Design of Fiber Reinforced Composite Structures
01ST1214 (PEC)

Objective of the Course:

- To understand the behavior on the characteristics, relative amounts, geometry/distribution, and properties of the constituent phases.
- To acquaint about various types of reinforced composites.

Credit Earned: 3

Students learning outcomes:

After successful completion of the course it is expected that student will be able to,

1. Cite the difference in strengthening mechanism for large-particle and dispersion-strengthened particle-reinforced composites
2. Distinguish the three different types of fibre reinforced composites on the basis of fibre length and orientation; comment on the distinctive mechanical characteristics for each type.
3. Determine longitudinal modulus and longitudinal strength for an aligned and continuous fibre reinforced composite.
4. Name and briefly describe the subclassifications of structural composites.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	**Introduction**	**10**
	Type of structural fibers, Particle reinforced composites, Dispersion-strengthened composites, Influence of fiber orientation and concentration	
2	**Phases of composites**	**14**
	Reinforcements: Glass Fibers, Boron Fibers, Carbon Fibers, Organic Fibers, Ceramic Fibers, Whiskers; Matrix Materials: Polymers, Metals	

3	**Reinforced Composites**	18
	Glass Fiber-Reinforced Polymer (GFRP) Composites, Carbon Fiber-Reinforced Polymer (CFRP) Composites, Aramid Fiber-Reinforced Polymer Composites, Other Fiber Reinforcement Materials, Hybrid composites	
		42

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:

Reference Book:

1. Agarwal, B. D. and L. J. Broutman, Analysis and Performance of Fiber Composites, 2nd edition, Wiley, New York, 1990
2. Ashbee, K. H., Fundamental Principles of Fiber Reinforced Composites, 2nd edition, Technomic Publishing Company, Lancaster, PA, 1993.
3. Chawla, K. K., Composite Materials Science and Engineering, 2nd edition, Springer-Verlag, New York, 1998.
4. Hollaway, L. (Editor), Handbook of Polymer Composites for Engineers, Technomic Publishing Company, Lancaster, PA, 1994.
5. Mallick, P. K., Fiber-Reinforced Composites, Materials, Manufacturing, and Design, 2nd edition, Marcel Dekker, New York, 1993.