Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2152106 **Date: 05/05/2017**

Subject Name: Physical 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.

			MARKS	Attribute
Q.1		Short Questions	14	
	1	Define Atomic Packing Factor (APF).	1	(R)
	2	Draw (1 0 0)	1	(U)
	3	Solidification of metals and alloys occurs by _____ & _____ phenomena.	1	(R)
	4	Define phase.	1	(R)
	5	Microstructure of 0.4 % carbon steel are _____ & _____ .	1	(R)
	6	APF for simple cubic structure is _____ .	1	(R)
	7	Phase diagram for 3 elements is known as _____.	1	(R)
	8	There are _____ no of allotropic forms of iron.	1	(R)
	9	Cast iron contains min _____ % carbon theoretically.	1	(R)
	10	Name any etchant.	1	(R)
	11	Cementite contains _____ % of carbon.	1	(R)
	12	Plain Carbon steel is alloy steel. True/False	1	(U)
	13	During solidfication _____ is released at melting temperature of pure metal.	1	(U)
	14	_____ no of isothermal reactions occurs in iron-iron carbide diagram.	1	(R)
Q.2	(a)	Calculate APF for BCC.	03	(A)
	(b)	Classify plain carbon steel and discuss its advantages and limitations.	04	(U)
	(c)	Draw neat sketch of Iron-Iron carbide phase diagram & label it.	07	(U)
		OR		
	(c)	Discuss effect of grain size and its measurement methods.	07	(A)
Q.3	(a)	Draw microstructure of 0.4 % and 0.8 % carbon steel.	03	(U)
	(b)	Discuss allotropic changes in iron.	04	(U)
	(c)	Using suitable example discuss the Hume Routhery rules.	07	(A)
		OR		
Q.3	(a)	Draw cooling curves for pure metal, alloy and eutectic alloy.	03	(U)
	(b)	Discuss importance of phase diagram and limitations.	04	(U)
	(c)	Explain the process of solidification in metals and alloys.	07	(U)
Q.4	(a)	Explain any one designation system of steel.	03	(U)
	(b)	Explain Miller Indices in cubic system with example.	04	(A)
	(c)	Discuss the effect of alloying elements on properties of steel.	07	(U)
		OR		
Q.4	(a)	Define crystal and explain crystal system.	03	(R)
	(b)	Discuss function of alloying elements in steel.	04	(U)
	(c)	Briefly explain the steps for metallographic specimen preparation.	07	(U)

Q.5	**(a)**	With neat sketch draw metallurgical microscope and give functions of each part.	**03**	**(U)**
	(b)	Discuss purpose of alloying of steel.	**04**	**(U)**
	(c)	Explain isothermal reactions occurring in Iron-Iron carbide phase diagram.	**07**	**(A)**

OR

Q.5	**(a)**	Draw microstructure of SG Iron and Gray Cast Iron.	**03**	**(A)**
	(b)	Apply lever rule at eutectoid temperature for steel portion.	**04**	**(A)**
	(c)	List different types of phase diagrams and with draw any two types using suitable example.	**07**	**(A)**

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