

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE – SEMESTER VII– • EXAMINATION – SUMMER 2018**

**Subject Code: 170103**

**Date: 03-05-2018**

**Subject Name: Mechanics of Composite Materials**

**Time: 02:30 pm to 05:00 pm**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define composite materials. Classify and explain types of composite materials. **07**  
(b) Define: Ply, Principal axis, Reference axis, In-plane stress, On-axis system, Orthotropic material, Transversely isotropic material. **07**
- Q.2** (a) Describe and cite the applications of composites and their use in different industries Explain in detail and with sketches the mechanical behaviour of isotropic, orthotropic and anisotropic materials. **07**  
(b) Derive longitudinal strength of a lamina. **07**
- OR**
- (b) Explain strength and stiffness of composite materials and metals with comparison. **07**
- Q.3** (a) Explain Maximum Stress theory. **07**  
(b) Define and explain a lamina and laminate with necessary sketches. **07**
- OR**
- Q.3** (a) Discuss, justify, sketch and derive the stress-strain behaviour over a laminate. Also explain the need of tailoring FRPs. **07**  
(b) Explain transverse modulus and in-plane shear modulus. **07**
- Q.4** (a) Explain the stress and strain relations in a laminate and also explain and sketch the variation of stress and strain through a laminate. **07**  
(b) Describe [A], [B] and [D] matrices and explain its importance. **07**
- OR**
- Q.4** (a) Write the types of local failure modes at micro-level. Explain longitudinal tension. **07**  
(b) Write a short note on symmetric laminates. **07**
- Q.5** (a) Derive inplane-shear modulus and Poisson's ratio for a uni-directional composite. **07**  
(b) What do you mean by failure in materials? Explain the use of failure criteria. **07**
- OR**
- Q.5** (a) Write a short note on anti-symmetric laminates. **07**  
(b) Explain failure in transverse tension and compression. **07**

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