woven Reinforcements - Mechanical Testing	1	35

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36	Determination of Stiffness in Composites	1	36
37	Strengths of Unidirectional Composites	1	37
38	Mechanical Properties - Tension, Compression	1	38
39	Flexural and Shear Properties of Composites	1	39
40	Fatigue and Impact Properties	1	40
41	Environmental and Thermal Effects	1	41
42	Composite Failure Mechanisms	1	42
43	Failure Theories in Composites	1	43
44	Non-Destructive Testing (NDT) Methods	1	44
45	Experimental Methods for Composite Testing	1	45
46	Case Studies on Mechanical Testing	1	46
47	Introduction to Laminates	1	47
48	Plate Stiffness and Compliance	1	48
49	Assumptions in Laminated Composites	1	49
50	Strains and Stress Resultants in Laminates	1	50
51	Computation of Stresses in Laminates	1	51
52	Symmetric Laminates	1	52
53	Antisymmetric Laminates	1	53
54	Balanced Laminates	1	54
55	Cross-Ply and Angle-Ply Laminates	1	55
56	Design and Fabrication of Laminates	1	56
57	Manufacturing Methods for Laminated Composites	1	57
58	Case Studies on Laminates in Aerospace and Automotive	1	58
59	Practice Questions and Exam Discussion	1	59
60	Practice Questions and Exam Discussion	1	60

E.LEARNING RESOURCES: 1 A.K Bhargava Engineering Materials: Polymers, Ceramics and Composites Prentice Hall India 2 . Dieter Mechanical Metallurgy Mc-Graw Hill 3 R.F. Speyer Thermal Analysis of Materials Marcel Decker