[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: **(08)**

i) What is Rutherford Backscattering? Explain its significance.
ii) Discuss the advantages of Secondary Ion Mass Spectrometry (SIMS) and its applications.
iii) Explain the Principle and working of Partic1e-Induced X-Ray Emission.
iv) Write a note on Low energy ion scattering.

B) Describe the difficulties that occur during the surface analysis of materials. **(04)**

OR

B) Write a note on principle of Secondary Ion Mass Spectroscopy. **(04)**

Q. 2 A) Attempt **any two** of the following: **(08)**

i) Explain instrumentation involved in Mossbauer's spectroscopy.
ii) Write a note on Inductively coupled plasma source.
iii) Explain Isomer shift and quadrapole shift with reference to Mossbauer spectroscopy.
iv) What are the important applications of ESR?

B) Describe the instrumental set up of ESR spectroscopy. **(04)**

OR

B) Explain the principle of AES. **(04)**

Q. 3 A) Attempt **any two** of the following: **(08)**

i) What is Stripping Voltammetry? Explain in detail.
ii) Explain the principle and applications of Linear Sweep Voltammetry.
iii) Distinguish between Normal and Differential Pulse Polarography.
iv) Explain the principle and working of Chronopotentiometry.

B) Write a note on modified electrodes in voltammetry. **(04)**

OR

B) Describe the principle of TAST. **(04)**

Q. 4 A) Attempt **any two** of the following: **(08)**

i) State and explain the Principle of Chemiluminescence techniques.
ii) Explain the basic principle of circular dichroism (CD).
iii) Explain the principle and instrumentation of spectroelectrochemistry.
iv) With the help of a neat diagram describe the technique of ORD.

B) How is Chemiluminescence technique used for determination of gaseous air pollutant? **(04)**

OR

B) What are Chirooptical Methods? Discuss their applications. **(04)**

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

i) Draw a neat diagram of Ion source used in SIM Spectroscopy.
ii) Explain the significance of surface analytical techniques.
iii) Discuss the electrical discharge sources used in AES.
iv) What are the applications of Mossbauer spectroscopy?
v) Give the applications of ultra microelectrodes.
vi) What is Chronoamperometry?
vii) Describe the applications of spectroelectrochemistry.
viii) Explain the principle of photo acoustic spectroscopy.

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