(i) Printed Pages: 3 Roll No. .....

(ii) Questions : 9 Sub. Code : 0153

Exam. Code : 0002

B.A./B.Sc. (General) 2nd Semester

(2042)

CHEMISTRY

Paper : VII Physical Chemistry–B

(Same for B.Sc. Microbial & Food Tech.)

Time Allowed : Three Hours] **[Maximum Marks : 22**

Note :—(1) Attempt **five** questions in all, with **one** question each from Units I, II, III and IV and Question No. **9** is compulsory.

(2) Use of simple calculator is allowed.

UNIT–I

1. (a) Define, with examples, the following terms :

(i) Reversible process and Irreversible process

(ii) Extensive and Intensive variables. 2

(b) What is Joule-Thomson effect ? Derive an expression for Joule-Thomson coefficient for an ideal gas. 2

2. (a) Derive the following relation for an ideal gas undergoing adiabatic reversible changes :

$$TV^{\gamma - 1} = \text{constant}$$

Is this relation valid for adiabatic irreversible changes also ?

2

(b) Three moles of an ideal monatomic gas at 300 K expand isothermally and reversibly from 10 dm^3 to 30 dm^3. Calculate w, q, ΔU and ΔH. Would these quantities change if the gas were diatomic ? 2

UNIT–II

3. (a) Derive thermodynamically Kirchhoff equation giving the variation of heat of reaction with temperature. 2

(b) Calculate the enthalpy of hydration of anhydrous copper sulphate ($CuSO_4$) into hydrated copper sulphate ($CuSO_4.5H_2O$). Given that the enthalpies of solutions of anhydrous copper sulphate and hydrated copper sulphate are = -66.5 and $+11.7$ kJ mol^{-1} respectively. 2

4. (a) What do you understand by Heat of reaction at constant volume and that at constant pressure ? Derive the relationship between them. Under what conditions, the two are equal ? 2

(b) Explain, giving reasons that the Hess's law of constant heat summation is a direct consequence of the first law of thermodynamics. 2

UNIT—III

5. (a) Discuss the Origin of charge on Colloidal particles. How would you determine the charge on a colloid ? Describe briefly the electrical properties of colloids. 2

(b) What are emulsions ? What are their different types ? Give example of each type. 2

6. (a) What are protective colloids ? What is meant by gold number ? Discuss how a lyophilic colloid protects a lyophilic colloid. 2

(b) Distinguish between coagulation from peptisation. 2

UNIT–IV

7. (a) Derive a relationship between the depression in freezing point and the molecular weight of a non-volatile solute. 2

(b) Explain the following terms :

Molarity, Molality, Normality and Mole fraction. 2

8. (a) State and explain Van't Hoff theory of dilute solutions. 2

(b) A solution containing 6 g of a solute dissolved in 250 ml of water gave osmotic pressure of 4.5 atmosphere at 27°C. Calculate the boiling point of the solution. The molal elevation constant of water is 0.52 K kg mol^{-1}. 2

(Compulsory Question)

9. (a) Explain that q and w are not state functions but become state functions under certain conditions. 1

(b) Define 'Bond energy' for a diatomic molecule and for a polyatomic molecule. 1

(c) What are micelles ? Give an example of a micellar system. 1

(d) What are state functions ? 1

(e) What are isotonic solutions ? Explain. 1

(f) What is Van't Hoff's factor ? 1