B.Sc. CHEMISTRY
SECOND SEMESTER
PHYSICAL CHEMISTRY-I
BSC – 921 IDM$_N$
USE OMR FOR OBJECTIVE PART]

SET
A

Duration: 1:30 hrs.

Full Marks: 35

(**Objective**)

Time: 15 mins.

Marks: 10

Choose the correct answer from the following: *1X10=10*

1. Which of the following statements about gases is true?
    a. Gases have a definite shape
    b. Gases have high density.
    c. Gases can be easily compressed.
    d. Gases have low kinetic energy.

2. Which of the following substances is an example of a solid?
    a. Oxygen gas
    b. Ethanol liquid
    c. Ice
    d. Helium gas

3. The process of a substance changing from a solid state directly to a gaseous state is called
    a. Sublimation
    b. Condensation
    c. Evaporation
    d. Freezing

4. Which state of matter has the highest kinetic energy?
    a. Gas
    b. Liquid
    c. Solid
    d. Plasma

5. Which of the following statements about the gaseous state is true?
    a. Gases have weak intermolecular forces.
    b. Gases have a fixed shape.
    c. Gases cannot be compressed.
    d. Gases have low diffusion rates.

6. No process is possible in which the sole result is the absorption of heat from a reservoir and its complete conversion into work. This is the statement of and it is given by
    a. 1st law of thermodynamics and stated by Kelvin.
    b. 2nd law of thermodynamics and stated by Kelvin.
    c. 1st law of thermodynamics and stated by Nernst.
    d. 2nd law of thermodynamics and stated by Nernst.

7. Which law of thermodynamics is applicable to thermometer?
    a. Zeroth law of thermodynamics
    b. First law of thermodynamics
    c. Second law of thermodynamics
    d. All of the above

8. Which is not an extensive property
   a. mass
   b. volume
   c. energy
   d. Internal Energy

9. For adiabatic expansion of a gas, which is the correct option
   a. Decrease in the internal energy of the system
   b. Increase in the internal energy of the system
   c. No Change in internal energy
   d. None of the above

10. The unit of Specific heat Capacity is
    a. $J\ K^{-1}$.
    b. $JK^{-1}\ kg^{-1}$
    c. JK
    d. None of the above

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(Descriptive)

Time : 1 hr. 15 mins.   Marks : 25

[Answer question no. 1 & any two (2) from the rest]

1. a. How does the kinetic gas theory explain the behavior of   2+2+1
       gases?   =10

    b. Write the Zeroth law of Thermodynamics. Explain its
       Applications.

    c. Write about the closed system and isolated system.

2. a. What do you mean by critical temperature, critical pressure   5+5=10
       and critical volume of a gas? How we can determine these
       critical constants. Explain?

    b. What are the factors that affect the vapor pressure of a
       liquid? What will be the effect of temperature on viscosity
       and surface tension of a liquid? What are the SI unit of
       surface tension and viscosity coefficient?

3. a. What are the five elements of symmetry? Explain briefly.   5+5=10

    b. Discuss the concept of point groups and space groups in
       crystallography. What is Bragg's law? What are the lattice
       parameters in crystal structures, such as cubic and
       tetragonal?

[3]

4. a. What is a state function? Give examples.

   b. Match the following

(i) Adiabatic process	(i) No exchange of energy and matter
ii) Isolated system	(ii) No transfer of heat
(iii) Isothermal change	(iii) $p_{ext} = 0$
(iv)Free expansion	(iv) Constant temperature

   c. What is an adiabatic system? Explain.

   d. Write the statement of First Law of Thermodynamics. Explain with the help of mathematical relation.

   e. Derive the work done expression for a reversible isothermal expansion of a perfect gas.

   f. Calculate the change in internal energy for an isolated system at constant volume.

2+2+1+
1+2+2
=10

5. a. What are the major limitations of First law of thermodynamics?

   b. Write the definitions of Specific heat Capacity and Molar heat capacity? Write their S.I. units.

   c. Derive the relation, $C_P - C_V = R$

   d. Calculate the work done and the change in internal energy when 1 litre of ideal gas expands isothermally into vacuum until its total volume is 5 litre?

   e. Write the statement of third Law of thermodynamics. Explain.

   f. Write the difference between reversible and irreversible process?

2+2+2+
1+1+2
=10

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