

Code : 102609

(2)

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

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(Turn Over)

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(Continued)

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. <https://www.akubihar.com> 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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