[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) Describe the principle and instrumentation of particle induced X ray emission.
   iii) Write a note on principle and working of Low energy Ion scattering.
   iv) Describe the principle of Low-Energy Ion Scattering.

B) Describe the principle of Low-Energy Ion Scattering. (04)
   OR
   B) Write a note on applications of Rutherford back scattering. (04)

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) Explain Isomer shift and quadrapole shift with reference to Mossbauer spectroscopy.
   iii) Discuss the electrical discharge sources used in AES.
   iv) What is Mossbauer's effect?

B) Describe the applications of AES. (04)
   OR
   B) What are the important applications of ESR? (04)

Q. 3 A) Attempt any two of the following: (08)
   i) What is Chronoamperometry? Explain in detail.
   ii) Describe the stripping voltammetry as an anodic process.
   iii) Discuss between Normal and Differential Pulse Polarography.
   iv) Describe the principle of TAST.

B) Write a note on modified electrodes in voltammetry. (04)
   OR
   B) Explain the principle and working of Chronopotentiometry. (04)

Q. 4 A) Attempt any two of the following: (08)
   i) Explain the principle of photoacoustic spectroscopy.
   ii) Explain the basic principle of circular dichroism (CD).
   iii) How is Chemiluminescence technique used for determination of gaseous air pollutant?
   iv) With the help of a neat diagram describe the technique of ORD.

B) Explain the principle and instrumentation of spectroelectrochemistry. (04)
   OR
   B) What are Chirooptical Methods? Discuss their applications (04)
Q. 5  Attempt any four of the following:  

i) Give the main applications of Particle induced X ray emission.  
ii) Explain the significance of surface analytical techniques.  
iii) Explain the principle of AES.  
iv) What are the applications of Mossbauer spectroscopy?  
v) Give the applications of ultramicroelectrodes.  
vi) What are the applications Chronopotentiometry?  

vii) Describe the applications of spectroelectrochemistry.  
viii) State and explain the Principle of Chemiluminescence techniques.