CBCS SCHEME

USN

18NT53

Fifth Semester B.E. Degree Examination, July/August 2021

Characterization Techniques

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Explain in detail about Rayleigh criterion and Abbe criterion. **(08 Marks)**
b. Mention the different compositional characterization tools and explain any two briefly. **(12 Marks)**

2 a. Explain the electron diffraction and interference with suitable diagram. **(08 Marks)**
b. Mention the different structural characterization tools. Explain any two in detail. **(12 Marks)**

3 a. Explain the working of XPS along with a neat schematic. **(08 Marks)**
b. Explain the basic principle of powder XRD. Mention the advantages and disadvantages. **(08 Marks)**
c. Mention the applications of powder XRD and write an equation to find out average thickness of a given sample. **(04 Marks)**

4 a. With a schematic, explain the working of single crystalline XRD. **(08 Marks)**
b. Explain the basic principle of single crystalline XRD. Mention the advantages and limitations. **(08 Marks)**
c. Write a short note on XANES. **(04 Marks)**

5 a. With a neat schematic, explain the working of SEM. **(08 Marks)**
b. Briefly explain the working of STM with a neat schematic. **(08 Marks)**
c. Write a short note on electron beam interaction with matter. **(04 Marks)**

6 a. With a neat schematic diagram, explain the working of TEM. **(08 Marks)**
b. Explain the basic principle of SEM. Mention the advantages and limitations. **(08 Marks)**
c. Write a short note on selective area electron diffraction. **(04 Marks)**

7 a. With a scheme, explain the working of UV-Vis spectrometer. **(08 Marks)**
b. Define zeta potential. Explain the process of measuring zeta potential and its applications. **(08 Marks)**
c. Mention the advantages and limitations of FTIR. **(04 Marks)**

8 a. Explain the working of Raman spectroscopy with a schematic. **(08 Marks)**
b. Explain dynamic light scattering method along with neat schematic for nanoparticle size measurement. **(08 Marks)**
c. Mention the advantages and limitations of Raman spectroscopy. **(04 Marks)**

9 a. Define Potentiometry. Explain the working principle of potentiometry with a neat schematic. **(08 Marks)**
b. Explain impedance measurement and analysis using LCR meter with a schematic. **(08 Marks)**
c. Write a short note on DC electric measurement. **(04 Marks)**

10 a. Explain the working process of linear sweep voltametry. **(08 Marks)**
b. Explain lock in amplifier method to measure AC signals for low power nanotechnology and other sensing devices. **(08 Marks)**
c. Write a short note on AC electric measurements. **(04 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.