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

BSCCHCN 201

Second Semester B.Sc. Degree Examination, September 2022
(NEP 2020) (2021 – 22 Batch Onwards)
CHEMISTRY (DSCC)
Inorganic and Physical Chemistry – I (DSC-2)

Time : 2 Hours Max. Marks : 60

***Instructions** : 1) A **single** booklet containing **40** pages will be issued. No additional sheets will be **issued**.*
*2) Write the question number and sub-divisions **clearly**.*
*3) Write equations and diagrams **wherever** necessary.*
*4) Answer Part – **A** in **first two** pages of the answer book.*
*5) Scientific calculators are **allowed**.*

PART – A

Answer **any six** of the following. **(6×2=12)**

1. a) Define orthogonality.

   b) State Pauli's exclusion principle.

   c) Define Modern Periodic law.

   d) Why $HClO_3$ is stronger acid than HClO ?

   e) What is critical phenomenon ?

   f) Define parachor.

   g) State Nernst distribution law.

   h) Define the law of rationality of indices.

P.T.O.

PART – B

Answer **any four** questions, selecting **one** question from **each** Unit. **Each** question carries **12** marks. **(4×12=48)**

Unit – I

2. a) Calculate effective nuclear charge felt by the last d electron of Mn (At.No. 25). **3**

   b) Explain the normalization and orthogonality of a wave function. **4**

   c) Explain Bohr's theory of atom. **5**

3. a) Derive de Broglie equation. **3**

   b) Discuss the radial distribution function for 1s and 2s orbitals. **4**

   c) Discuss Aufbau principle and give its limitations. **5**

Unit – II

4. a) Explain the structure of P_4O_6. **3**

   b) Discuss any two factors responsible for variation of electronegativity. **4**

   c) Explain the structure and bonding in diborane. **5**

5. a) Discuss Mulliken-Jaffe's electronegativity scale. **3**

   b) Explain the preparation and structure of aluminium carbide. **4**

   c) What do you mean by Ionisation enthalpy ? How does it change down the group and across the period ? **5**

Unit – III

6. a) Calculate RMS, average and most probable velocities of carbon dioxide at 25°C. **3**

   b) Give an account of Maxwell's distribution of molecular velocities of gases. **4**

   c) Explain the method of determination of surface tension of a liquid. **5**

7. a) Describe the effect of temperature and solute on surface tension. **3**

   b) Describe working of Abbe's refractometer. **4**

   c) Derive expression for critical constants of a gas using van der Waal's equation of state. **5**

Unit – IV

8. a) Discuss the applications of liquid crystals. **3**

   b) Discuss the modification in Nernst distribution law when association of solute occurs in one of the solvents. **4**

   c) Derive Bragg's equation $n\lambda = 2d \sin\theta$ for a crystalline solid. **5**

9. a) Write the differences between solid, liquid crystal and liquid. **3**

   b) Derive Nernst distribution law thermodynamically. **4**

   c) What are Miller indices ? Explain the procedure for determining the Miller indices for a plane. **5**
