Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (NEW) • EXAMINATION – SUMMER 2015

Subject Code: 2132004 **Date: 04/06/2015**

Subject Name: Principles of Material Science and Physical Metallurgy

Time: 02.30pm-05.30pm **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 need of TTT diagram in context of material property and microstructure?	**07**
	(b)	What is allotropy? Explain various allotropic forms of iron with diagram.	**07**
Q.2	**(a)**	Sketch the iron-iron carbide equilibrium diagram and level all the phase fields.	**07**
	(b)	Distinguish between ductile and brittle fracture. Name two ductile and two brittle metallic materials.	**07**
		OR	
	(b)	Discuss the factors that are taken into consideration in selecting materials for engineering application.	**07**
Q.3	**(a)**	With the aid of an iron-iron carbide equilibrium diagram show and explain eutectic, peretectic and eutectoid transformation. Also mention the significance of these transformations.	**07**
	(b)	Explain hume rothary rules as applied to the formation of solid solutions.	**07**
		OR	
Q.3	**(a)**	Explain the method of plotting an equilibrium diagram by the use of cooling curves.	**07**
	(b)	Enlist various methods to determine crystal structure. Explain any one.	**07**
Q.4	**(a)**	Explain flame hardening and induction hardening process.	**07**
	(b)	Define annealing. Explain spheroidise annealing with advantages.	**07**
		OR	
Q.4	**(a)**	Define heat treatment? Explain various stages of heat treatment.	**07**
	(b)	Explain the lever rule as applied to equilibrium diagram.	**07**
Q.5	**(a)**	What is powder metallurgy? Discuss advantages and disadvantages of powder metallurgy techniques.	**07**
	(b)	What is non destructive testing? State various advantages and disadvantages of non destructive tests over the destructive tests.	**07**
		OR	
Q.5	**(a)**	Describe the various steps involved in powder metallurgy with importance of each step in controlling the properties of final sintered component.	**07**
	(b)	Explain magnetic particle test with diagram. State its application.	**07**

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