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Question Paper Code: 4153224

M.E. / M.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Third Semester
Power Electronics and Drives
P23PEO26 – NANO COMPOSITE MATERIALS
(Regulation 2023)

Time: Three Hours Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. List the common methods of sample preparation for nan composites.

2. Explain how nanocomposites differ from traditional composite materials.

3. What is the function of a metal matrix in nanocomposites?

4. Explain how metal-based nanocomposites differ from polymer-based nanocomposites.

5. Define the resin transfer molding (RTM) process.

6. Compare hand layup with compression molding in terms of efficiency and output quality.

7. List three types of mechanical tests used to evaluate composites.

8. Explain the role of interlaminar shear stress in the failure of laminated composites.

9. Define macro mechanics of a single layer in composites.

10. Define the term “laminate” in composite mechanics.

PART – B (5 x 16 = 80 Marks)

11. (a) Apply nanocomposite technology to develop a product with enhanced thermal conductivity. (16)

(OR)

(b) Demonstrate how to enhance the mechanical properties of a nanocomposite. (16)

12. (a) Explain the relationship between the metal matrix and the reinforcement materials in metal-ceramic composites. (16)

(OR)

(b) Explain how a metal matrix composite improves mechanical properties over pure metals. (16)

13. (a) Demonstrate how to use resin transfer molding (RTM) to manufacture a lightweight automotive panel. (16)

(OR)

(b) Design a composite structure using prepregs for an aerospace application. (16)

14. (a) Compare the influence of fiber volume fraction on tensile strength between thermoset and thermoplastic composites. (16)

(OR)

(b) Compare the interlaminar shear properties of composites made with different fiber types and layups. (16)

15. (a) Explain how micro mechanics can predict the properties of fiber-reinforced composites. (16)

(OR)

(b) Discuss the importance of considering both micro and macro mechanics in composite material analysis. (16)

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