11ST926 MECHANICS OF COMPOSITE MATERIALS 3 0 0 3

AIM:
The aim of the course is to provide knowledge to students to the properties and behavior of composite materials and design of some simple composite beams

OBJECTIVES:
The objectives of this subject are to enable students:

- To make know the mechanical properties and analysis of composite laminae
- To understand the behavior of glass – fibre - laminates
- To develop an idea of structural design with properties
- To familiarize with design of GRP Box beams

UNIT I INTRODUCTION 9
Requirements of structural materials, influence of nature of materials in structural form' Nature of structural materials- Homogeneous materials, composite materials

UNIT II MACROMECHANICAL PROPERTIES AND ANALYSIS OF COMPOSITE LAMINAE 9
Introduction – Assumptions and Idealizations, stress strain relationship for composite Laminae- Isotropic, orthotropic laminae- strength Characteristics-Basic concepts- hypothesis for isotropic and orthotropic laminae- Macro mechanical Analysis of composite laminae: introduction, Assumptions and Limitations, stiffness characteristics of glass reinforced laminae- Stress- Strain relationships in continuous' discontinuous fiber laminae, strength characteristics of glass reinforced laminae - strengths in continuous discontinuous fibre laminae.

UNIT III BEHAVIOUR OF GLASS FIBRE-REINFORCED LAMINATES 9
Introduction, stiffness characteristics of Laminated composites-Behaviour of laminated beams and plates, strength characteristics of Laminated composites- strength analysis and failure criteria, Effect of inter laminar structures' Glass Reinforced composites: Introduction, continuously reinforced laminates- uni-directionally and multi directionally continuously reinforced laminates, Discontinuously reinforced laminates - Stiffness and Strength properties.

UNIT IV GRP PROPERTIES RELEVANT TO STRUCTURAL DESIGN 9
Introduction, short-term strength and stiffness-Tensile' compressive, Flexural and Shearing Long term strength and Stiffness properties, Temperature effects, Effect of Fire-Structural joints-Adhesive, mechanical, Combinational, Transformed sections

UNITV DESIGN OF GRP BOX BEAMS 9
Introduction, loading, span and cross-sectional shape selection of material, Beam manufacture, beam stresses, Experimental Behaviour, Effect on Beam performance- Modulus of Elasticity, Compressive strength, I value, prevention of compression buckling failure Behaviour under long term loading. Design of Stressed skinned roof structure: Introduction, loading and material properties, preliminary design, and computer analysis.

L: 45, T: 0, Total: 45

REFERENCES:

1. Holmes. M. and Just. D.J., GRP in Structural Engineering, Narosa Publications, New Delhi, 2008
2. Madhujith Mukhopadhyay Mechanics of composite materials and Structures Universities Press 2001
3. Robart M.Jones, Mechanical of Composite Materials McGraw Hill Publishing Co. 2002
4. Bhagwan D Agarvalm, and Lawrence J Brutman, Analysis and Performance of Fiber Composites John Willy and Sons. 2004.

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