

[Time: 2 ½ Hours]

[Marks: 60]

Please check whether you have got the right question paper.

- N.B:
1. All questions are compulsory.
 2. Figures to the right indicate full marks.
 3. Use of logarithmic table/non programmable calculator is allowed.

- Q.1** A) Attempt **any TWO** of the following: (8)
- i. Explain the significance of low energy ion scattering
 - ii. Discuss the advantages of Secondary Ion Mass Spectrometry (SIMS) and its applications.
 - iii. Describe the experimental set up of Rutherford Back scattering spectroscopy
 - iv. Write a note on applications of Rutherford back scattering
- B) Attempt **any ONE** of the following: (4)
- i. Explain the difficulties occurred during the surface analysis of materials
 - ii. Draw a neat diagram of Ion source used in SIM Spectroscopy.
- Q.2** A) Attempt **any TWO** of the following: (08)
- i. Explain the instrumentation of ESR spectroscopy
 - ii. With reference to electrical discharge sources, explain the basic principle of atomic emission spectroscopy
 - iii. Write a note on Hyperfine splitting in ESR spectrum
 - iv. Discuss applications of Mossbauer's spectroscopy
- B) Attempt **any ONE** of the following: (4)
- i. Discuss the applications of Atomic emission spectroscopy
 - ii. With respect to Mossbauer's spectroscopy, explain isomer shift and quadrupole splitting
- Q.3** A) Attempt **any ONE** of the following: (08)
- i. Write a note on various forms of Pulse polarography
 - ii. Describe Adsorption Stripping Voltammetry
 - iii. Explain Linear sweep voltammetry.
 - iv. Differentiate between Chronopotentiometry and Chronoamperometry
- B) Attempt **any ONE** of the following: (4)
- i. Discuss chemically modified electrodes used in Voltammetry
 - ii. Discuss the applications of Cyclic voltammetry

- Q.4** A) Attempt **any TWO** of following. **(08)**
- i. Discuss factors affecting Specific rotation of the molecule
 - ii. Explain Chemiluminescence immunoassay
 - iii. Give the applications of Spectroelectrochemistry
 - iv. Draw and explain the schematic diagram of ORD

- B) Attempt **any ONE** of following. **(4)**
- i. Discuss the principle and instrumentation of Chemiluminescence techniques
 - ii. Explain the principle of spectro-electrochemistry

- Q.5** Attempt **any FOUR** of the following **(12)**
- i. Describe the principle of Low-Energy Ion Scattering
 - ii. Explain the applications of Particle Induced X-ray emission spectroscopy
 - iii. Write a note on the applications of Electron Spin Resonance Spectroscopy
 - iv. Discuss instrumentation of Mossbauer's Spectroscopy
 - v. Give the applications of Photo acoustic Spectroscopy
 - vi. What is the difference between Anodic stripping voltammetry and Cathodic stripping voltammetry?
 - vii. Explain the difference between ORD and CD
 - viii. What are the advantages and limitations of adsorption stripping voltammetry
