Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET-A

SCHOOL OF ENGINEERING
END TERM EXAMINATION – MAY/JUNE 2024

Semester : Semester VI
Course Code : MEC3049
Course Name : Mechanics of Composite Materials
Program : B.Tech.

Date : June 7, 2024
Time : 01.00pm to 04.00pm
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ANY FIVE QUESTIONS **5QX2M=10**

1. The modulus of elasticity for unidirectional fibrous composite materials will be more in a longitudinal direction or transverse direction. Comment.
(CO1) [Knowledge]

2. Mention 4 naturally occurring composites.
(CO2) [Knowledge]

3. What is engineering stress?
(CO1) [Knowledge]

4. What is the difference between fibres and particles?
(CO2) [Knowledge]

5. Why are fibers stronger than bulk materials?
(CO1) [Knowledge]

6. Define strength and stiffness.
(CO2) [Knowledge]

7. Comment on the thermal expansion of metals and polymers.
(CO1) [Knowledge]

PART B

ANSWER ANY FIVE QUESTIONS **5QX10M=50**

8. Describe glass fiber. Explain the advantages of glass fiber over metallic fibers.
(CO3) [Comprehension]

9. Write down the steps involved in the fabrication of Polymer matrix composite.

(CO1) [Comprehension]

10. What are prepregs? Explain briefly.

(CO2) [Comprehension]

11. Explain the steps involved in the RTM method for the fabrication of your composite materials.

(CO4) [Comprehension]

12. What fiber factors contribute to the mechanical performance of a composite?

(CO1) [Comprehension]

13. Define stress and strain. Draw stress and strain components acting on any 3D cube.

(CO2) [Comprehension]

14. How will the amount of voids in the composite material affect mechanical properties?

(CO3) [Comprehension]

PART C

ANSWER ANY TWO QUESTIONS **2QX20M=40**

15. Find the compliance and stiffness matrix for a graphite/epoxy lamina. The material properties are given as
E_1= 181 GPa, E_2= 10.3 GPa, E_3= 10.3 GPa, v_{12}=0.28, v_{23}=0.60, v_{13}=0.27,
G_{12}= 7.17 GPa, G_{23}=3.0 GPa, G_{31}=7.00 GPa.

(CO3) [Application]

16. A glass/epoxy lamina consists of a 70% fibre volume fraction. Determine
(i) density of lamina
(ii) mass fraction of glass and epoxy
(iii) Volume of composite lamina if the mass of lamina is 4 kg.
(iv) Volume and mass of glass and epoxy in part (iii)
ρ_m= 1200 kg/m^3 and ρ_f = 2500 kg/m^3

(CO3) [Application]

17. A thermoplastic matrix contains 45 wt.% glass fiber. If the density of the matrix is 1.2 gm/cm^3 while that of glass fiber,is 2.5 gm/cm^3. Calculate the density of composite materials.

(CO4) [Application]