Q.P. Code :05439

[Time: 2.30 Hours]   [Marks:60]

Please check whether you have got the right question paper.

N.B: 1)   All questions are compulsory.
         2)   Use of log table or non-programmable calculator is permitted.

1. A)   Attempt **any two** of the following :-   08
     i.   What is ultraviolet photoelectron spectroscopy? How does it differ from ESCA?
     ii.   What is auger electron? How is it produced?
     iii.   Explain the working of Atomic Force Microscope, with reference to surface
            morphology.
     iv.   Discuss the applications of scanning probe microscopes.

   B.   An Auger peak was observed at 570 ev. Estimate the difference in energy between the   04
        inner shell from which the electron was ejected and the outer shell from which the second
        electron fell. The binding energy of Auger electron is 580 ev. ($h = 4.1 \times 10^{-15}$ ev, $c = 3 \times 10^8$ ms^{-1})

                                                          OR

   B.   Explain the following terms with respect to ESCA: 04
        a) Satellite peak.
        b) Fermi level.

2.   Attempt **any two** of the following :-   08
     i.   With respect to Mossbauer's spectroscopy, explain isomer shift and quadrapole
            splitting.
     ii.   Give an account of the different cells used in photo acoustic spectroscopy.
     iii.   Explain inductively coupled plasma source with suitable diagram.
     iv.   Describe sample handling in Arc source spectrometry.

   B.   Give a block diagram of a single beam photo acoustic spectrometer and explain function of   04
        each component.
                                                          OR
   B.   Explain instrumentation involved in Mossbauer's spectroscopy.   04

3. A)   Attempt **any two** of the following :-   08
     i.   Describe the working of multilayer film electrode for the determination of glucose in
            blood serum. What is the specific role of different layer?
     ii.   Explain the basic principle of TAST polarography and discuss its applications.
     iii.   What are screen printed electrodes? How are the analyzer determined using these
            electrodes?
     iv.   Discuss the principle and working of chronoamperometry.

   B)   In chronopotentiometric analysis of metal ion; the transition time of 3.5 sec. was   04
        observed for a 25 cm^3 solution containing 1.6 milimoles of metal ions. For another 25 cm^3
        sample solution of same metal ion under identical conditions, the transition time was
        found to be 2.44 sec. Calculate the concentration of the metal ion in the second solution.
                                                          OR

B) What are chemically and electro chemically modified electrode? 04

4. A. Attempt **any two** of the following :- 08
    i.   What are applications of ORD?
    ii.   How is the chemiluminescence technique useful in analysis of gaseous air pollutants?
    iii. Explain the chemiluminescence apparatus, with a neat labeled diagram.
    iv. Describe the various prisms used in polarimetry.

B. Give and account of liquid phase chemiluminescence titration. 04

OR

B. Explain the principle and instrumentation involved in ORD. 04

5. A. Attempt **any four** of the following :- 12
    i.   What is the principle of auger electron spectroscopy?
    ii.   Explain the working principle of scanning tunneling microscope.
    iii. With reference to electrical discharge sources, explain the basic principle of atomic emission spectroscopy.
    iv. What are applications of spark source spectroscopy?
    v.   Compare and contrast chronopotentiometry and chronoamperometry.
    vi. What are the applications of voltametery in inorganic analysis?
    vii. Discuss the basic principle of circular dichroism.
    viii. What is the role of luminal in chemiluminescence method?

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