Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:182105 **Date:16/05/2016**

Subject Name:Modern Techniques for Material Characterization (Department Elective - II)

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.**

Q.1	**(a)**	Explain briefly Laue method of diffraction. What are the advantages and disadvantages of Laue method?	**07**
	(b)	What is Auger Electron Spectroscopy? Explain the technique with sketch of instrumentation. Give applications and limitations.	**07**
Q.2	**(a)**	Explain briefly Powder (Debye Scherrer) method of diffraction. How it is useful to study lattice parameter of crystal?	**07**
	(b)	What do you mean by photoelectron spectroscopy? Explain the principle and instrumentation of XPS. Give applications and limitations.	**07**
		OR	
	(b)	Explain the Nuclear Magnetic Resonance (NMR) spectroscopy. List the applications of NMR spectroscopy.	**07**
Q.3	**(a)**	Discuss thermogravimetric analysis technique? Explain principle involved. Mention the applications of Thermogravimetric analysis.	**07**
	(b)	What is resolution of Microscope? Explain in detail using the formula. Write the effect of wavelength and Numerical Aperture on resolution of microscope.	**07**
		OR	
Q.3	**(a)**	What do you meant by Differential scanning calorimetry? Explain principle involved. Give the difference between Heat flux DSC and Power Compensated DSC.	**07**
	(b)	Explain Hot Stage Microscopy.	**07**
Q.4	**(a)**	What is TEM? Give basic difference between SEM and TEM. With a ray diagram explain working of TEM.	**07**
	(b)	Write a note on High Resolution Electron Microscopy (HREM).	**07**
		OR	
Q.4	**(a)**	Draw schematic showing basic components of the scanning electron microscope. Briefly explain each component and its working in SEM.	**07**
	(b)	What is electron microscopy? Discuss the techniques of replica preparation for electron microscopy.	**07**
Q.5	**(a)**	With a neat sketch explain IR Spectrometer. List advantages, disadvantages and applications of IR analysis.	**07**
	(b)	What is XRF? With a block diagram explain the working of XRF system.	**07**
		OR	

Q.5	**(a)**	Explain the principle and operation of FTIR spectrometer. Write advantages, disadvantages and applications of FTIR.	**07**
	(b)	What is Atomic Emission Spectroscopy (AES)? Explain Atomic Emission Spectroscopy. List advantages of AES.	**07**

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