SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Technology
Structural Engineering

M.Tech. II Semester III

Subject Name: Composite Materials **Subject Code:** MTST15302

Type of course: OE
Prerequisite: Engineering Mechanics
Rationale: To provide a coherent development to the students for the courses in sector of designing of the Steel Structures. It present the foundations of many basic Engineering concepts related Design of Steel Structures. To give an experience in the implementation of engineering concepts which are applied in field of Steel Structure and to involve the application of scientific and technological principles of planning, analysis, design of buildings.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	100
3	0	0	3	60	25	15	0	0	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage %
1.	**Introduction of composite materials** Definitions: Composite material, Fiber, Matrix. Types of Fibers and Raw Fiber Properties, Types of Matrix, Prepegs, Fillers and other Additives	6	14%
2	**Advantage and applications** Advantages of Composite Materials and Structures. Applications and Use of Composite materials in present world	7	16.5%
3.	**Basics of composites** Mechanical Behaviour of Composite Materials. Lamina, Laminate: The basic building block of a composite material	7	16.5%
4.	**Micromechanical analysis of composite** Strength and Stiffness: Properties of typical composite materials. Volume and Weight Fractions. Longitudinal Strength and Stiffness. Transverse Modulus. In-plane shear Modulus. Poisson's ratio	6	14%
5.	**Analysis of laminated composites** Laminates, Basic Assumptions, Strain-Displacement Relationship, Stress- Strain Relationships, Equilibrium Equations, Laminate	7	17%

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	Stiffness, Determination of Lamina Stresses and Strains, Types of Laminate Configuration, Balanced Laminate, Anti-symmetric Laminate		
6.	**Testing of composites** Mechanical testing of composites, tensile testing, Compressive testing, Intra-laminar shear testing, Inter-laminar shear testing, Fracture testing etc.	5	12**%**
7	**Failure theories** Micromechanics of Failure of Unidirectional Lamina, Anisotropic Strength and Failure Theories, Importance of Shear Strength, Choice of Failure Criteria, Examples	4	10**%**

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15%	25%	20%	20%	10%	10%

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	**Title of book /article**	**Author(s)**	**Publisher and details like ISBN**	**Year of publication**	**Publication Edition**
1.	Materials characterization,	Thomas J. Bruno,	Vol. 10, ASM hand book	2019	1st Edition
2.	Mechanical Metallurgy	G. Dieter	Mc-Graw Hill	2017	3rd Edition
3	Engineering Materials: Polymers, Ceramics and Composites	A.K Bhargava	Prentice Hall India	2005	1st Edition
4	Mechanics of Composite Materials and Structures	Madhujit Mukhopadhyay	University Press	2005	1st Edition
5	Mechanics of Composite Materials	R M Jones	CRC Press	1988	1st Edition

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Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Learn the basic elements of composite materials (Cognitive level-U)	25%
CO-2	Learn the advantages and application of composite materials (Cognitive level-U&A)	25%
CO-3	Learn to analysis of laminates (Cognitive level-N)	15%
CO-4	Able know failure theories (Cognitive level-U)	20%
CO-5	Learn the testing and behavior of composites. (Cognitive level-U&A)	15%

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