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

# BSCCHC 284

## Choice Based Credit System IV Semester B.Sc. Degree Examination, September 2022
## (2021 – 2022 Batch Onwards)
## 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 question number and subdivision **clearly**.*
*2) Write equations and diagrams **wherever** necessary.*
*3) Answer Part – **A** in the **first two** pages of answer book.*
*4) Scientific calculators are **allowed**.*

PART – A

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

a) What is reverse osmosis ?

b) State Raoult's law.

c) Write SI equivalent of 1 Debye.

d) What are chelating ligands ?

e) Write the IUPAC name of $K_3[Fe(CN)_5(NO)]$.

f) What is crystal field stabilization energy ?

g) How do you convert benzyl phenyl ketone into benzil ?

h) Give one synthetic application of diazomethane.

i) Write one method of preparation of ester.

j) State Le-Chatelier's principle.

k) State Gibb's phase rule.

l) Define ionic yield.

PART – B

Answer **any four** of the following questions, choosing **one full** question from **each** Unit. **(15×4=60)**

## Unit – I

2. a) Explain the determination of molecular mass of a solute by Beckmann's method. **4**

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

   c) i) Explain the determination of osmotic pressure by Berkeley-Hartley method. **4**

   ii) The refractive index of acetic acid at 20°C is 1.3698. If density at the given temperature is 1.049 g/cm$^3$. Calculate the molar fraction. **3**

3. a) A solution containing 5.98 g of a solute in 50 g of a solute in 50 g of diethyl ether has a vapour pressure equal to $5.464 \times 10^4$ Nm$^{-2}$ at 300 K. If the vapour pressure of diethyl ether at the same temperature is $5.893 \times 10^4$ Nm$^{-2}$, calculate the molecular mass of the solute. **3**

   b) Derive the relationship between elevation in boiling point and molecular mass of the non-volatile solute. **5**

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

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

## Unit – II

4. a) Write any four postulates of crystal field theory. **4**

   b) Explain any four factors that affect the crystal field splitting energy. **4**

   c) i) On the basis of valence bond theory, explain hybridization, geometrical shape and magnetic property of $[Ni(CN)_4]^{2-}$. **4**

   ii) Write all possible geometrical and optical isomers of $[CoCl_2(en)(NH_3)_2]^+$. **3**

5. a) What are ionization and linkage isomerism ? Give one example each. **3**

   b) Discuss the crystal field splitting of d-orbitals in octahedral complexes. **5**

   c) i) Explain geometrical isomerism in complex compounds with coordination number four. **4**

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

## Unit – III

6. a) Give the mechanism of Wolff-Kishner reduction. **4**

   b) What is Baeyer-Villiger oxidation ? Give the mechanism. **4**

   c) i) Give the mechanism of Arndt-Eistert reaction. **4**

      ii) How succinic acid is synthesized ? **3**

7. a) Explain keto-enol tautomerism in ethyl acetoacetate. **3**

   b) What is HVZ reaction ? Explain the mechanism. **5**

   c) i) Explain the mechanism of allylic bromination of alkenes using N-bromosuccinimide. **4**

      ii) Give the mechanism of Dakin reaction. **3**

## Unit – IV

8. a) Derive law of mass action thermodynamically. **4**

   b) Discuss the phase diagram of water system. **4**

   c) i) Explain the radiolysis of
      i) methane
      ii) formic acid **4**

      ii) Write note on freezing mixture. **3**

9. a) Explain Pattinson's process of desilverisation of lead. **3**

   b) Discuss the phase diagram of sulphur system. **5**

   c) i) Derive van't Hoff equation. **4**

      ii) Explain the use of radioisotope in medicine. **3**

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