Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name: Physical Chemistry - II

Subject Code: 4SC06CHC3 **Branch: B.Sc.(Chemistry)**

Semester: 6 **Date: 11/05/2016** **Time : 02:30 To 05:30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Define Residual Entropy **(1)**
b) Write any one statement of third law of thermodynamics **(1)**
c) Define chemical equilibrium **(1)**
d) Define law of mass action **(1)**
e) Define rate law **(1)**
f) Write the unit of third order reaction **(1)**
g) Write two main postulates of collision theory **(1)**
h) What is psudo order reaction? **(1)**
i) Define isotones **(1)**
j) What is nuclear binding energy? **(1)**
k) Give two examples of isobars **(1)**
l) Define Osmosis **(1)**
m) What are colligative properties? **(1)**
n) Define reverse osmosis. **(1)**

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a. Explain Nernst heat theorem **(4)**
b. Determine absolute entropies of solid, liquid and gasses **(7)**
c. Calculate absolute entropy of the formation of CO_2 (g). Given standard entropies of CO_2(g), C(s) and O_2(g) are 213.6, 5.740 and 205.0 JK^{-1} respectively. **(3)**

Q-3 **Attempt all questions** **(14)**

a. Discuss Le Chateliers Principle **(7)**
b. Derive relation between K_p and K_c **(3)**
c. The equilibrium constant of a reaction doubles on raising the temperature from 25^oC to 35^oC. Calculate ΔH^o for the reaction. (R=8.314 $JK^{-1}mol^{-1}$) **(4)**

Q-4 **Attempt all questions** **(14)**

a. Explain methods to determine the order of reaction **(7)**

b. Calculate half-life for first, second and third order reactions **(7)**

Q-5 **Attempt all questions** **(14)**

a. The rate constant of second order reaction at 27^oC and 37^oC are 4.5×10^{-5} and 9.0×10^{-5} sec^{-2}. Evaluate the activation energy and pre exponential factor **(5)**

b. The optical rotation of sucrose in 0.9 N HCl at various time intervals is given below. Show that inversion of sucrose is first order reaction. **(5)**

Time (min)	0	7.18	18	24.1	∞
Rotation (degree)	+24.09	+21.4	+17.7	+15	-10.74

c. The half-life period of radon is 3.825 days. Calculate the activity of radon. (Atomic weight of radon =222) **(4)**

Q-6 **Attempt all questions** **(14)**

a. Discuss the applications of radio isotopes. **(5)**

b. Compare the workings of Geiger-Muller counter and Scintillation Counter. **(5)**

c. Give the differences between Nuclear fission and Nuclear fusion **(4)**

Q-7 **Attempt all questions** **(14)**

a. Discuss different methods to determine osmotic pressure **(7)**

b. Explain lowering in vapor pressure. Determine molecular weight from Vapor pressure lowering. **(4)**

c. The boiling point of solution containing 0.20 g of a substance X in 20 g of ether is 0.17 K higher than that of pure ether. Calculate the molecular mass of X. boiling point constant of ether is 2.16 K **(3)**

Q-8 **Attempt all questions** **(14)**

a. Derive $S=klnW$ **(5)**

b. Explain types of radioactive decay **(4)**

c. Give thermodynamic derivation of law of chemical equilibrium **(5)**