Total No. of Questions :10]

SEAT No. :

P3999

[Total No. of Pages :2

[4959]-1187
B.E. (Chemical)
d : Advanced Materials
(2012 Course) (Elective - III) (409351)

Time : 2½ Hours ***[Max. Marks :70]***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary.***

Q1) a) Recommend suitable materials for high temperature applications and explain the possible high temperature problems. **[5]**

b) Write about various methods used to improve the fatigue strength of the materials. **[5]**

OR

Q2) a) List its important properties of stainless steel and compare austenitic and martensitic stainless steels. **[5]**

b) What is Maraging steel? Explain the heat treatment cycle for it. Also give properties and applications. **[5]**

Q3) a) Discuss the polymer structure and its properties. **[5]**

b) Write a short note on processing and applications of Austempered Ductile Iron. **[5]**

OR

Q4) a) Discuss important characteristic of Aluminum that makes it attractive for engineering application. **[5]**

b) Write the properties and applications of Kevlar and Nomex. **[5]**

P.T.O.

Q5) a) What are composite materials? Classify composite materials and explain PMC. **[7]**

b) Define metallic glasses. Describe the properties of metallic glasses and Compare it with crystalline alloys. Write their applications. **[10]**

OR

Q6) a) Compare semiconducting and superconducting materials. **[7]**

b) Define and classify the composites. Discuss properties & applications of ceramic matrix composites. **[10]**

Q7) a) What are shape memory alloys? Write properties and applications. **[7]**

b) Differentiate cold work working and hot working. Discuss the annealing behavior of cold worked alloys with respect to strengthening. **[10]**

OR

Q8) a) Give the classification, properties and applications of Fe-based super-alloys. **[7]**

b) What are smart materials? How they differ from conventional engineering materials? Discuss shape memory alloys. **[10]**

Q9) a) List the different refractory metals and their specific applications. **[8]**

b) Aluminum and Magnesium alloys are preferred in aerospace applications-Justify. **[8]**

OR

Q10)a) Classify the Nanomaterials? Write a note on carbon nanomcomposites. **[8]**

b) Recommend materials, processes and desired properties for aerospace applications, in particular aero-engine. **[8]**