

B.Sc. Semester - 6 (NEP-2020) Examination

March/April-2026

CHE: Higher Chemistry-305 (Major-15)

Time: 2:00 Hours

Marks: 50

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate marks.

Que.1 Answer any two out of three in details. (10)

1. Give the pigeon hole diagram for P^2 case and decide the spectral term for ground state
2. Give the term symbol for following ions and complex.
(a) V^{+3} (b) Cu^{+2} (c) Ni^{+2} (d) $K_4[Fe(CN)_6]$
3. Calculate number of microstate for following term
(1) 2D (2) 3F (3) 1G (4) 1D

Que.2 Answer any two out of three in details. (10)

1. Draw a well labelled diagram of Tetragonal Distortion in octahedral complex and discuss in detail
2. Discuss Hole formalism and splitting of F term with Orgel diagram.
3. Write a short note on selection rules for d-d transition.

Que.3 Answer any two out of three in details. (10)

1. pH of fluoro acetic acid solution is 2.82 and $K_a = 2.6 \times 10^{-3} M$ than find out the molarity of this solution.
2. List the types of potentiometric titration and explain any one in brief.
3. How the dissociation constant of weak acid can be calculated using pH metry.

Que.4 Answer any two out of three in details. (10)

1. Explain terms: conductance, specific conductance, equivalent conductance, molar conductance and cell constant.
2. Explain titration curve of sodium acetate with hydrochloric acid by conductometry.
3. Calculate the equivalent conductance of acetic acid by using following data
 $\Lambda^\circ_{CH_3COONa} = 91.0 \text{ Ohm}^{-1}m^2(eq)^{-1}$, $\Lambda^\circ_{HCl} = 426.0 \text{ Ohm}^{-1}m^2(eq)^{-1}$,
 $\Lambda^\circ_{NaCl} = 126.0 \text{ Ohm}^{-1}m^2(eq)^{-1}$

Que.5 Answer any two out of three in details. (10)

1. Explain Russell Saunder's coupling
2. List out the types of electronic transition observed in the metal complexes. Discuss any two of them in detail.
3. Find out the mass of acetic acid in 1 liter solution and pH if degree of dissociation of acetic acid is 1% and $K_a = 1.8 \times 10^{-5} M$
4. Explain conductometric titration curve of mixture of strong acid and weak acid with strong base.
