



- (x) Cover slips are used before viewing slides in light microscopy. (1)
2. (i) What were the results and conclusions of Miller and Urey's experiments ?
- (ii) Why do you think only L-amino acids and D-sugars have been selected by nature ?
- (iii) With the help of an energy level diagram show how internal conversion results in fluorescence and intersystem crossing results in phosphorescence ?
- (iv) A solution of L-leucine (3.0 g/50 ml 6N HCl) had an observed rotation of  $1.81^\circ$  in a 20 cm polarimeter tube. Calculate (a) the specific rotation  $a$  and (b) the molar rotation  $[\alpha]_m$  of the leucine solution. (4,2,4,4)
3. (i) The solubility product of AgCl in water is  $1.5 \times 10^{-10}$ . Calculate its solubility in 0.01M NaCl solution.
- (ii) The molar ionic conductances at infinite dilution of  $Mg^{2+}$  and  $Cl^-$  are 106.1 and  $76.3 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$  respectively. Find out the molar conductance of the solution of  $MgCl_2$  at infinite dilution.
- (iii) Which property of water is attributed to the following : (a) water is a good solvent (b) water plays a role in regulating body temperature ?
- (iv) Why does a high dietary intake of phosphate increase the possibility of forming calcium stones ?
- (v) Differentiate between isoosmotic and isotonic solutions.
- (vi) Explain why atomic emission spectrum relates to only an individual element ? (3,3,2,2,2,2)
4. (i) Give a schematic representation of a spectrophotometer.

- (ii) Write a note on three types of monochromators used in spectrophotometry.
- (iii) A solution containing  $10^{-5}$  M ATP has a transmission of 70.2% at 260 nm using a 1cm path length cuvette. Calculate (a) transmittance in a 3 cm path length cuvette (b) Absorbance in a 1cm cuvette. (4,6,4)
5. (i) Write the principle of  $^1\text{H}$  NMR spectroscopy and give its use in structure determination using ethyl alcohol as an example.
- (ii) Write the Bragg's equation as used in X-ray crystallography and briefly explain its use in determining molecular structures. (2×7)
6. Differentiate between the following :
- (i) Intrinsic and extrinsic fluors
- (ii) Paramagnetic and diamagnetic elements
- (iii) Alpha and beta radioactive radiations
- (iv) CD and ORD spectra
- (v) Relative and specific viscosity
- (vi) Dark field and light field microscopy
- (vii) Salting in and salting out (2×7)
7. (i) Write the equation used to determine molecular weight of a macromolecule using its determined sedimentation coefficient. What are the various factors that affect the sedimentation coefficient ?
- (ii) Represent schematically an ultracentrifuge.
- (iii) Differentiate a clinical centrifuge from a high speed one in terms of design and applications. (5,5,4)

8. Write short notes on :

(i) The three phases of evolution

(ii) Biological effects of radiation

(iii) Geiger-Muller counters

(5,5,4)