

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– III (New) EXAMINATION – WINTER 2019****Subject Code: 3131904****Date: 28/11/2019****Subject Name: Material 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
<b>Q.1</b>	(a) What is unit cell.	<b>03</b>
	(b) Explain any two mechanical properties.	<b>04</b>
	(c) Do the detailed classification of engineering material.	<b>07</b>
<b>Q.2</b>	(a) Grain boundary is a defect. Evaluate.	<b>03</b>
	(b) Explain the importance of undercooling in nucleation.	<b>04</b>
	(c) Explain the final solidification structure of a pure metal ingot.	<b>07</b>
<b>OR</b>		
	(c) Explain homogeneous and heterogeneous nucleation process with neat sketch.	<b>07</b>
<b>Q.3</b>	(a) Describe applications of phase diagram.	<b>03</b>
	(b) Eutectic alloys solidify at fixed temperature. Justify with the help of Gibbs Phase rule.	<b>04</b>
	(c) What is the purpose of hardening? Explain induction hardening in detail.	<b>07</b>
<b>OR</b>		
<b>Q.3</b>	(a) Explain interstitial solid solution.	<b>03</b>
	(b) Explain Hume Rothary rule for substitutional solid solution	<b>04</b>
	(c) Explain the detail procedure of polishing the specimen for microexamination.	<b>07</b>
<b>Q.4</b>	(a) What is the role of etchant in microexamination?	<b>03</b>
	(b) Explain the principle of magnetic particle test with neat sketch.	<b>04</b>
	(c) Draw and label Iron – Iron Carbide diagram. Also explain the reactions taking place in it.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	(a) Differentiate between Eutectic and Eutectoid reaction.	<b>03</b>
	(b) What are the limitations and capabilities of LPT.	<b>04</b>
	(c) Explain the advantages and disadvantages of powder metallurgy.	<b>07</b>
<b>Q.5</b>	(a) What is martensite?	<b>03</b>
	(b) Differentiate between annealing and normalizing	<b>04</b>
	(c) Explain Jominy Hardenability test with neat sketch.	<b>07</b>
<b>OR</b>		
<b>Q.5</b>	(a) Why cast iron has a limited engineering applications?	<b>03</b>
	(b) Explain macro and micro examination.	<b>04</b>
	(c) Explain the mechanism of corrosion. Also explain any one corrosion prevention technique in detail.	<b>07</b>

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