

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2022**

Subject Code: 3172109

Date: 03-01-2023

Subject Name: Materials Characterization

Time: 10:30 AM TO 01:00 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) State the importance of materials characterization.	03
	(b) Distinguish between Positive Replica and Negative Replica	04
	(c) Differentiate between heat flux DSC and power compensated DSC.	07
<b>Q.2</b>	(a) Explain the phenomenon of cryo trapping.	03
	(b) Write short note on Colour Metallography.	04
	(c) What do you understand by optical Abberation? Differentiate between on axis and off axis abberation	07
<b>OR</b>		
	(c) Write short note on field ion microscopy.	07
<b>Q.3</b>	(a) What is the purpose of molecular sieve in sorption pump?	03
	(b) What do you understand by vertical resolution?	04
	(c) Explain in detail the principle, working, advantages and applications of SEM	07
<b>OR</b>		
<b>Q.3</b>	(a) Draw the schematic diagram illustrating the principle of Metallurgical microscope.	03
	(b) List the application of TEM	04
	(c) Differentiate between optical microscopy and Electron Microscopy	07
<b>Q.4</b>	(a) Write short note on formvar replica.	03
	(b) State the importance of Image Analyzer as quantitative metallography tool..	04
	(c) What is XRD? Derive The Bragg's law	07
<b>OR</b>		
<b>Q.4</b>	(a) State the electrolyte and conditions for electrolytic polishing to prepare replica.	03
	(b) Draw the schematic diagram of HOT stage microscopy.	04
	(c) Explain Electron Probe Micro Analysis (EPMA) in detail.	07
<b>Q.5</b>	(a) Explain the terminology 1) Numerical Aperture 2) depth of focus	03
	(b) Which technique is used to find out the elemental analysis of geological material? Explain its principle in brief.	04
	(c) Explain the application of XPS (ESCA) for material characterization	07
<b>OR</b>		
<b>Q.5</b>	(a) Draw a schematic diagram of arrangement of TMA.	03
	(b) State the working principle of Turbo molecular pump	04
	(c) Differentiate between EDS and WDS.	07