Time: 30 min

## Ch\#7 : Equilibrium -01

## Instructions:

## 1. All questions are compulsory.

2. Please give the explanation for the answer where applicable.

Q1 - (a) Write expression showing relationship between Kp and KCfor following reaction

$$
2 \mathrm{NO}(\mathrm{~g})+\mathrm{Cl}_{2}(\mathrm{~g}) \rightleftharpoons 2 \mathrm{NOCl}(\mathrm{~g})
$$

(b) Define conjugate acid and base with an example.
(5 Marks)

Q2 -(i) Define the term 'pH of solution'.
(ii) The hydrogen ion concentration of a solution is $10-4$. Calculate the pH of solution.
(2 Marks)

Q3 - At equilibrium, the concentrations of $\mathrm{N}_{2}=0.0032 \mathrm{M}, \mathrm{O}_{2}=0.0043 \mathrm{M}$ and $\mathrm{NO}=0.0026 \mathrm{M}$ in a sealed vessel at 800 K . What will be Kc for the reartion?

$$
\mathrm{N}_{2}(\mathrm{~g})+\mathrm{O}_{2}(\mathrm{~g})=2 \mathrm{NO}(\mathrm{~g})
$$

(2 Marks)
Q4 - For the equilibrium, $2 \mathrm{NOCl}(\mathrm{g}) \rightleftharpoons 2 \mathrm{NO}(\mathrm{g})+\mathrm{Cl}_{2}(\mathrm{~g})$

The value of equilibrium constant, Kc is $4.30 \times 10-6$ at 1069 K . calculate the Kp for the reaction at this temperature?

Q5 -Hydrolysis of sucrose gives,
Sucrose + water $\rightleftharpoons$ Glucose + Fructose
Equilibrium constant, Kc for the reaction is $3 \times 1011$ at 300 K . Calculate Ga a 300 K

Q6 - State Ostwald's dilution law.

Q7 -The pKa of acetic acid and pKb of ammonium hydroxide are 4.82 and 4.72. Calculate the pH of ammonium acetate solution?

Q8 - Calculate the solubility of $A X$ in pure water. The solubility product of $A X$ is $2.5 \times 10^{-20}$.

