



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

COMPOSITE MATERIALS

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

1 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.

UNIT – II

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 – III6 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 $8.6 \times 10^{-6} \text{ m/m}^\circ\text{C}$ and $22.1 \times 10^{-6} \text{ m/m}^\circ\text{C}$ 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 envelopes.

