Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 2131904 **Date: 02/06/2017**

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Give any three names of composite material.	
	2	Draw a BCC crystal structure.	
	3	Define coordination no. and state Coordination no. for BCC, FCC, and HCP.	
	4	Which is the hardest structure in Fe-C Diagram?	
	5	In Microstructure which is weakest portion? Grain or Grainboundry?	
	6	For any material Freezing Temperature and Melting temperature Both are Same. True or False?	
	7	State Eutectic reaction of Fe-C Diagram.	
	8	What elements are added to pig iron for good fluidity?	
	9	State Any 4 name of Case hardening Processes.	
	10	What are the Major alloying elements added to make stainless steel?	
	11	Inconel and monel is an alloy of which basic element?	
	12	State any four names of NDT Techniques.	
	13	Define Metallography.	
	14	State any two product name made by Powder metallurgy.	
Q.2	**(a)**	Differentiate a following Term: (1) Impact and Toughness (2) Ductility and Malleability	**03**
	(b)	Write a material selection process for a crankshaft of Engine.	**04**
	(c)	Explain a Nucleation and growth in Solidification of metals	**07**
		OR	
	(c)	Explain Point defect, Line defect and Plane defect.	**07**
Q.3	**(a)**	Define Unit cell and draw (111) and [101]	**03**
	(b)	Briefly explain Gibb's Phase rule.	**04**
	(c)	Explain Iron –Carbon diagram with neat sketch.	**07**
		OR	
Q.3	**(a)**	Explain Binary equilibrium Phase Diagram.	**03**
	(b)	State Hume -Rothery rules for solid solution.	**04**
	(c)	Write a short note on Solidification Defects with its causes and remedies.	**07**
Q.4	**(a)**	Compare nodular cast iron and malleable cast iron.	**03**
	(b)	What are the effect of following elements in steel:	**04**

(1) Carbon (2) Chromium (3) Silicon (4) Nickel

	(c)	Write a full name of TTT diagram and explain how it is constructed.	**07**

OR

Q.4	**(a)**	State the composition, Characteristics, and Applications of Malleable iron and	**03**
	(b)	Explain Macro examination and Micro examination	**04**
	(c)	For stainless steel we cannot use MPT. Why? State reason and explain MPT method in detail	**07**
Q.5	**(a)**	Briefly explain an allotropy of iron.	**03**
	(b)	Explain Flame hardening.	**04**
	(c)	Explain the principle of Radiography testing. With its use in metal testing.	**07**

OR

Q.5	**(a)**	Explain the methods to control grain size.	**03**
	(b)	Explain any one method of powder production in powder metallurgy.(with neat sketch)	**04**
	(c)	Explain Austempering and Martempering	**07**

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