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10AE52

**Fifth Semester B.E. Degree Examination, June/July 2019**

**Introduction to Composite Materials**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting at least TWO questions from each part.**

**PART – A**

- 1 a. Define a composite material. Classify them in detail. (08 Marks)  
b. What are the important characteristics of composite materials? (06 Marks)  
c. Mention the function of fiber and matrix in a composite material. (06 Marks)
- 2 a. With a neat sketch, explain hand layup technique. (10 Marks)  
b. With a neat sketch, explain vacuum bag moulding technique. (10 Marks)
- 3 a. With a neat sketch, explain pultrusion process. Mention its advantages and disadvantages. (10 Marks)  
b. Discuss the applications of composites with respect to (i) Automobile (ii) Recreational and sports equipment. (10 Marks)
- 4 a. Write a note on Adhesive and Mechanical joining of composites. (10 Marks)  
b. With a neat sketch, explain laser cutting process. (10 Marks)

**PART – B**

- 5 a. Explain:  
i) Maximum Stress Failure Theory  
ii) Maximum Strain Failure Theory (10 Marks)  
b. Explain stress strain relationship for an orthotropic lamina. (10 Marks)
- 6 a. Define the term rule of mixture and obtain the relationship for density of composite using Rule of Mixture (ROM). (10 Marks)  
b. Derive the expression for :  
i) Longitudinal young's modulus  
ii) Transverse Young's modulus (10 Marks)
- 7 a. State the assumptions made in classical laminate theory. (05 Marks)  
b. Derive the expressions [A], [B] and [D] matrices for a laminate using fundamentals. (15 Marks)
- 8 a. List and explain the characteristics of reinforcement materials used in MMCs. (10 Marks)  
b. List the various applications of MMCs. (05 Marks)  
c. What are the factors to be considered in the selection of base metals for MMCs. (05 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.