

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2172109
Date: 03/12/2019
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.

		MARKS
Q.1	(a) Give significance of thermal analysis.	03
	(b) Describe the importance of Material characterization.	04
	(c) Explain the principle and working of Rutherford backscattering spectroscopy (RBS). Write applications and limitations.	07
Q.2	(a) Write different Vacuum range.	03
	(b) Write use of Vacuum systems in Material Characterization techniques.	04
	(c) What are Vacuum gauge? Explain the principle and instrumentation of Pirani gauge with their merits, limitations and applications.	07
	OR	
	(c) Discuss the Principle, Working and application of DTA. Give the difference between DSC and DTA.	07
Q.3	(a) Discuss effect of Numerical Aperture on resolution of the microscope.	03
	(b) Write a note on Bright field microscopy.	04
	(c) Describe the steps for microstructural study by image analysis.	07
	OR	
Q.3	(a) What is Raman Effect? How it arises?	03
	(b) Explain the principle of Differential Interference Contrast microscopy.	04
	(c) What do you mean by STM? Explain the principle and instrumentation. Give merits, limitations and applications.	07
Q.4	(a) Explain how electron microscopy differs from optical microscopy.	03
	(b) Discuss- Diffraction pattern in TEM.	04
	(c) Draw schematic showing basic components of the scanning electron microscope. Briefly explain each component and its working in SEM.	07
	OR	
Q.4	(a) What is basic difference between SEM and TEM?	03
	(b) List advantages and applications of IR analysis.	04
	(c) What do you mean by AFM? Explain the principle and instrumentation. Give merits, limitations and applications.	07
Q.5	(a) Write the advantages and disadvantages of Laue method of diffraction.	03
	(b) What is X-ray diffraction? How it is useful in material characterization?	04
	(c) What is Atomic Emission Spectroscopy (AES)? Discuss various methods of Atomic Emission Spectroscopy. List advantages of AES.	07
	OR	
Q.5	(a) Derive Bragg's law.	03
	(b) What are Auger electrons? How they produced?	04
	(c) Discuss Electron Probe Micro Analysis (EPMA) in terms of instrumentation and working principle using line diagram.	07
