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**SA—20—2025**

**FACULTY OF SCIENCE**

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

**MARCH/APRIL, 2025**

**CHEMISTRY**

**Paper—IV**

**(Physical and Inorganic Chemistry)**

**(Saturday, 12-4-2025)**

**Time : 10.00 a.m. to 12.00 noon**

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*Time—2 Hours*

*Maximum Marks—40*

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

(ii) Use of logarithmic table and calculator is allowed.

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

(a) Define metallic bond. Explain the free electron theory of metallic bond.

(b) Write a short note on hydrogen bond.

(c) Define van der Waals bond. Explain the types of van der Waals forces.

(d) Give the postulates of VSEPR theory.

(e) Define hybridization. Explain the types of  $sp^3d^3$  hybridization with example IF.

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

- (a) Discuss homogeneous and heterogeneous catalysis with examples.
- (b) What are gels ? Give preparation and properties of gels.
- (c) Derive an expression for energy difference of an electron in the terms of wave number.
- (d) What is Parachor ? Describe the use of parachor in determining the molecular structure.
- (e) (i) State the postulates of Bohr's atomic theory.  
(ii) Write a note on catalytic promoters.

3. Solve any *two* of the following : 2×5=10

- (a) What is acid-base catalysis ? Explain with example.
- (b) What is gold number ? Give the classification of gels.
- (c) In the determination of surface tension of a liquid by the drop number method, is given 66 drops, while water give 25 drops for the same volume. The densities of liquid and water are 0.996 and 0.800 g/cm<sup>3</sup> respectively. Calculate the surface tension of the liquid if water is having surface tension 72.0 dyne/cm.
- (d) (i) State and explain Pauli's exclusion principle.  
(ii) In hydrogen atom the energy of the electron in first Bohr's orbit is  $-2.179 \times 10^{-11}$  erg/atom. What is the energy required for the excitation of second Bohr's orbit ?