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## Fourth Semester B.E. Degree Examination, July/August 2022 Composite Materials

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define composite material and give their classification. (08 Marks)  
b. Give the difference between thermoplastics and Thermosets polymer. (06 Marks)  
c. Explain Carbon – Carbon composite in brief. (06 Marks)

OR

- 2 a. Explain Stir casting and squeeze casting with a neat sketch. (10 Marks)  
b. What are the properties of MMC's? (04 Marks)  
c. Give the applications of Al, Mg, Ti based MMC. (06 Marks)

### Module-2

- 3 a. Explain Hand lay-up process with a neat sketch. (05 Marks)  
b. Explain Filament winding with a neat sketch. (07 Marks)  
c. Explain Pultrusion and pulforming process with a neat sketch. (08 Marks)

OR

- 4 a. Explain Extrusion process and Injection moulding process with a neat sketch. (10 Marks)  
b. Explain post processing of composites including Adhesive bonding, drilling and cutting processes. (10 Marks)

### Module-3

- 5 a. Derive an Expression for Longitudinal Young's modulus  $E_1$  for a unidirectional Lamina by strength of material approach. (07 Marks)  
b. Derive an expression for Transverse Young's modulus  $E_2$  for a unidirectional Lamina by strength of material approach. (07 Marks)  
c. A glass/epoxy lamina consists of a 70% fiber volume fraction use properties of glass and epoxy  $\rho_f = 2500 \text{ Kg/m}^3$ ,  $\rho_m = 1200 \text{ Kg/m}^3$  respectively to determine the  
i) Density of a lamina  
ii) Mass fraction of glass and epoxy  
iii) Volume of composite lamina if the mass of the lamina is 4Kg. (06 Marks)

OR

- 6 Explain in brief the following materials  
i) Anisotropic ii) Monoclinic iii) Orthotropic iv) Transversely isotropic v) Isotropic. (20 Marks)

**Module-4**

- 7 a. Explain Tsai-Hill failure theory and Tsai-Wu failure theory. (16 Marks)  
b. Define strength ratio and explain maximum stress failure theory. (04 Marks)

**OR**

- 8 a. What are the assumptions of classical Lamination Theory? (04 Marks)  
b. Give the variation of stress and strain in a laminate showing the resultant forces and moments. (16 Marks)

**Module-5**

- 9 a. Explain Destructive and Non-Destructive Testing with an example. (06 Marks)  
b. Explain Tensile and Flexural testing with a neat sketch. (06 Marks)  
c. Explain ultrasonic testing A-B-C scan with a neat sketch. (08 Marks)

**OR**

- 10 a. Explain the applications of composites materials in the field of  
i) Automobile ii) Aircrafts iii) Missiles iv) Space hardware v) Electrical and Electronics  
vi) Marine vii) Recreational and sports equipment. (14 Marks)  
b. Explain the future potential of composites. (06 Marks)

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