Code: 13A03803

R13/SS

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

COMPOSITE MATERIALS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 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.

UNIT – II

4 Sketch and describe Autoclave process.

OR

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 mm^2 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 N/m^2, E_{fibre} = 70 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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