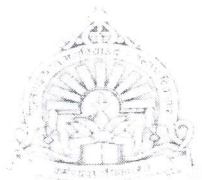


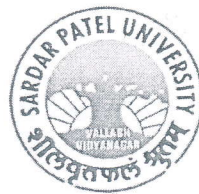
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A Charutar Vidya Mandal's Institutes
V. P. & R. P. T. P. SCIENCE COLLEGE,
(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
VALLABH VIDYANAGAR-388120

B. Sc. (SEMESTER – III) EXAMINATION 2025
US03MACHE02 – Physical Chemistry



07/10/2025, Tuesday
Time: 2:00 pm to 4:30 pm

Total Marks : 50

Note: Figures to the right indicate marks of the question.

Q.-1 Write the most appropriate answer from the following multiple-choice questions. (10)

- 1 The compressibility factor (Z) for an ideal gas is _____.
(a) 1.5 (b) 1.0 (c) 2.0 (d) ∞
- 2 The unit of van der Waal's constant 'a' is _____.
(a) $\text{atm dm}^6 \text{mol}^{-2}$ (b) $\text{atm dm}^6 \text{mol}^{-1}$ (c) $\text{atm dm}^3 \text{mol}^{-2}$ (d) none of these
- 3 For one mole of gas, the ideal gas equation _____.
(a) $PV=1/2RT$ (b) $PV=3/2RT$ (c) $PV=2/3RT$ (d) $PV=RT$
- 4 For exothermic reaction, ΔH is _____ while for the endothermic reaction it is _____.
(a) positive, negative (b) positive, positive (c) negative, negative (d) negative, positive
- 5 If the reaction is carried out at constant volume heat released or absorbed is equal to _____.
(a) ΔV (b) ΔP (c) ΔE (d) ΔH
- 6 Which of the following is not state function?
(a) enthalpy (b) heat (c) energy (d) potential energy
- 7 The ratio of number of moles of a constituent and the total number of moles present in a mixture is Called _____.
(a) mole fraction (b) mole fraction (c) mole fraction (d) mole fraction
- 8 At high altitudes the boiling point of water decreases because _____.
(a) atmospheric pressure is low (c) atmospheric pressure is high
(b) temperature is low (d) water is cold
- 9 The degree of dissociation $\alpha =$ _____.
(a) Λ_c / Λ_m (b) Λ^0 / Λ (c) Λ / Λ^0 (d) Λ_m / Λ_c
- 10 The unit of ionic mobility is _____.
(a) $\text{S m}^2 \text{eq}^{-1}$ (b) S m^{-1} (c) $\text{m}^2 \text{V}^{-1} \text{s}^{-1}$ (d) m s^{-1}

Q-2 Attempt the following.

(A) Define Critical temperature and Calculate the excluded volume per molecule. (05)

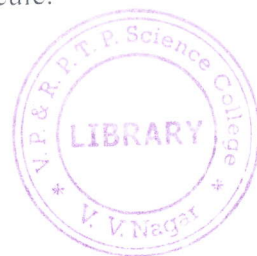
(B) State the main postulates of kinetic molecular theory of gases. (05)

OR

Q-2 Attempt the following.

(A) Discuss the experimental method for determination critical Volume. (05)

(B) Discuss the Van der Waal's equation at low and high pressure. (05)



Q-3 Attempt the following.

- (A) Define Heat Capacity. Establish the relation between C_p and C_v . (05)
 When 78 gm Benzene is burnt completely in oxygen to form liquid water and carbon dioxide gas -781kcal of heat is evolved at 25°C. Calculate the value of Internal energy of this reaction at constant volume. ($R = 1.99 \text{ cal/deg. Mol}$) (05)

OR

Q-3 Attempt the following.

- (A) Derive Kirchoff's equation. (05)
 (B) Show that work is the means to change the energy of the system. (05)

Q-4 Attempt the following.

- (A) Describe static method to measure lowering of vapor pressure and Landsberger method to measure elevation in boiling point. (05)
 (B) Derive the equation which relates depression in freezing point and molality. (05)

OR

Q-4 Attempt the following.

- (A) Derive the equation relating lowering of vapour pressure and concentration of non-volatile solute. (05)
 (B) An aqueous solution containing 0.25gm of a solute dissolved in 20gm of water froze at -0.42°C . Calculate the molar mass of the solute. Enthalpy of fusion of ice at 0°C is 6024.6J mole⁻¹ (05)

Q-5 Attempt the following.

- (A) What is ionic mobility? Derive an expression for the determination of ionic mobility's of ions in solution from the measurement of conductance at an applied voltage V . (05)
 (B) Derive an expression relating mean activity coefficient and dissociation constant of weak acid. (05)

OR

Q-5 Attempt the following.

- (A) Explain Van't Hoff Factor. Derive the relation between Van't Hoff Factor and degree of dissociation. (05)
 (B) What is electrolysis? Explain the electrolysis of HCl with electrode reaction. (05)

