Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2015

Subject Code:2132004 **Date:29/12/2015**

Subject Name: Principal of Material Science and Physical Metallurgy

Time: 2:30pm to 5:30pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

MARKS

Q.1 **Short Questions** **14**

1 The effective numbers of atoms in B.C.C. is
A) 1, B) 2, C) 4, D) 6

2 Using Gibb's phase rule no. of phase 1 and no. of components 2 than which type of system is?
A) Bivariant, B) Univariant,
C) Non variant, D) Indeterminate

3 Which of the following iron exist between 910°c and 1403°c?
A) Alpha iron, B) Beta iron,
C) Gamma iron, D) Delta iron

4 A steel with 0.8% carbon is known as
A) Eutectoid steel, B) hyper-eutectoid steel'
C) hypo-eutectoid steel, D) None of these

5 The hardness and tensile strength in austenitic stainless steel can be increased by
A) Hardening and cold working, B) normalizing,
C) mar tempering, D) full annealing

6 The process in which carbon and nitrogen both are absorbed by the metal surface to get hardened is known as
A) Carburizing, B) cyaniding,
C) flame hardening, D) induction hardening

7 Quenching is not necessary when hardening is done by
A)Case hardening, B) flame hardening,
C) nitriding, D) any one of these

8 What is coordination number for FCC structure?

9 Which are examples of ceramics?

10 Define the term "Unit cell".

11 What is cooling curve?

12 Which mixer is known as ledeburite?

13 What is powder metallurgy?

14 What is the purpose of any non-destructive testing method?

Q.2 **(a)** Differentiate crystalline and non-crystalline structure. **03**

(b) Explain types of crystal structures. **04**

(c) Explain classification of engineering materials. **07**

Or

	(c)	Discuss factors affecting selection of engineering material for engineering application.	**07**
Q.3	**(a)**	Explain lever rule.	**03**
	(b)	Define Allotropy. Explain allotropy of iron.	**04**
	(c)	Draw iron-iron carbide equilibrium diagram with all necessary details.	**07**

OR

Q.3	**(a)**	Define System, Phase, and Degree of freedom.	**03**
	(b)	Explain Gibb's Phase rule.	**04**
	(c)	Explain cooling of 1.2% carbon steel from liquid state to room temperature.	**07**
Q.4	**(a)**	List various heat treatment processes which applied to steel.	**03**
	(b)	Write a short note on: pack carburizing.	**04**
	(c)	Explain TTT diagram with fully labeling.	**07**

OR

Q.4	**(a)**	What is Quenching? Which are generally used quenching medium?	**03**
	(b)	Write a short note on: Induction hardening.	**04**
	(c)	Write a difference between Annealing and Normalizing in terms of range temperatures in which they are performed and objectives.	**07**
Q.5	**(a)**	Explain the principle of ultrasonic testing.	**03**
	(b)	Comparison of NDT with Destructive testing.	**04**
	(c)	State advantages and disadvantages of powder metallurgy.	**07**

OR

Q.5	**(a)**	Write the Applications of Radiography.	**03**
	(b)	Explain X-ray Fluoroscopy.	**04**
	(c)	Explain basic steps of powder metallurgy method.	**07**

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