

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

B.Tech S8 (Hons) Exam May 2020

**Course Code: CH466****Course Name: COMPOSITE MATERIALS**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer any two full questions, each carries 15 marks.*

- |   | Marks |
|---|-------|
| 1 a) Explain the constituents in a polymeric composite with examples.   | (7)   |
| b) Explain the defects in composite manufacturing and the methods used to minimize these defects.                                 | (8)   |
| 2 a) Explain the advantages of composite in structural design.  | (4)   |
| b) Explain the applications of composite in (i) medical and (ii) transportation industries.                                       | (7)   |
| c) List out any four common terms with definitions used in composite manufacturing.   | (4)   |
| 3 a) Explain the (i) Pultrusion process and (ii) Resin Transfer moulding process used in the manufacture of polymeric composites. | (10)  |
| b) Differentiate thermoplastic and thermoset matrix composites with examples.   | (5)   |

**PART B***Answer any two full questions, each carries 15 marks.*

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|--|-----|
| 4 a) Explain the Halpin –Tsai equations used in fiber composites for calculating the elastic constants.                    | (7) |
| b) Explain thermal expansion coefficients and moisture expansion coefficients in unidirectional composites with equations. | (8) |
| 5 a) Derive an expression for transverse stiffness of a unidirectional reinforced composite.                               | (5) |
| b) Derive Hook's law to unidirectional composites.   | (5) |
| c) Explain the importance of arrangement of lamina in a laminate.  | (5) |
| 6 a) Explain Classical Laminate Theory of composites.  | (6) |
| b) Differentiate micromechanics and macromechanics of composites.  | (4) |
| c) Explain how stress-strain relations vary in a unidirectional composite when subjected to moisture loads.                | (5) |

**PART C**

*Answer any two full questions, each carries 20 marks.*

- 7 a) Explain the behaviour of composites used in sporting goods. (6)
- b) Explain the process involved in composite structural design. (7)
- c) Explain the causes and effects of stress concentration in laminates. (7)
- 8 a) Explain any four non destructive inspection techniques used for detection of damages in composite materials. (8)
- b) Explain the effect of environmental factors on service life of metallic and composite structures. (7)
- c) Explain any five in-service damages occur in composite materials. (5)
- 9 a) Explain (i) maximum stress failure theory and (ii) maximum strain failure theory (iii) Tsai-Hill Failure theory of fiber composites. (9)
- b) Explain the basic types of repair techniques that can be adopted in composites. (5)
- c) Explain the damage tolerance capability of composites with examples. (6)

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