

**B.E. DEGREE EXAMINATIONS: APRIL/MAY 2012**

Sixth Semester

**MECHANICAL ENGINEERING**

MEC138: Composite Materials

**Time: Three Hours**

**Maximum Marks: 100**

**Answer All Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. The value of elastic modulus for titanium and their alloy is  
A) 110 GPa                      B) 100 GPa                      C) 50 GPa                      D) 60 GPa
2. Silicon Nitride is a  
A) Ceramic Matrix Material                      B) Metal Matrix Material  
C) Polymer Matrix Material                      D) Calcium borosilicate
3. In fiber reinforced composites the major part of the load is carried by the  
A) Matrix                      B) Fibers                      C) Both fibers and Matrix                      D) none of these
4. The factors affecting fiber performance in the composite is  
A) Orientation                      B) Length                      C) Shape                      D) All of these
5. The elastic modulus of whiskers range between  
A) 400 GPa and 700 GPa                      B) 200 GPa and 500 GPa  
C) 700 GPa and 900 GPa                      D) 100 GPa and 200 GPa
6. E-type glass fiber is a  
A) Calcium alumino borosilicate glass                      B) Magnesia alumino silicate glass  
C) Alumina glass                      D) Magnesium glass
7. Aspect ratio of fiber is  
A) Length to diameter ratio                      B) Length to breath ratio  
C) Length to cross sectional area ratio                      D) Length to circumference ratio
8. Graphite fibers are usually  
A) 99% carbon                      B) 90% carbon                      C) 85% carbon                      D) 96% carbon
9. SAP is a typical example of  
A) Dispersion strengthened composite                      B) Particle strengthened composite  
C) Fiber strengthened composite                      D) Laminate composite
10. Carbon-Carbon matrix composites retain much of their strength up to  
A) 500°C                      B) 2500°C                      C) 1500°C                      D) 1000°C

**PART B (10x2=20 Marks)**

11. Define the term composite material.

12. What is a reinforced composite?
13. What are the various function of a matrix phase in a composite material?
14. State the rule of mixture as applied to some composite properties.
15. What are whiskers?
16. List the advantages of metal fibers and wires.
17. Name the various grades of glass fibers used as reinforcements in glass fiber reinforcement plastics.
18. What are the factors that determine the mechanical properties of GRP products?
19. What is a carbon-carbon composite?
20. Enlist the uses of carbon-carbon composites.

**PART C (5x14=70 Marks)**

21. a) Explain in detail about dispersion strengthened composites and particle strengthened composites.

**(OR)**

- b) Explain in detail about fiber strengthened composites.

22. a) Explain the various steps in powder metallurgy process to produce composites.

**(OR)**

- b) Draw and explain the squeeze casting process with neat sketch.

23. a) Explain the hot isostatic pressing and cold isostatic pressing process with neat sketch.

**(OR)**

- b) Explain the various steps involved in processing of ceramics.

24. a) Draw and explain compression molding and transfer molding process with neat sketch.

**(OR)**

- b) Draw and explain the pultrusion and injection molding process with neat sketch.

25. a) Explain the chemical vapour deposition process with neat sketch.

**(OR)**

- b) Write short notes on applications of metal matrix composite materials and ceramic matrix composite materials.

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