

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3131904****Date:26-07-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

	MARKS
<b>Q.1</b> (a) What is Metallurgy? List the functions of it.	<b>03</b>
(b) List Mechanical Properties and explain any 02.	<b>04</b>
(c) Explain Bravais Lattice with neat diagrams.	<b>07</b>
<b>Q.2</b> (a) Grain boundary is a crystalline imperfection. Explain	<b>03</b>
(b) Determine Miller indices of a plane that makes intercepts of $2A^0$ , $3A^0$ and $4A^0$ on coordinate axes of an orthorhombic crystal with $a:b:c = 4:3:2$ .	<b>04</b>
(c) Explain with neat sketches the arrangement of atoms in B.C.C, F.C.C. and H.C.P. lattice. Show that F.C.C. structure is always more close packed than B.C.C. structure.	<b>07</b>
<b>OR</b>	
(c) Explain the different methods for Grain size measurement.	<b>07</b>
<b>Q.3</b> (a) Which information is revealed by micro-examination of metal specimen?	<b>03</b>
(b) Name few enchants for steel. What is the function of enchant.	<b>04</b>
(c) Describe sample preparation technique for microscopic examination.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) Which information is disclosed by macro-examination?	<b>03</b>
(b) What is sulphur printing and how it is executed.	<b>04</b>
(c) Explain with neat diagram construction and working of metallurgical microscope.	<b>07</b>
<b>Q.4</b> (a) Explain interstitial solid solution.	<b>03</b>
(b) Differentiate between annealing and normalizing	<b>04</b>
(c) What are the requirements for the solidification to be initiated and proceed further?	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) Explain types of growth of nucleus for metals and alloys.	<b>03</b>
(b) What is the difference between homogenous and heterogeneous nucleation process.	<b>04</b>
(c) Explain iron-carbon diagram with neat sketch	<b>07</b>
<b>Q.5</b> (a) Explain objective of heat treatment of steel.	<b>03</b>
(b) Explain cathodic protection against corrosion.	<b>04</b>
(c) Explain in detail Radiography testing method along with its advantages & disadvantages.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) List various heat treatment processes as applied to steels.	<b>03</b>
(b) Write the advantages and disadvantages of powder metallurgy.	<b>04</b>
(c) Explain different NDT methods used for inspection of castings.	<b>07</b>

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