

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VI • EXAMINATION – WINTER 2012

Subject code: 162104

Date: 07/01/2013

Subject Name: Advanced Materials and Applications

Time: 02.30 pm - 05.00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) What are Ni -hard and Heat resistance cast irons? Describe their properties and applications. **07**

(b) Describe the metallurgical aspects of Titanium and its alloys including their properties and applications. **07**

Q.2 (a) Explain different mechanism by which high strength and creep resistance are achieved in super alloys. Enlist the properties and applications of Co-based super alloys. **07**

(b) Discuss important properties and applications of martensitic stainless steel. How hardness and wear resistance is developed in martensitic stainless steels? **07**

OR

(b) Describe important characteristics & applications of free cutting steel. Why free cutting steel contain high sulphur content? Give typical composition of a free cutting steel. **07**

Q.3 (a) Define Nano technology Explain the sol-gel technique for nano-material production. Give the advantages of this method. **07**

(b) What are semi conducting and superconducting materials. Describe their properties and applications. **07**

OR

Q.3 (a) What are Nano materials? Give some examples and applications of Nano materials. Describe the Gas Condensation Technique for Ultrafine Nano Particle production. **07**

(b) Classify the composites. Discuss properties & applications of polymer matrix composites. **07**

Q.4 (a) Describe the properties of metallic glasses. Discuss the copper mold casting technique to produce the metallic glasses. **07**

(b) Discuss important characteristics and applications of High speed steel. Give composition of one Tungston base & one Molybdenum base High speed steel. **07**

OR

Q.4 (a) Discuss the melt spinning technique to produce the metallic glasses. Mention applications of metallic glasses. **07**

Q.4 (b) What is a TRIP steel? Explain the structure and properties of these steels. Also mention important applications. **07**

Q.5 (a) Define bio-materials. What is bio-inertness and bio-functionality? Describe properties and application of Co-Cr-Mo alloys as a bio-material. **07**

(b) What is Smart Material? Give their advantages. Write a note on shape memory alloys. **07**

OR

Q.5 (a) Give the classification of bio-materials. Write a not on Ni-Ti alloy. **07**

(b) Define Piezoelectricity and write a note on Piezoelectric materials. Nacl or any gas does not show Piezo character. Why? **07**
