

III B.Tech II Semester Supplementary Examinations, April/May 2005
HIGH TEMPERATURE MATERIALS
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 70

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What do you mean by high temperature materials? What should be the important properties of high temperature materials. Explain them.
(b) Classify high temperature materials. Discuss their structure, Advantages, disadvantages and applications of any two high temperature materials.
2. Compare Nickel base alloys with cobalt base alloys, with respect to composition, Microstructure, properties and applications.
3. (a) What is creep? Explain the mechanism of creep?
(b) What metallurgical factors affect the creep characteristics of metals and alloys.
(c) Explain why the two phase titanium alloys are stronger than the single phase alpha alloys.
(d) Explain the mechanism of strengthening in Ni-Mn alloys.
4. (a) Explain why a single crystal turbine blade is preferred over a polycrystalline turbine blade.
(b) Discuss the production of components by Hot Isostatic pressing of cobalt base alloys.
5. (a) Explain the role of carbides in high temperature materials with respect to their classes; compositions microstructure.
(b) Discuss the production of Titanium based inter-metallics by infiltration technique.
6. (a) Discuss the dependence of strength of high temperature materials on grain size and grain boundary.
(b) What are the important molybdenum base high temperature alloys? Explain their composition; microstructures and high temperature applications.
7. (a) What are refractory materials? Explain how are they different from refractories.
(b) Discuss various types of oxide ceramics used for high temperature applications.
8. Write short notes on the following:
 - (a) Use of cermets in gas turbine blades
 - (b) Plastic composites

- (c) Metallurgy of chromium based high temperature materials
- (d) High temperature corrosion.

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