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**Question Paper Code: 99711**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2022

Elective

Mechanical Engineering

19UME911– COMPOSITE MATERIALS

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- Major load carrier in dispersion-strengthened composites. CO1- U  
(a) Matrix (b) Fiber (c) Both (d) Can't define
- Mechanical properties of fiber-reinforced composites depend on CO1- U  
(a) Properties of constituents (b) Interface strength  
(c) Fiber length, orientation, and volume fraction (d) All the above
- Size range of fibres used in dispersion strengthened polymer composites CO1- U  
(a) 0.01-0.1  $\mu\text{m}$  (b) 0.01-0.1 nm (c) 0.01-0.1 mm (d) None of the above
- The engineering materials known as "plastics" are more correctly called \_\_\_\_\_ CO1- U  
(a) Polyvinyl chloride (b) Polymers  
(c) Polyethylene (d) Mers
- Al-alloys for engine/automobile parts are reinforced to increase their CO1- U  
(a) Strength (b) Wear resistance (c) Elastic modulus (d) Density
- Give an example of a glassy sealant that is used to improve the oxidation CO1- U  
resistance of carbon-carbon composites.  
(a) HfC (b)  $\text{B}_2\text{O}_3$  (c) Ni (d)  $\text{Si}_3\text{N}_4$
- Ceramic matrix composites have matrices of CO1- U  
(a) Alumina (b) Calcium Alumino Silicate (CAS)  
(c) Lithium Alumino Silicate (LAS) (d) All of the above

8. Ceramic Matrix Composites are designed to improve ..... of conventional ceramics CO1- U
- (a) Toughness                      (b) Brittleness                      (c) density                      (d) None of the above
9. Flaws can occur due to fibres..... CO1- U
- (a) Fibres broken                      (b) Kinked or wavy fibres
- (c) Irregular distributions of fibres                      (d) All of the above
- 10 In ultrasonic testing, operating frequency limit for composite materials is usually CO1- U
- (a) 5 MHz or less                      (b) 50 Hz or less
- (c) 50 kHz or less                      (d) 500 Hz or less.

PART – B (5 x 2= 10 Marks)

- 11 Write applications about Thermoset matrix. CO1- U
- 12 Discuss about applications of Al metal matrix composites. CO1- U
- 13 List advantages of metal matrix composites CO1- U
- 14 Discuss about applications of ceramic matrix composites. CO1- U
- 15 Write short notes on Tap test. CO1- U

PART – C (5 x 16= 80 Marks)

- 16 (a) Discuss about properties of composite materials over conventional materials. CO1-U (16)
- Or
- (b) Discuss about properties, applications, advantages and limitations of Glass fibre in detail. CO1-U (16)
- 17 (a) Explain about the PMC manufacturing process of ‘Hand layup method’ with neat sketch CO1-U (16)
- Or
- (b) Explain with neat sketch the process ‘Filament winding’. CO1-U (16)
- 18 (a) Describe about the process of “stir casting” and write about its uniqueness in MMC manufacturing process. CO1-U (16)
- Or
- (b) Explain about the characteristics and various types of MMCs. CO1-U (16)

- 19 (a) Describe about the process of “chemical vapor deposition” and write about its uniqueness in CMC manufacturing process. CO1-U (16)
- Or
- (b) Explain the process Cold pressing and Sintering process. CO1-U (16)
- 20 (a) Explain with a neat sketch the Ultrasonic testing. CO1-U (16)
- Or
- (b) Demonstrate the Non-Destructive Testing method of ‘Radiographic testing’ with neat sketch. CO1-U (16)

