Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (OLD) EXAMINATION – WINTER 2018

Subject Code:131904 **Date:05/12/2018**

Subject Name:Material Science And Metallurgy

Time:10:30 AM TO 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 (i) Creep, (ii) Malleability (iii) Hardness (iv) Resilience (v) Ductility (vi) Toughness (vii) Plasticity	**07**
	(b)	Explain Ultrasonic testing with advantages and limitations	**07**
Q.2	**(a)**	Explain any two methods for production of metal powders.	**07**
	(b)	What is solid solution? Explain types of solid solution and significance of Hume Rothery's Rules	**07**
		OR	
	(b)	State composition and specific applications of (i) Muntz metal (ii) German silver (iii) Naval brass	**07**
Q.3	**(a)**	Define Heat Treatment. Explain the importance of TTT diagram in heat treatment	**07**
	(b)	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**
		OR	
Q.3	**(a)**	What is case hardening processes and explain any one in detail	**07**
	(b)	Differentiate between gray cast iron & spheroidal cast iron in terms of microstructure, properties, composition & applications	**07**
Q.4	**(a)**	Discuss the cathodic protection method of corrosion prevention for underground pipelines	**07**
	(b)	With Neat Sketch Draw Iron-Carbon (Fe-C) Equilibrium Diagram &Explain briefly various micro constituents of the diagram.	**07**
		OR	
Q.4	**(a)**	What is phase diagram? Explain Lever rule based on phase diagram	**07**
	(b)	Explain the effects on steel by alloying elements (i)Silicon (ii) Sulphur, (iii) Magnesium and (iv) Phosphorous.	**07**
Q.5	**(a)**	Describe with neat sketch how would a Jominy hardenability test on a steel sample is being conducted.	**07**
	(b)	Define unit cell. Explain with neat sketches the arrangement of atoms in B.C.C, F.C.C. and H.C.P. lattice. Prove that a F.C.C. structure is always more close packed than B.C.C. structure.	**07**
		OR	
Q.5	**(a)**	Explain the process of flame hardening with neat sketch	**07**
	(b)	Classify different types of cast iron. Why silicon is added to cast iron? Explain the effects of any four alloying elements on the properties of cast iron.	**07**

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