Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (New) EXAMINATION – WINTER 2019

Subject Code: 3132004 **Date: 3/12/2019**

Subject Name: Principles of Materials Science and 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
Q.1	**(a)**	Differentiate material science and metallurgy.	**03**
	(b)	Write a short note on Creep and Fatigue.	**04**
	(c)	Describe material selection process for turbine blade.	**07**
Q.2	**(a)**	Enlist three non-ferrous metals.	**03**
	(b)	What is APF and CN? State CN for BCC, SC and FCC unit cell system.	**04**
	(c)	What is the significance of crystallographic planes and directions? Enlist the steps to find out crystallographic planes within unit cell.	**07**
		OR	
	(c)	Differentiate among single crystal and polycrystalline materials. Also explain isotropy and anisotropy of the materials.	**07**
Q.3	**(a)**	Explain Bragg's law for crystal structure determination.	**03**
	(b)	Explain jominy hardenability test.	**04**
	(c)	Enlist and explain different point defects in metallic and ionic materials.	**07**
		OR	
Q.3	**(a)**	Define linear and planer density.	**03**
	(b)	Enlist the steps involved in liquid penetrant test. Explain each briefly.	**04**
	(c)	Give a detailed overview of ultrasonic testing method.	**07**
Q.4	**(a)**	Explain sintering process in power metallurgical process.	**03**
	(b)	Give the advantages and disadvantages of MPT.	**04**
	(c)	Explain the ductile and brittle failures with relevant diagram.	**07**
		OR	
Q.4	**(a)**	What is the requirement of performing jominy hardenability test?	**03**
	(b)	Give brief overview of flame hardening process.	**04**
	(c)	Define hardness. Explain Rockwell hardness test in detail.	**07**
Q.5	**(a)**	State gibb`s phase rule giving its significance in metallurgy.	**03**
	(b)	Explain significance of TTT diagram.	**04**
	(c)	Enlist the various techniques for powder production. Explain any one with neat sketch.	**07**
		OR	
Q.5	**(a)**	Enlist the steps involved in micro examination of specimen.	**03**
	(b)	Draw and explain isomorphous binary phase diagram.	**04**
	(c)	Draw iron-iron carbide equilibrium diagram with all necessary details. Briefly explain cooling of 0.8 % carbon steel.	**07**

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