Reg. No. | | | | | | | | | |

BSCCHC 281/BSCCHC 253

Choice Based Credit System/Credit Based IV Semester B.Sc. Degree Examination, September 2022
(2019 – 20 and Earlier Batches/2020 – 21 and Earlier Batches)
Paper – IV : CHEMISTRY

Time : 3 Hours Max. Marks : 80

Instructions : *1) A single booklet containing **40** pages will be issued. **No** additional sheets will be **issued**. Write the question number and sub-division **clearly**.*

*2) Write the equations and diagrams **wherever** necessary.*

*3) Answer Part – **A** in the **first two** pages of the answer book.*

*4) Scientific calculators are **allowed**.*

PART – A

1. Answer **any ten** of the following : **(2×10=20)**

a) What is linkage isomerism ? Give an example.

b) What is spectrochemical series ?

c) Square planar complexes do not show optical isomerism. Give reason.

d) Pressure has no effect on the equilibrium, $2HI_{(g)} \rightleftharpoons H_{2(g)} + I_{2(g)}$. Give reason.

e) What is freezing mixture ? Give an example.

f) Write BET equation for multilayer adsorption and explain the terms.

g) Define normality of a solution.

h) CO_2 has zero dipole moment. Why ?

i) What is critical angle ?

j) What is an active methylene compound ?

k) What is S_N2 reaction ? Give an example.

l) Toluene can be more easily nitrated than benzene. Give reason.

P.T.O.

PART – B

Answer **any four** of the following, choosing **one full** question from **each** Unit.

(15×4=60)

Unit – I

2. a) Explain any two types of structural isomerism exhibited by complex compounds. **4**

   b) Explain geometrical isomerism in complexes with co-ordination number four. **4**

   c) i) Explain the crystal field splitting of d-orbitals in octahedral complexes. **4**

   ii) What are the important limitations of valence bond theory ? **3**

3. a) Write any three differences between valence bond theory and crystal field theory. **3**

   b) Explain the factors affecting crystal field stabilization energy. **5**

   c) i) Explain optical isomerism in complexes with co-ordination number four. **4**

   ii) What are ambidentate ligands ? Give two examples. **3**

Unit – II

4. a) Give the thermodynamic derivation of law of mass action. **4**

   b) Derive Van't - Hoff's equation. **4**

   c) i) Explain the phase diagram of water system. **4**

   ii) Give the differences between adsorption and absorption. **3**

5. a) Explain 'True equilibrium' and 'Meta stable equilibrium' with one example each. **3**

   b) Explain Freundlich adsorption isotherm. What are its limitations ? **5**

   c) i) Explain the phase diagram of Lead - Silver system. **4**

   ii) Mention any three applications of Clausius - Clapeyron equation. **3**

Unit – III

6. a) Explain the determination of molecular mass of a solute by Walker-Lumsden method. **4**

   b) Describe how dipole moment measured by temperature method. **4**

   c) i) Predict the structures of BF_3 and NH_3 using dipole moment values. **4**

   ii) Give any three applications of refractometry. **3**

7. a) Show that relative lowering of vapour pressure is a colligative property. **3**

   b) Derive the thermodynamic relation between elevation in boiling point and molecular mass of a solute. **5**

   c) i) Discuss the differences among diamagnetic, paramagnetic and ferromagnetic substances. Give an example for each type. **4**

   ii) Define molar refraction. What is the effect of temperature on refractive index of the medium ? **3**

Unit – IV

8. a) How are the following synthesized from reactive methylene compounds ? **4**

   i) Antipyrine ii) 4-Methyl uracil.

   b) Explain benzyne mechanism of aromatic nucleophilic substitution. **4**

   c) i) Discuss the mechanism of S_N1 reaction. **4**

   ii) What is Saytzeff's rule ? Explain with a suitable example. **3**

9. a) Give the comparison of S_N2 and S_N1 reactions. **3**

   b) What is orienting influence of substituents ? Explain the orienting influence of meta directing substituents with suitable example. **5**

   c) i) Describe Keto-enol tautomerism in ethyl acetoacetate. Write the supporting evidences in each case. **4**

   ii) Explain the mechanism of E1 reaction. **3**
