[Time: 2 ½ Hours] **[Marks : 60]**

Please check whether you have got the right question paper.

N.B: 1. Attempt all questions.
2. All questions carry equal marks.

1. A) Answer any **two** of the following **8**

a) Describe the preparation of surface for the Surface analysis technique.

b) Describe the experimental set up of Rutherford Back scattering spectroscopy.

c) Discuss the principle of "Particle induced X-ray emission" spectroscopy.

d) Draw the diagram of instrument used for "Low Energy ion scattering" spectroscopy. Give few applications of it.

B) Give principle of "Rutherford Back Scattering" spectroscopy. Discuss any two applications of it. **4**

OR

Give a brief account of difficulties faced during Surface analysis. **4**

2. A) Answer any **two** of the following **8**

a) Discuss the origin of Electron Spin Resonance spectroscopy.

b) Explain the basic principle of Mossbauer's spectroscopy.

c) Give the general information of Atomic emission spectrometer.

d) Write a note on Hyperfine splitting.

B) Discuss Inductively coupled plasma sources used in Atomic Emission Spectroscopy. **4**

OR

How is sample introduced in Atomic emission spectrometer? Also, give brief information about the electrodes used in atomic emission spectrometer.

3. A) Answer any **two** of the following **8**

a) Give brief account of various forms of Pulse Polarography.

b) Explain Linear sweep voltammetry.

c) Describe Adsorption Stripping Voltammetry.

d) Differentiate between Chronopotentiometry and Chronoamperometry.

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B) Give applications of Cyclic Voltammetry. **4**

OR

Discuss chemically modified electrodes used in Voltammetry. **4**

4. A) Answer any **two** of the following **8**

a) What is Chemiluminesescence immunoassay?

b) Discuss factors affecting Specific rotation of the molecule.

c) Draw and explain the schematic diagram of Polarimeter.

d) Give the applications of Spectroelectrochemistry.

B) What is Spectro-Electrochemistry? **4**

OR

Explain Quadrupole splitting. **4**

5. A) Attempt any **four** of the following **12**

a) Discuss the application of Particle induced X -ray emission in Art and Archaeology.

b) Give the applications of Secondary Ion Mass Spectroscopy.

c) Explain the role of Klystrons and isolators used in the Electron Spin Resonance spectroscopy.

d) What is Quadrupole splitting and Chemical Shift?

e) What is the difference between Anodic stripping voltammetry and Cathodic stripping voltammetry?

f) What are the advantages and limitations of adsorption stripping voltametry?

g) Give the applications of Photoacoustic Spectroscopy.

h) Explain the difference between ORD and CD.

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