

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI • EXAMINATION – WINTER • 2014****Subject Code: 162104****Date: 05-12-2014****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) Discuss the characteristics of Titanium that makes it attractive for certain engineering applications. Also give its limitations. **07**

(b) Explain the mechanisms by which high strength and creep resistance are achieved in super alloys. Enlist the properties and applications of Co-based super alloys. **07**

Q.2 (a) What do you mean by alloy cast Iron? Give the composition, properties and applications of High silicon cast iron. **07**

(b) Define composite. Discuss properties & applications of ceramic matrix composites. **07**

OR

(b) Describe the requirements of aero-space materials. Enlist some candidate materials. **07**

Q.3 (a) What is sensitization? Discuss how Inter Granular corrosion is harmful for stainless steel. Suggest the methods to minimize it. **07**

(b) Describe important characteristics & applications of free cutting steel. Give typical composition of a free cutting steel. **07**

OR

Q.3 (a) Mention the properties and applications of Ferritic stainless steel. Give the composition of 409 and 405 stainless steel. **07**

(b) Explain the Heat treatment cycle for Maraging steel. Give properties and applications of maraging steel. **07**

Q.4 (a) Define Piezoelectricity. Discuss the working of Piezoelectric materials. **07**

(b) What do you mean by body response to foreign materials? Discuss the properties required by biomaterials. **07**

OR

Q.4 (a) Write a note on Electro-rheological fluids. **07**

(b) Describe properties and application of Ni-Ti alloy as an important bio-material. **07**

Q.5 (a) Explain the sol-gel technique for nano-material production. Draw the necessary diagram. Give advantages of it over other methods. **07**

(b) Define Metallic glasses. Discuss the melt spinning technique to produce the metallic glasses. **07**

OR

Q.5 (a) Explain the mechanism of mechanical alloying technique for nano-powder production. Enlist the process affecting factors. **07**

(b) Discuss the piston and anvil technique to produce the metallic glasses. Write applications of metallic glasses. **07**
