

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-V • EXAMINATION – SUMMER • 2015**

**Subject Code: 150106****Date: 15/05/2015****Subject Name: Composite Materials and Smart Structures****Time: 02.30pm-05.00pm****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 material and classify composite material on the basis of reinforcing element. **07**  
 (b) List the different materials used as a fiber in a composite materials and enlist the properties and application of carbon fiber. **07**
- Q.2** (a) Explain about Micro Electromechanical Systems. Enlist its advantages and applications. **07**  
 (b) Briefly explain about smart material? Enlist different smart materials and explain about them in brief. **07**
- OR**
- (b) List the various manufacturing processes of composite and explain about filament winding process. **07**
- Q.3** (a) Explain the stress stain law for a single ply in laminate axes for off-Axis laminates. **07**  
 (b) Explain the function of matrix material in a composite and enlist the selection criteria of matrix material. **07**
- OR**
- Q.3** (a) Explain the stress-strain relationships of a thin lamina. **07**  
 (b) Explain major poisson's ratio and in-plane shear modulus of unidirectional lamina for composite material. **07**
- Q.4** (a) Explain the Tsai-Wu tensor failure criteria in detail. **07**  
 (b) Describe with neat sketch, the different wave pattern of fibers used in composite. **07**
- OR**
- Q.4** (a) Describe maximum stress theory of unidirectional lamina for composite material. **07**  
 (b) Explain the strain displacement relationship of composite laminate. **07**
- Q.5** (a) Explain about shape memory alloy and state its applications and advantages. **07**  
 (b) Write short-note on self-healing composite. **07**
- OR**
- Q.5** (a) What do you mean by smart fluid? Explain about ER fluid and MR fluid. **07**  
 (b) Explain about Acoustic Emission Techniques. **07**

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