

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– III(NEW) EXAMINATION – WINTER 2022****Subject Code:3132004****Date:27-02-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

	MARKS
Q.1 (a) How metallurgy differs from material science?	03
(b) Differentiate between poly-crystallin and non-crystalline materials.	04
(c) Describe material selection for fizzy drink bottle.	07
Q.2 (a) What is significance of linear and planer density?	03
(b) What is the significance of study of metallurgy?	04
(c) Compute the APF for HCP crystal system. Also give coordination number for HCP structure.	07
OR	
(c) What is space lattice? What are the characteristics of a space lattice? With the help of neat sketch explain the term “unit cell”.	07
Q.3 (a) What is significance of compaction process in powder metallurgy?	03
(b) Classify point defects in materials.	04
(c) Explain ductile and brittle failure of engineering materials.	07
OR	
Q.3 (a) State and explain the Gibb’s phase rule.	03
(b) Explain bragg’s law for x-ray diffraction.	04
(c) Explain the steps involved in micro-examination of materials. Also give significance of each step.	07
Q.4 (a) What is heat treatment of steel? What is its objective?	03
(b) What is phase diagram? Explain lever rule.	04
(c) Draw cooling curve of (i) pure metal and (ii) An alloy of two metals which are completely soluble in liquid and solid phase.	07
OR	
Q.4 (a) List various heat treatment processes applicable to steel.	03
(b) Define system, phase and degree of freedom.	04
(c) Describe jominy hardenability test. Why is it required to perform?	07
Q.5 (a) Why material loss is minimum during production of powder metallurgical parts?	03
(b) What are the important critical reactions that appear on iron-iron carbide diagram?	04
(c) Write steps of MPT and explain in brief.	07
OR	
Q.5 (a) What are the limitations of MPT?	03
(b) Differentiate between eutectic and eutectoid reaction in all respect.	04
(c) Write steps of LPT and explain in brief.	07
