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Total No. of Printed Pages: 1

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**B.Sc. (Non-medical) (Semester – 2<sup>nd</sup>)**

**PHYSICAL CHEMISTRY - I**

**Subject Code: BSNMS1-203**

**Paper ID: [22131409]**

**Time: 03 Hours**

**Maximum Marks: 60**

**Instruction for candidates:**

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

**Section – A**

**(2 marks each)**

Q1. Attempt the following:

- a. What do you understand by Miller indices? Explain.
- b. Discuss the law of corresponding states.
- c. What do you mean by half-life of a reaction?
- d. What is compressibility factor?
- e. Write van der Waals equation describing all the terms.
- f. What do you understand by nematic and cholesteric phases?
- g. Write Bragg's law explaining all the terms involved.
- h. What do you understand by order and molecularity of a reaction?
- i. What are symmetry elements and symmetry operations?
- j. Define stoichiometric and non-stoichiometric defects.

**Section – B**

**(5 marks each)**

- Q2. Calculate root mean square velocity and average velocity for hydrogen gas at 0 °C.
- Q3. Discuss Maxwell distribution of molecular velocities.
- Q4. Explain the differences between solid crystal and liquid crystal.
- Q5. State and explain the principle of corresponding states.
- Q6. Derive an expression for integrated rate equation for first order reaction.

**Section – C**

**(10 marks each)**

- Q7. Explain all postulates of kinetic theory of gases pointwise.
- Q8. The rate constant of a second order reaction is  $5.70 \times 10^{-5} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$  at 25°C and  $1.64 \times 10^{-4} \text{ dm}^3 \text{ mol}^{-1} \text{ s}^{-1}$  at 40°C. Calculate the activation energy and the Arrhenius pre-exponential factor.
- Q9. Explain collision theory and activated complex theory of bimolecular reactions in detail.