Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–III • EXAMINATION – WINTER • 2014

Subject Code: X 31902 Date: 29-12-2014

Subject Name: Material Science and Metallurgy

Time: 10:30 am - 01:00 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)**	Define (1) Toughness (2) Hardness (3) Hardenability (4) Malleability (5) Creep (6) Elasticity (7) Ductility.	**07**
	(b)	What are micro and macro examination ? Explain steps for micro examination process.	**07**
Q.2	**(a)**	What is Gibb's phase rule ? Define system, phase and degree of freedom. Show that the degree of freedom at eutectic point in a binary phase diagram is zero.	**07**
	(b)	What is atomic packing factor? Calculate the same for BCC and FCC structures.	**07**
		OR	
	(b)	Discuss selection criteria for materials used in engineering applications.	**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)**	Explain thermal equilibrium diagrams of binary alloy completely soluble in solid state.	**07**
	(b)	Define Critical Cooling Rate of steel and show the same on a TTT diagram with complete labeling.	**07**
Q.4	**(a)**	Explain Jiminy Quench Test.	**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 "Alloy". Also state composition, properties & uses of any two copper alloys.	**07**
	(b)	What are advantages and limitations of powder metallurgy ?	**07**
Q.5	**(a)**	What is Wrought iron? Enlist properties and application of it.	**07**
	(b)	Explain cathodic protection against corrosion.	**07**
		OR	
Q.5	**(a)**	Explain the NDT method widely used for inspection of castings.	**07**
	(b)	Explain application of Annealing, Normalizing and Spheroidizing. Explain any one from above process.	**07**

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