

[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. Describe the principle and instrumentation of the particle induced X ray emission spectroscopy
 - ii. Explain the significance of surface analytical techniques
 - iii. Discuss the principle of the Secondary Ion mass spectroscopy.
 - iv. Write a note on Rutherford back scattering
- B) Attempt **any ONE** of the following: (4)
- i. Explain the main applications of secondary ion mass spectroscopy
 - ii. Describe the principle of Low-Energy Ion Scattering
- Q.2 A) Attempt **any TWO** of the following: (08)
- i. With the help of a neat diagram explain the instrumentation of ESR spectroscopy
 - ii. Describe the applications of Atomic emission spectroscopy.
 - iii. Discuss applications of Mossbauer's spectroscopy
 - iv. Explain isomer shift and quadrupole splitting with respect to Mossbauer's spectroscopy
- B) Attempt **any ONE** of the following: (4)
- i. What are the applications of ESR spectroscopy?
 - ii. Draw a neat diagram for Mossbauer spectroscopy. Explain the functions of any two parts of the instrument.
- Q.3 A) Attempt **any ONE** of the following: (08)
- i. Discuss stripping voltammetry as an anodic process.
 - ii. What is Chronoamperometry? Explain in detail.
 - iii. Write a note on modified electrodes in voltammetry.
 - iv. Distinguish between Normal and Differential Pulse Polarography.
- B) Attempt **any ONE** of the following: (4)
- i. Explain the principle and working of Chronopotentiometry
 - ii. Describe the principle of TAST.

Q.4 A) Attempt **any TWO** of following. (08)

- i. Explain the basic principle of circular dichroism (CD)
- ii. With the help of a neat diagram describe the technique of ORD.
- iii. How is Chemiluminescence technique used for determination of gaseous air pollutants?
- iv. Explain the principle of photo acoustic spectroscopy

B) Attempt **any ONE** of following. (4)

- i. What are Chiroptical Methods? Discuss their applications
- ii. Explain the principle and instrumentation of spectro-electrochemistry

Q.5 Attempt **any FOUR** of the following (12)

- i. Explain the method of preparation of the surface for surface analysis
- ii. Describe the significance of low energy ion scattering
- iii. Explain the basic principles of atomic emission spectroscopy with plasma source
- iv. Discuss the instrumentation of Atomic Emission Spectroscopy
- v. What are the applications Chronopotiometry?
- vi. Give the applications of spectroelectrochemistry.
- vii. Describe the applications of Chemiluminescence techniques.
- viii. Explain the principle of Chemiluminescence techniques.
