Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC- SEMESTER–III - EXAMINATION – SUMMER 2017

Subject Code: X31902 **Date:29/05/2017**

Subject Name: Material Science & Metallurgy

Time: 02:30 PM to 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)**	List out a various heat Treatment process. Explain Differentiate between Annealing and Normalizing.	**07**
	(b)	(I) Explain the following terms : (a) Ferrite (b) Austenite (c) Pearlite (II) Explain Objectives of Heat treatment process of Steel.	**07**
Q.2	**(a)**	What is solid solution? Explain types of solid solution. Also give Hume Rothery's Rules.	**07**
	(b)	Explain in brief about FCC, BCC, and HCP structures for metallic elements.	**07**
		OR	
Q.2	**(b)**	What are the applications of Powder Metallurgy?	**07**
Q.3	**(a)**	Draw and Explain Iron Carbon Equilibrium Diagram.	**07**
	(b)	What is phase diagram? Explain Lever rule.	**07**
		OR	
Q.3	**(a)**	Discuss the Cathodic protection of corrosion prevention for underground Pipelines.	**07**
	(b)	What are the factor affecting the rate of Corrosion? Explain the hydrogen evaluation and oxygen absorption mechanism of corrosion.	**07**
Q.4	**(a)**	What is Malleable cast iron? Enlist properties and application of it.	**07**
	(b)	Discuss mechanisms of quenching of steel. State the advantages and drawbacks of water & oil as quenching media.	**07**
		OR	
Q.4	**(a)**	Define Critical Cooling Rate of steel and show the same on a TTT diagram with complete labeling.	**07**
	(b)	What are micro and macro examination? Explain steps micro examination process.	**07**
Q.5	**(a)**	What do you mean by Non-destructive test? And describe the various NDT Methods, their features, and applications.	**07**
	(b)	Explain working principle of LPT and its method and applications.	**07**
		OR	
Q.5	**(a)**	Explain the Following terms :- (a) Fatigue (b) Creep (c) Toughness (d) Hardness (E) Macrostructure (F) Stiffness	**07**
	(b)	Explain in detail the criteria for selection of materials for Engineering Applications.	**07**

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