Roll No. | | | | | | | | | | | | | Total No. of Pages : 2

Total No. of Questions : 08

M.Tech (ME) (2017 Batch) (Sem.–1)

ADVANCED ENGINEERING MATERIALS

Subject Code : MTME-101

Paper ID : [74715]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. a) Discuss the need of advanced engineering materials and give the general classification of these materials.

   b) Write a note on the selection criteria of advanced engineering materials.

2. a) Composite materials have gained wide acceptance in the Automobile industry. Comment on this statement and give some real life examples.

   b) What are dispersion-strengthened composites? Name the materials that are generally used in the fabrication of these composites.

3. a) Which reinforcing fibers are generally used in making composite materials? What is the range in length and diameter of the reinforcing fibers?

   b) For a polymer-matrix fiber-reinforced composite, list three functions of the matrix phase and compare the desired mechanical properties of the matrix and fiber phases.

4. a) Explain why the mechanical properties of ceramics are generally better than those of metals? What are the limitations of ceramics as engineering materials?

   b) Describe the structure of glass and give its important properties.

5. a) Discuss the need for surface modification of ceramics. What are the techniques available for surface modification of ceramics?

   b) What are the properties of the materials that are used for low temperature applications? Give some examples of such materials.

6. What are smart materials? Comment on the scope of these materials in bio-medical applications. Give some specific examples.

7. a) Describe the various nano-materials that may be used in the fabrication of composites. Which materials may be used for the matrix phase in such cases?

   b) What are carbon nanotubes? Describe the typical structure of a carbon nanotube and explain the reasons of its extreme strength and stiffness.

8. Write short notes on :

   a) Metal matrix composites.

   b) Calcium phosphate ceramics.

   c) Bio-reactive glasses.

   d) Materials for high temperature applications.