NA—20—2023

FACULTY OF SCIENCE AND TECHNOLOGY

B.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(New Pattern)

CHEMISTRY

Paper–IV

(Physical and Inorganic Chemistry)

(Thursday, 7-12-2023)   **Time : 10.00 a.m. to 12.00 noon**

Time—2 Hours   *Maximum Marks—40*

N.B. :—   (*i*)   Attempt *all* questions.

      (*ii*)   Use of logarithmic table is allowed.

1. Solve any *three* of the following :   3×5=15

   (*i*)   How will you determine lattice energy using Born-Haber cycle ?

   (*ii*)   Explain free electron theory of metallic bond.

   (*iii*)   (*a*)   How are sigma and pi-bond formed ? Explain with the help of valence bond theory.

       (*b*)   Explain unique properties of water based on hydrogen bond.

   (*iv*)   Explain geometry and bond angle of CH_4, NH_3 and H_2O molecules with the helf VSEPR theory.

   (*v*)   Explain molecular orbital diagram of Ne_2 molecule. Calculate its bond order.

                      P.T.O.

2. Solve any *three* of the following : 15

   (*i*) State and explain autocatalysis with example.

   (*ii*) What is emulsion ? Explain the types of emulsion.

   (*iii*) Explain Pauli's exclusion principle. Give any *two* limitations of Bohr's theory.

   (*iv*) Give an account of various intermolecular forces in liquids.

   (*v*) Explain :

   (*a*) Hund's rule of maximum multiplicity.

   (*b*) Promoters.

3. Solve any *two* of the following : 10

   (*i*) Explain Homogeneous and Heterogeneous catalysis with example.

   (*ii*) Give general applications of colloids.

   (*iii*) In the determination of surface tension of liquid by drop number method, water gives 35 drops and liquid gives 69 drops for the same volume. The densities of water and liquid are 0.997 g/cm^3 and 0.866 g/cm^3 respectively. If surface tension of water 72 dyne/cm. Calculate surface tension of liquid.

   (*iv*) Explain :

   (*a*) Principal Quantum Number (n)

   (*b*) Magnetic Quantum Number (m).