

Time: 3 hours

Max. Marks: 80

- Note:**
1. Assume suitable data if necessary
 2. Figures to the right indicate full marks
 3. Question No. 1 is compulsory
 4. Solve any three out of the remaining five questions

Q1. Solve any four

- | | | |
|---|--|----------|
| A | State the scope of composite materials in various sectors. | 5 |
| B | Explain the stiffness and compliance matrix for Anisotropic and Isotropic materials. | 5 |
| C | Write a short note on the Strength ratio | 5 |
| D | Explain the Plain stress assumption for composite lamina | 5 |
| E | Explain various criteria for composite repair works with suitable examples. | 5 |
| F | Explain with figures the various levels of a generic repair design. | 5 |

Q2.

- | | | |
|---|---|-----------|
| A | Derive an expression for Hook's law for a 2D Unidirectional lamina. | 10 |
| B | Explain with a neat diagram the working of the hand lay-up method for composite materials with its merits and demerits. | 5 |
| C | Explain the concept of the powder metallurgy route for ceramic and metal matrix composites | 5 |

Q3.

- | | | |
|---|---|-----------|
| A | Differentiate between Vacuum Infusion and Resin Transfer Moulding techniques for composite manufacturing on the basis of diagram, set-up, operation, advantages, disadvantages, and applications. | 10 |
| B | Write a short note on surface preparation for composites. | 5 |
| C | Illustrate with neat figures the matrix cracks repair method in composites. | 5 |

Q4.

- | | | |
|---|---|-----------|
| A | Classify and briefly elaborate on various types of defects that may occur in composite parts. | 10 |
| B | Illustrate with neat sketch the ultrasonic method of inspection for composites. | 5 |
| C | Explain the laminates codes of [0/-45/60/-45/0] and [0/45/-30]s | 5 |

Q5.

- | | | |
|---|--|-----------|
| A | Differentiate between passive and active methods of thermography inspection based on principle, construction, working, advantages and disadvantages. | 10 |
| B | Explain Tsai-Hill failure theory for 2D composite lamina | 5 |
| C | Illustrate with a neat sketch of the spray lay-up technique for composite preparation | 5 |

Q 6.

- | | | |
|---|--|-----------|
| A | Derive an expression of failure criteria with a failure envelope according to Maximum Stress theory. | 10 |
| B | Explain repair techniques for Delaminations in composites. | 5 |
| C | Explain various types of laminates with their codes. | 5 |
