Code : 102609

B.Tech 6th Semester Exam., 2022

(New Course)

COMPOSITE MATERIALS

Time : 3 hours | **Full Marks** : 70

Instructions

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory*

1. Answer the following short answer-type sub-questions (any *seven*) 2×7=14

(a) Write the types of glass fiber.

(b) What is material utilization factor?

(c) What is pultrusion?

(d) List four sources of composite manufacturing defects.

(e) Write any four applications of composites.

(f) What are symmetric laminates?

(g) What is vacuum bag moulding?

(h) What is meant by orthogonally isotropic material?

(i) How are local and global stresses related?

(j) What are the merits and demerits of Tsai-Hill failure theory?

2. *(a)* What are composites? Discuss the functions of matrix and reinforcement in composites. 6

(b) Describe any two physical properties that can be estimated using rule of mixtures. 8

3. *(a)* What is bag moulding? List the characteristics that should be required for bag moulding. 6

(b) Discuss the behaviour of fiber composites under tensile and compressive loads. 8

4. *(a)* What are lamina assumptions? 4

(b) With illustration, explain the filament winding process used to manufacture the polymer matrix composites. 10

5. (a) Write and explain von Mises yield criterion for isotropic materials. 4

(b) What is lamina stress? Derive its expression for a laminated anisotropic plate. 10

6. (a) State and explain the Tsai-Hill's criterion for composites. 6

(b) Briefly discuss various fracture modes in fiber composites. 8

7. (a) Write the laminate stress-strain relation in material coordinate. 4

(b) Write and explain the applications of transformation matrix for an angle-ply matrix. 4

(c) Write the basic assumptions considered in the analysis of laminated anisotropic plates. Also explain the term angle-ply laminates. 6

8. (a) Write the equilibrium equation of motion for the analysis of laminated plates. 4

(b) How is the failure of laminated composite predicted? Derive the expression for thermal stress of a laminated composite plate. 10

9. (a) Explain briefly any two methods used for producing laminar composites. Give examples and any two applications for laminar composites. 7

(b) Derive the expression in case of static bending of a laminated plate having all edges are simply supported. 7

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