

Printed Pages – 4

Roll No. :

C037532(037)

B. Tech. (Fifth Semester) Examination, Nov.-Dec. 2021

(Mechanical Engg. Branch)

COMPOSITE MATERIAL

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Each question carries equal marks. Part (a) is compulsory and answer any two from (b), (c) and (d).

Unit-I

1. (a) What are advanced composites? Mention the limitations of composite materials.

4

[2]

- (b) Give the classification of composites based on reinforcement. In brief discuss the types of continuous fibres. 8
- (c) Discuss roles/functions served by matrix and reinforcement in composite materials. 8
- (d) Why low modulus of honey comb used in the middle of the sandwich structure? 8

Unit-II

2. (a) Define the hand lay-up technique. 4
- (b) Explain filament winding process with a neat sketch. 8
- (c) Explain the quality inspection and testing for uniaxial tension and uniaxial compression. 8
- (d) Discuss the following techniques for processing composites : 8
- (i) Pultrusion
- (ii) Injection molding

Unit-III

3. (a) Give the characteristics of composite materials. 4
- (b) Write the expression relating stresses and strains for orthotropic material. 8

C037532(037)

[3]

- (c) What are the different failure theories used in composite materials? 8
- (d) Write short note on the following : (any two) 8
- (i) Carbon-carbon composites
- (ii) Maximum stress failure theory
- (iii) Failure envelop

Unit-IV

4. (a) Explain the hooks law for different materials. 4
- (b) Define stiffness and compliance matrix for an anisotropic materials and explain how it is transformed to orthotropic, monoclinic and isotropic materials. 8
- (c) Explain the different method of joining composite and discuss the challenge that exists during joining. 8
- (d) Derive the strain-stress relations for an orthotropic lamina and explain the significant points. 8

Unit-V

5. (a) How do composite laminates behave under load? 4

C037532(037)

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[4]

- (b) Derive the expression for stiffness matrix and compliance matrix for an angle ply lamina using generalized Hook's law. 8
- (c) What are assumptions in the thin plate laminate theory? 8
- (d) Differentiate between the total-ply failure method and partial-ply failure method. 8