

M.E. MECHANICAL ENGINEERING FIRST YEAR SECOND SEMESTER - 2025

Subject: MANUFACTURING OF COMPOSITE MATERIALS

Time: 3 Hours Full Marks: 100

Answer any five questions

1. a) Define composite materials with examples.
b) Classify composite materials based on their reinforcements and matrixes.
c) What is PMC?
d) Why are PMC-type composite materials much more in number than any other type of composite materials? 4+6+4+6=20

2. a) Make a comparison chart of PMC based on their matrix, as thermoset polymers and thermoplastic polymers. Also explain the advantages and disadvantages of these matrixes.
b) Write down the steps of chemical reactions in short form for polyester resins when being used as a base matrix. 10+10=20

3. a) What is pre-peg? Write down all necessary information on pre-peg.
b) What are the steps of hand laminating processes?
c) Categorize tooling materials of hand laminating processes.
d) What is release agent? 6+6+4+4=20

4. a) What is debulking?
b) What is Curing? Write down curing characteristics?
c) What is autoclave processing? Explain curing cycle in autoclave process. 5+7+8=20

5. a) Explain ultrasonic assisted cooling processes with diagram.
b) Steps of infiltration process for MMC fabrication.
c) Write a short note on 'Pultrusion' 8+7+5=20

6. a) What are the differences between filament winding and autoclave processes?

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b) It is desirable to wind a 30 cm diameter by 100 cm long cylinder at a 30° wind angle. The fiber band width is assumed to be 0.6 cm and the dwell angle is 180° . Determine the number of circuits required to make a pattern.

c) In liquid composite molding process, what are the advantages of using polyesters and epoxy as base matrix.

$$6+8+6=20$$