Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER –III– EXAMINATION – SUMMER 2015

Subject Code: 131904 **Date:09/06/2015**

Subject Name: MATERIAL SCIENCE AND METALLURGY

Time: 02.30pm-05.00pm **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)**	Draw Iron – iron Carbide diagram and explain changes in structures that are taking place for 0.6 % Carbon steel from liquid to room temperature considering very slow rate of cooling. Explain any two reactions that are involved in this diagram.	**10**
	(b)	Draw the microstructures of Gray Cast iron and eutectoid steel at room temperature indicating details of structures presents in it.	**04**
Q.2	**(a)**	What are the criterions to be taken in to account for the selection of material for a given engineering application? Explain with suitable examples.	**07**
	(b)	What are the different methods of manufacturing metal powder? Explain any two	**07**
		OR	
	(b)	What are the advantages and limitations of powder metallurgy? Name any three applications of it.	**07**
Q.3	**(a)**	List important bearing materials. Enlist important properties of a bearing material.	**07**
	(b)	Explain thermal equilibrium diagram of binary alloys.	**07**
		OR	
Q.3	**(a)**	What do you mean by allotropy of metal? Discuss allotropy Iron.	**07**
	(b)	What do you mean by Micro and Macro examination of engineering metallic materials? How metallic specimen is prepared for optical microscopic examination	**07**
Q.4	**(a)**	Explain with neat sketches Jominy end quench test for hardenability test.	**07**
	(b)	It is required to find the surface defects of a metal, which nondestructive test method you will select? Explain the method with neat sketch.	**07**
		OR	
Q.4	**(a)**	Define corrosion. Explain ‘Cathodic protection against corrosion‘.	**07**
	(b)	Write short note on Copper and its alloys.	**07**
Q.5	**(a)**	Define Heat treatment of metals. Explain with neat sketch TTT diagram for heat treatment of steel.	**07**
	(b)	Explain the process of flame hardening with neat sketch.	**07**
		OR	
Q.5	**(a)**	Differentiate between Annealing process and Normalizing process.	**07**
	(b)	Explain effect of different alloying elements on properties of steel.	**07**

****