Roll No. .....

(07/21-II)

5213

B. Sc. EXAMINATION

(For Batch 2011 & Onwards)

(Fourth Semester)

CHEMISTRY

CH-205

Physical Chemistry

Time : Three Hours *Maximum Marks : 26*

Note : Attempt *Five* questions in all. Q. No. 1 is compulsory. Attempt any *two* questions from each Section A and Section B. Each question of Section A and Section B carry equal marks.

1. Attempt all *six* Parts.

   (a) How can the efficiency of Carnot-engine be increased ?

   (b) Show for an irreversible process $\Delta S_{Syst} + \Delta S_{Surr} > 0$

   (c) Write complete expression for calculation of absolute entropy of a gas at T K

   (d) Why KCl is not-used in the salt-bridge of Cu-Ag cell ?

   (e) Why a voltmeter cannot be used to measure the EMF of a Cell ?

   (f) Derive the candidates under which the EMF of a Reversible cell becomes equal to standard EMF of cell ? 6×1=6

Section A

2. Derive an expression for the calculation of the entropy change of an ideal gas when the temp. changes from T_1 to T_2 and volume changes from V_1 to V_2. 5

3. Derive an expression for the molar entropy change of mixing of two ideal gases. 5

4. (a) Four moles of an ideal gas expend isothermally from 1 litre to 10 litres at 300 K. Calculate the change in free energy of the gas. ($R = 8.314\ JK^{-1}\ m^{-1}$). 2

(b) What is Residual Entropy ? How the concept of Residual Entropy Originated ? How is it calculated ? 3

Section B

5. (a) Write the cell reaction and calculate the standard EMF of the cell $Zn \mid Zn^{+2}(a=1) \| Cd^{+2}(a=1) \mid Cd$. Given $E^{\circ}_{Zn,Zn^{+2}} = 0.763\ V$ and $E^{\circ}_{Cd,Cd^{+2}} = 0.403\ V$. 3

(b) Describe the construction and working of the following electrodes : 2

(i) Hydrogen Electrode

(ii) Calomel electrode.

Section C

6. (a) What are Concentration Cells ? How are they classified into different types ? 2

(b) Explain the term activity, activity coefficient and standard state. 3

7. Derive Nernst equation for measuring EMF of a cell. 5