DCA-4

Seat No. _____

B. Sc. (Sem. II) (CBCS) Examination

July - 2022

C-201 : Chemistry Theory

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) This question paper contains five questions.
(2) All questions are compulsory; all questions carry 14 marks each.

1 (a) Answer the following in short (each one mark) **4**

(1) Which type of defect is observed in AgBr?

(2) Write Max-Born Equation.

(3) Give any one example of Bidentate ligand.

(4) Give structure of $[Cu(en)_2]^{+2}$ complex.

(b) Answer the following : (any one) **2**

(1) Explain Schottky defect in short.

(2) Explain with example: Chelating Ligand.

(c) Answer the following : (any **one**) **3**

(1) Derive r^+/r^- in Face centered cubic lattice.

(2) Explain with example: Ionization isomerism.

(d) Answer the following in detail (Any one) **5**

(1) Write short note on, "Born-Haber cycle".

(2) Explain Geometrical isomerism in 4-coordinate complex compounds.

2 (a) Answer the following in short : (each one mark) **4**

(1) Write electronic configuration of Manganese.

(2) Write Fenten's reagent.

(3) Give example of Amorphous solid.

(4) Define : Unit Cell.

(b) Answer the following : (any one) **2**

(1) Write the oxidation states of chromium and cupper.

(2) Draw the structure of Body centred cubic.

(c) Answer the following : (any **one**) **3**

(1) Explain law of symmetry.

(2) Calculate spin only magnetic momentum of $\left[Ni\,Cl_4\right]^{2-}$.

(d) Answer the following in detail : (any **one**) **5**

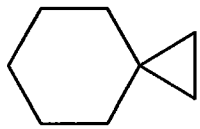
(1) Derive Bragg's equation (with figure).

(2) Discuss any three physical properties of first transition series.

3 (a) Answer the following in short (each one mark) **4**

(1) Give structure of Bicyclo [3, 2, 0] heptane.

(2) Give IUPAC name of following compound.



(3) Complete the reaction:

Cyclopropane + $Br_2 \rightarrow$ _____

(4) Give structure of propylcyclohexane.

(b) Answer the following : (any **one**) **2**

(1) Give structure of following name

(a) 5-methylcyclopentane-l, 3-diene

(b) Bicyclo [2, 2, 1] heptane

(2) Give any two addition reaction of cyclobutane.

(c) Answer the following : (Any **one**) **3**

(1) Write only structure of Newman projection and Sawhorse conformation of Eclipsed and Staggered ethane.

(2) Give reaction of Diels-Alder method and Wurtz's method for preparation of cycloalkane.

(d) Answer the following in detail : (any one) **5**

(1) Discuss conformation of Ethane with diagram.

(2) Write short note on, "Baeyer's Strain Theory".

4 (a) Answer the following in short : (each one mark) **4**

(1) Write structure of Pheuanthrene.

(2) Give structure of Acetophenone.

(3) Give Name of Anti-aromatic compound.

(4) Give name of product of following reaction

Nitrobenzene + Con. $HNO_3 \xrightarrow[100°C]{H_2SO_4}$

(b) Answer the following : (any **one**) **2**

(1) Complete the following reactions and give name of product.

Benzene reacts with acetyl chloride in presence of Lewis acid $\rightarrow$?

(2) Write only reaction: Nitration of benzene.

(c) Answer the following : (any one) **3**

(1) Explain sulphonation of benzene with mechanism

(2) Write note on, "Halogenation of Benzene".

(d) Answer the following in detail : (Any one) **5**

(1) Explain Huckel's rule for aromaticity with examples.

(2) Discuss effect of deactivating substituents on reactivity and orientation.

5 (a) Answer the following in short (each one mark) **4**

(1) Write any one cation of III-A group.

(2) Give example of weak electrolyte.

(3) Give example of acidic buffer solution.

(4) If the pH of the acidic solution is 3.7 at 25°C, calculate pOH of the solution.

(b) Answer the following : (Any one) **2**

(1) Explain solubility product with AgCl.

(2) Explain Buffer capacity.

(c) Answer the following : (Any one) **3**

(1) Explain common ion effect with example of NH_4OH and NH_4Cl.

(2) Calculate the pH of the mixture containing 0.1M acetic acid and 0.3M sodium acetate solutions $(pKa = 4.8)$.

(d) Answer the following in detail : (any one) **5**

(1) Derive the equations for hydrolysis constant (K_h), degree of hydrolysis (x) and pH of the salt solution of NH_4Cl.

(2) What is Buffer solution? Derive equation for pH of basic buffer solution.
