

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI EXAMINATION – WINTER 2015

Subject Code:162104**Date:14/12/ 2015****Subject Name: Advanced Materials and Applications****Time:2:30pm to 5:00pm****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 is stainless steel? List its important properties. Compare austenitic and martensitic stainless steels. **07**
- (b) What are super alloys? Discuss Ni-based superalloys with reference to their properties and applications. **07**
- Q.2** (a) What is alloy cast iron? How it is different from conventional cast irons? Discuss Ni-hard cast iron. **07**
- (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**
- OR**
- (b) Explain the characteristics of aluminium and its alloys that make them highly useful engineering materials. **07**
- Q.3** (a) Give your comments on the statement- “TRIP steel satisfies the requirements of automotive industry for good formable high strength steel”. **07**
- (b) What are nanomaterials? Discuss briefly carbon nanotubes. **07**
- OR**
- Q.3** (a) Write a short note on metallic glasses. **07**
- (b) Compare semiconducting and superconducting materials. **07**
- Q.4** (a) What are smart materials? How they differ from conventional engineering materials? Discuss shape memory alloys. **07**
- (b) Discuss the cryogenic materials in terms of their applications and the properties required for the same. **07**
- OR**
- Q.4** (a) What is piezoelectricity? Explain the working of piezoelectric materials and state their applications. **07**
- (b) What are composite materials? Classify composite materials and explain PMC. **07**
- Q.5** (a) Discuss bio-compatibility of materials. List and explain commonly used biomaterials. **07**
- (b) What is tool steel? Discuss types, properties and applications of tool steels. **07**
- OR**
- Q.5** (a) Discuss magnetic materials in terms of their types, properties and applications. **07**
- (b) Write a short note on Hadfield manganese steel. **07**
