

GUJARAT TECHNOLOGICAL UNIVERSITY**B.VOC - SEMESTER– II EXAMINATION – SUMMER 2024****Subject Code: 21120304****Date:31-05-2024****Subject Name: Material Science and Metallurgy****Time:10:30 AM TO 12:30 PM****Total Marks:50****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) Explain the following material properties: Ductility, Creep, Fatigue, Toughness, Hardenability	05
(b) Discuss selection criteria for materials used in engineering applications.	05
Q.2 (a) Write a Hume-Rothery rules for Substitutional Solid solution formation.	05
(b) Explain homogeneous and heterogeneous nucleation process with neat sketch.	05
OR	
(b) Explain a atomic packing factor and Calculate the APF for BCC and FCC structures.	05
Q.3 (a) Draw Iron – carbon diagram and Explain solid state transformation from austenitic temperature to room temperature for 0.4% carbon steel.	05
(b) What are the effect of alloying various elements, viz Cr, Ni, Co, V, W in steels?	05
OR	
Q.3 (a) Write short note on Heat Resisting alloy Steels.	05
(b) Write short note on Gray Cast Iron.	05
Q.4 (a) Explain the NDT method widely used for inspection of castings.	05
(b) Explain in detail Radiography testing method along with its advantages, disadvantages.	05
OR	
Q.4 (a) Describe Ultrasonic Testing Method and also mention its advantages and Limitations.	05
(b) Explain in detail Magnetic particle testing method along with its advantages, disadvantages.	05
Q.5 (a) Explain with a neat sketch Time-Temperature-Transformation (TTT) diagram for a eutectoid composition steel.	05
(b) Justify the need of Heat treatment processes for metals. Explain with neat sketch TTT diagram for heat treatment of steel.	05
OR	
Q.5 (a) Define hardenability and list three factors affecting it	05
(b) Discuss mechanisms of quenching of steel. State the advantages and drawbacks of water & oil as quenching media.	05
