Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2162107 **Date: 25/10/2016**

Subject Name: Heat Treatment

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		**Short Questions**	**14**
	1	Define A.P.F.	
	2	Which one of the _____ is not equilibrium heat treatment?	
	3	The hardenability is not affected by _____	
	4	The slowest cooling rate is obtained when steel is quenched in _____	
	5	The fastest cooling rate is achieved when steel is quenched in _____	
	6	Annealing temperature is _____	
	7	Hardenability of steel is assessed by _____	
	8	Define Hardness.	
	9	What is the Toughness of metal ?	
	10	Mention the effect of Cr on the properties of steel.	
	11	Mention the effect of C on the properties of steel.	
	12	Mention the effect of Mo on the properties of steel.	
	13	Mention the effect of W on the properties of steel.	
	14	What is Annealing Process?	
Q.2	**(a)**	What is crystal?	**03**
	(b)	Calculate A.P.F. for BCC and FCC crystal structure.	04
	(c)	Draw microstructure of S.G. Iron. Give its properties and applications.	07
		OR	
	(c)	Write short note on grain size measurement. Draw microstructure of 0.4% and 0.8% carbon steel.	07
Q.3	(a)	Define unit cell. What are lattice parameters?	03
	(b)	Draw FCC and BCC crystal structures.	04
	(c)	Draw neat sketch of phase diagram for two metals completely soluble in liquid and solid state with suitable example.	07
		OR	

Q.3	(a)	How Miller indices can be found?	03
	(b)	Explain Miller indices with proper examples.	04
	(c)	With neat sketch draw Fe-Fe3C diagram and label it properly. Give all isothermal reactions.	07
Q.4	(a)	Write applications of plain carbon steels.	03
	(b)	Write advantages and limitations of Plain Carbon steels.	04
	(c)	State Gibb's phase rule, define its each term and calculate degree of freedom at melting point of pure metal and eutectic point.	07

OR

Q.4	(a)	What is purpose of alloying of steel?	03
	(b)	Explain effect of major alloying elements	04
	(c)	List the steps of metallography and explain them.	07
Q.5	(a)	Define Non metallic inclusion.	03
	(b)	Differentiate between Macroscopic and Microscopic Examination	04
	(c)	Write a short note on: Coding of Steel as per Indian Standards (IS).	07

OR

Q.5	(a)	What is Solid Solution?	03
	(b)	Discuss Hume-Rothery rules	04
	(c)	Short note on Allotropy of iron.	07

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