

CBGS Scheme

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15AE52

Fifth Semester B.E. Degree Examination, June/July 2018 Introduction to Composite Materials

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define composite material, classify the composite, matrix and reinforcement. (08 Marks)
b. Write a brief note on
i) Carbon-Carbon composites
ii) Functions of matrix
iii) Fibrous composites
iv) Particulate composites. (08 Marks)

OR

- 2 a. With a neat sketch explain the following processes : i) stir casting ii) squeeze casting. (10 Marks)
b. Name the properties of MMC's and write the application of aluminum, magnesium and titanium based metal matrix composites [MMC's]. (06 Marks)

Module-2

- 3 Explain with a neat sketch the following thermo set polymer fabrication processes with advantages and disadvantages :
i) Pultrusion processes ii) Filament winding processes. (16 Marks)

OR

- 4 With a neat sketch explain the following thermo plastic polymer fabrication processes with advantages and disadvantages : i) extrusion processes ii) thermoforming processes. (16 Marks)

Module-3

- 5 a. Derive the equation for longitudinal and transverse young's modulus by using strength of materials approach. (08 Marks)
b. For a graphite/epoxy unidirectional lamina, find the following :
i) Compliance matrix
ii) Minor Poisson's ratio
iii) Reduced stiffness matrix.
where $E_1 = 181 \text{ GPa}$, $E_2 = 10.3 \text{ GPa}$, $\nu_{12} = 0.28$, $G_{12} = 7.17 \text{ GPa}$, $\sigma_1 = 2 \text{ MPa}$, $\sigma_2 = -3 \text{ MPa}$, $\tau_{12} = 4 \text{ MPa}$. (08 Marks)

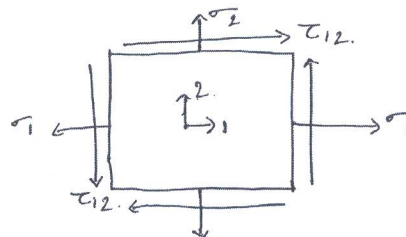


Fig.Q5(b)
1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Derive the following equations in global and local axis for angle lamina by using Hooks law in two dimensional :
- Global and local axis strains
 - Transformed reduced stiffness matrix
 - Transformed reduced compliance matrix.
- b. Write a brief note on carbon and oramid fiber.

(12 Marks)

(04 Marks)

Module-4

- 7 Explain the following failure theories :

- Maximum stress failure theory
- Maximum strain failure theory
- Tsai hill failure theory
- Tsai – wu failure theory.

(16 Marks)

OR

- 8 a. Explain classical laminate theory with stress and strain variation.
b. Derive A B D matrix by considering force, stress–strains and moments.

(08 Marks)

(08 Marks)

Module-5

- 9 a. Explain destructive and non destructive testing with example.
b. Briefly discuss the following testing methods :

- Tensile testing
- Compression testing
- Ultrasonic testing.

(06 Marks)

(10 Marks)

OR

- 10 Explain briefly the applications of composite materials in the following fields :

- Aircraft
- Automobile
- Marine
- Recreational and sports
- Electrical and electronics.

(16 Marks)

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