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10AE52

**Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019**  
**Introduction to Composite Materials**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. Define the term composite materials. Mention the characteristics of composite materials. (08 Marks)
- b. What are properties of fibrous material? (06 Marks)
- c. Explain the classification of composite material. (06 Marks)
- 2 a. With neat sketch, explain hand layup technique. (08 Marks)
- b. Explain the vacuum bag moulding process for the fabrications composite materials. (08 Marks)
- c. Write a short note on Curing Process. (04 Marks)
- 3 a. With neat sketch, explain filament winding process. (06 Marks)
- b. Explain the pultrusion process and processing and composites. (06 Marks)
- c. Write short note on application and composites in i) Recreational ii) Sports equipment. (08 Marks)
- 4 a. Explain the fabrications composites with reference to aero space applications. (07 Marks)
- b. What are disadvantages of machining of composites? (06 Marks)
- c. Write a short note on computer aided design in the fabrication of composite structure. (07 Marks)

**PART – B**

- 5 a. Explain how 36 elastic constants are reduced to two elastic constants for an isotropic material. (14 Marks)
- b. Explain TSai-Hill failure criteria for an ortho tropic material. (06 Marks)
- 6 a. Explain the rule of mixture and derive the equation for i) Longitudinal modulus; ii) In plane shear modulus. (10 Marks)
- b. Composite is made of unidirectional glass epoxy lamina with 70% of fiber volume fraction take  $E_f = 85\text{GPa}$ ,  $E_m = 3.4\text{GPa}$  find the: i) Longitudinal modulus; ii) Transverse modulus; iii) In plane shear modulus. Assume  $V_f = 0.2$   $V_m = 0.3$ . (10 Marks)
- 7 a. State the assumption made in classical laminate theory. (05 Marks)
- b. Derive ABD matrix for a laminate. (15 Marks)
- 8 a. Mention the properties of reinforcement materials with examples. (05 Marks)
- b. Write short note on metal matrix composites. (05 Marks)
- c. Mention the characteristics of base materials. (05 Marks)
- d. Explain the future potentials and composites material. (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.