

B.Sc. (Non-Medical) Semester - (2nd)
PHYSICAL CHEMISTRY-I (CORE COURSE-V A)
Subject Code: BSNMS1203
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) A first order reaction is 50% completed in 1.26×10^{14} s. How much time would it take for 100% completion?
- b) For a reaction $A + B \rightarrow \text{Products}$, the rate law is
 $\text{Rate} = k [A][B]^{3/2}$
What is the order and molecularity of the reaction?
- c) What will be the effect of temperature on rate constant?
- d) Define the semi conductor.
- e) Define the terms Crystal Lattice and Unit cell.
- f) Write two postulates of kinetic theory of gases.
- g) Write van der Waals equation for n moles of a gas.
- h) Calculate the ratio of most probable speed and average speed of a gas.
- i) Give any two applications of liquid crystal.
- j) What is “thermography”.

Section – B

(5 marks each)

- Q2. Write the differences between order and molecularity of a reaction.
- Q3. Calculate the miller indices of a crystal plane which cut through crystal axes at
i). (2a, -3b, -3c) ii) (a/3, b, -c/2)
- Q4. Calculate the number of atoms in a simple cubic, FCC and BCC structures?
- Q5. The temperature of a gas is -50° C. To what temperature the gas should be heated so that the RMS speed is increased by 3 times?
- Q6. What are liquid crystals? Classify them.

Section – C

(10 marks each)

- Q7. (a) Determine the units of rate constant for first and second order reaction.
(b) Show that time required for the completion of 99% of the first order reaction is twice the 90% of completion of the reaction.
- Q8. (a) Derive the Bragg’s equation and show that $\lambda = d_{hkl} \sin\theta$. What is the physical significance of ‘n’ in the equation $n\lambda = 2d\sin\theta$?
(b) Describe properties of cholesteric liquid crystals.
- Q9. State and explain the principle of corresponding states. Derive an expression inter connecting critical pressure, critical volume and critical temperature.