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B.Tech IV Year II Semester (R15) Regular Examinations April 2019

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 flake composites.
- (b) Define thermoplastics.
- (c) What is pultruded in FRP?
- (d) Write the stiffness matrix for orthotropic material.
- (e) Define volume and mass fraction.
- (f) What is the primary function of the matrix in a composite material?
- (g) What is the importance of cross-ply laminates?
- (h) What is lamination theory?
- (i) Write the equation of maximum stress failure criterion of composite materials.
- (j) What is failure envelop.

PART – B

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

UNIT – I

2 Briefly describe the classification of composites.

OR

3 With the help of a neat sketch, explain the production of boron fibers.

- 4 Explain the following methods of manufacturing PMC's with suitable sketches:
 - (a) Pultrusion.
 - (b) Prepregs.

OR

5 Derive the stress-strain relations for an orthotropic lamina in three dimensional domains in terms of engineering constants.

UNIT – III

6 Derive the expressions to γ_{12} and G_{12} in terms of constituent properties using micromechanics principles.

OR

7 Find the coefficient of thermal expansion for a 60° angle lamina of glass/epoxy whose longitudinal and transverse coefficients of thermal expansion are 8.6 X 10⁻⁶ m/m/°C and 22.1 X 10⁻⁶ m/m/°C respectively.

UNIT – IV

8 Briefly explain inter laminar stresses in a laminate composites.

OR

9 Write the assumptions of CLT and derive the stress strain relations for a classical laminate and represent the stress-strain variation in a laminate.

UNIT – V

10 What are the advantages of composites in structural design? Explain.

OR

11 Write short notes on the following:

(a) Maximum stress failure theory.

(b) Failure envelops.

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