



M.TECH. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Second Semester

TEXTILE TECHNOLOGY

P18TME0068: Textile Reinforced Composites

COURSE OUTCOMES

CO1: Select different types of textile reinforcements and materials for the manufacturing of the composites for getting different characteristics.

CO2: Evaluate the characteristics of composites.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): Nomex fiber is produced by using of dry spinning. CO1 [K₄]
Reason (R): Dry jet wet spinning process improve the moisture properties of the nomex material.
 - a) Both A and R are Individually true, and R is the correct explanation of A
 - b) Both A and R are Individually true, but R is not the correct explanation of A
 - c) A is true but R is false
 - d) A is false but R is True
2. _____ fibre is based on poly (m-phenylene terephthalamide) CO1 [K₂]
 - a) Kevlar
 - b) Carbon
 - c) Nomex
 - d) Boron
3. The molecular structure of a thermoplastic polymer may be _____ CO1 [K₁]
 - a) Linear
 - b) Branched
 - c) Cross linked
 - d) Linear and branched
4. Matching type item with multiple choice code CO1 [K₅]

| List I | List II |
|-----------------|---------------------------------|
| A. Glass fiber | i. SiO ₂ |
| B. Aramid fiber | ii. p-phenylene terephthalamide |
| C. SiC fiber | iii. Poly carbo silane |
| D. Carbon fiber | iv. Pitch |

| | A | B | C | D |
|----|----|-----|-----|----|
| a) | i | ii | iii | iv |
| b) | ii | iv | iii | ii |
| c) | iv | iii | ii | i |
| d) | i | iii | ii | iv |

5. Assertion (A): Hand lay-up process having more accurate and consistent than CO1 [K4]
compression molding.

Reason (R): Hand lay-up process is cheaper than a compression mould.

- | | | | |
|----|---|----|---|
| a) | Both A and R are Individually true, and R is the correct explanation of A | b) | Both A and R are Individually true, but R is not the correct explanation of A |
| c) | A is true but R is false | d) | A is false but R is True |

6. Pultrusion an ideal process for producing _____ CO1 [K3]

- | | | | |
|----|---|----|--|
| a) | High fibre volume with hollow profiles | b) | Low fibre volume with hollow profiles |
| c) | High fibre volume with non-solid profiles | d) | High fibre volume with hollow non-solid profiles |

7. _____ composite is the highest thermal resistance. CO2 [K2]

- | | | | |
|----|-------|----|--------|
| a) | Glass | b) | Nomex |
| c) | SiC | d) | Kevlar |

8. Assertion (A): In-plane tensile testing of composite laminates is the most common test CO2 [K5]
performed on composite materials.

Reason (R): Tensile strength of composite materials is determined mostly by the strength and volume content of the fibre reinforcement.

- | | | | |
|----|---|----|---|
| a) | Both A and R are Individually true, and R is the correct explanation of A | b) | Both A and R are Individually true, but R is not the correct explanation of A |
| c) | A is true but R is false | d) | A is false but R is True |

9. Composite materials have been not used in automobile applications _____ CO2 [K3]

- | | | | |
|----|---------------|----|------------|
| a) | Heat shields | b) | Bumper |
| c) | Cylinder head | d) | Tyre cords |

10. Arrange the elements in sequential order in hand layup method CO2 [K5]

1) Reinforcement 2) Thermosetting matrix and curing agent 3) Mould 4) Release agent

- | | | | |
|----|---------|----|---------|
| a) | 2-1-3-4 | b) | 1-2-3-4 |
| c) | 3-2-4-1 | d) | 4-3-2-1 |

PART B (10 x 2 = 20 Marks)

Answer all the Questions:-

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|---|-----|-------------------|
| 11. List out the properties of SiC fibers. | CO1 | [K ₁] |
| 12. Outline the applications of HPPE fiber. | CO1 | [K ₂] |
| 13. Summarize the characteristics of vinyl ester. | CO1 | [K ₂] |
| 14. Organize the importance of prepregs in polymer matrix composites. | CO1 | [K ₃] |
| 15. List out the advantages of hand lay-up process. | CO1 | [K ₁] |
| 16. Recall the compression molding process. | CO1 | [K ₁] |
| 17. Define fiber volume fraction. | CO2 | [K ₁] |
| 18. Summarize the different mechanical testing for composite material. | CO2 | [K ₂] |
| 19. List out the major types of failures in the composite materials. | CO2 | [K ₁] |
| 20. Outline the importance of interlaminar shear strength for composites. | CO2 | [K ₂] |

PART C (10 x 5 = 50 Marks)

Answer all the Questions: -

- | | | |
|--|-----|-------------------|
| 21. Summarize the production process of carbon fiber. | CO1 | [K ₂] |
| 22. Organize the applications of Glass fiber. | CO1 | [K ₃] |
| 23. Outline the thermoplastic resins and its characteristics. | CO1 | [K ₂] |
| 24. Compare PEEK and Polycarbonate matrices. | CO1 | [K ₄] |
| 25. Outline the resin transfer molding process. | CO1 | [K ₂] |
| 26. List out the advantages and disadvantages of filament winding process. | CO1 | [K ₁] |
| 27. Analyze the tensile testing of composite materials. | CO2 | [K ₄] |
| 28. Summarize the flexural test of composites. | CO2 | [K ₂] |
| 29. Compare micromechanics and macromechanics in composites. | CO2 | [K ₄] |
| 30. Summarize the classification of lamina failure theories in composites. | CO2 | [K ₂] |

Answer any TWO Questions

PART D (2 x 10 = 20 Marks)

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|---|-----|-------------------|
| 31. Elaborate on kevlar fiber production process, properties and applications. | CO1 | [K ₄] |
| 32. Discuss in detail about the impact testing of composite materials. | CO2 | [K ₄] |
| 33. Explain in detail about the classical lamination theory of composite materials. | CO2 | [K ₄] |
