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B.Tech IV Year II Semester (R13) Regular & Supplementary Examinations April 2018 COMPOSITE MATERIALS

(Mechanical Engineering)

Max. Marks: 70

Time: 3 hours

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PART – A

(Compulsory Question)

- Answer the following: (10 X 02 = 20 Marks)
 - (a) Define composite.
 - (b) Give examples for natural composites.
 - (c) List down various composites manufacturing methods.
 - (d) List the assumptions made during the macro mechanical analysis of a lamina.
 - (e) Define isotropic material.
 - (f) Define coefficients of moisture expansion.
 - (g) Write down stress strain relationship for a laminate.
 - (h) Define flexural modulus.
 - (i) List the failure criterion used for a laminate.
 - (j) List any two applications of laminates.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Discuss briefly the functions of the matrix and the reinforcements used in composites. Give the classification of composites.

OR

3 Sketch and describe liquid metallurgy route of processing composite materials.

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- 4 Sketch and describe Autoclave process.
- 5 With a neat sketch, describe Hand layup process.

UNIT – III

6 Derive an equation for the stiffness and compliance matrix for an isotropic material.

OR

7 A tensile load of 5000 N is applied to a plastic glass fiber composite of 100 mm² cross section area with 25% volume percentage of glass. Calculate the cross sectional area of plastic alone without reinforcement to withstand the same load with same elastic deformation. Given $E_{plastic} = 0.356 \text{ N/m}^2$, $E_{fibre} = 70 \text{ GN/m}^2$.

UNIT – IV

8 Differentiate between lamina and laminate.

OR

9 What are Hygro thermal stresses? Explain briefly the same.

UNIT – V

- 10 Write short notes on:
 - (a) Distortion energy failure theory.
 - (b) Tsai-Hill failure theory.

OR

11 Describe briefly maximum strain failure theory.

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