

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
Q.1 (a) What is Metallurgy? List the functions of it.	03
(b) List Mechanical Properties and explain any 02.	04
(c) Explain Bravais Lattice with neat diagrams.	07
Q.2 (a) Grain boundary is a crystalline imperfection. Explain	03
(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 $a:b:c = 4:3:2$.	04
(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.	07
OR	
(c) Explain the different methods for Grain size measurement.	07
Q.3 (a) Which information is revealed by micro-examination of metal specimen?	03
(b) Name few enchants for steel. What is the function of enchant.	04
(c) Describe sample preparation technique for microscopic examination.	07
OR	
Q.3 (a) Which information is disclosed by macro-examination?	03
(b) What is sulphur printing and how it is executed.	04
(c) Explain with neat diagram construction and working of metallurgical microscope.	07
Q.4 (a) Explain interstitial solid solution.	03
(b) Differentiate between annealing and normalizing	04
(c) What are the requirements for the solidification to be initiated and proceed further?	07
OR	
Q.4 (a) Explain types of growth of nucleus for metals and alloys.	03
(b) What is the difference between homogenous and heterogeneous nucleation process.	04
(c) Explain iron-carbon diagram with neat sketch	07
Q.5 (a) Explain objective of heat treatment of steel.	03
(b) Explain cathodic protection against corrosion.	04
(c) Explain in detail Radiography testing method along with its advantages & disadvantages.	07
OR	
Q.5 (a) List various heat treatment processes as applied to steels.	03
(b) Write the advantages and disadvantages of powder metallurgy.	04
(c) Explain different NDT methods used for inspection of castings.	07
