PHYSICAL CHEMISTRY - II
PAPER - III

(Common with B.Sc., B.Sc. (Biotech.) and B.Sc. Industrial Microbiology - Part - III)

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *five* questions in all. Select at least *one* question each from Seciton A, B, and C carrying 15 marks each, while Q. no. 9 of section D is compulsory.

Section : A

1. (a) State Ist law of thermodynamics. Give its limitations.
   (b) Define Joule-Thomson effect and Inversion temperature.
   (c) For reversible adiabatic expansion oa an ideal gas, derive the relationship $PV\gamma$ = Consts. 5×3
2. (a) Show that for irreversible process $\Delta S_{system} + \Delta S_{surroundings} \geq 0$.
   (b) Discuss entropy as a criterion for spontaneity and equilibrium.
   (c) What is Clausius inequality ? 5×3

Section : B

3. (a) Derive the reletionship between K_p and K_C.
   (b) "Chemiocal equilibrium is dynamic in nature". Comment.
   (c) What are Reversible and Irreversible processes ? Give examples. 5×3
4. (a) Why A and G are called work functions.
   (b) What is the concept of Residual entropy ? How it can be calculated ?
   (c) Show that $\left[\frac{\partial}{\partial T}(\Delta G/T)\right]_p = \frac{-\Delta H}{T^2}$. 5×3
5. (a) Discuss Phase Rule by explaining the components and phases.
   (b) Write a note on Freezing mixtures.
   (c) Draw phase diagram for H_2O and explain it also. 5×3

Section : C

6. Discuss the following :
   (a) Electrophoretic effect.
   (b) Transport number. 7½×2
7. (a) Discuss the working of Calomel electrode.
   (b) What are Concentration cells ? Give examples.
   (c) Define EMF of a cell. How is it related to free energy ? 5×3
8. (a) What are Buffer solutions ? Explain buffer action of these solutions.
   (b) How corrosion can be prevented ?
   (c) What is Salt bridge ? Give its working in a cell. 5×3

Section : D
(Compulsory Quesiton)

9. Write short answers of the following :
   (a) Define Nernst's Distribution law.
   (b) How specific conduction varies with dilution ?
   (c) What is Law of mass action ?
   (d) Which will have higher entropy – Dry ice – 78°C or CO_2 at 0°C.
   (e) Define Homogeneous systems.
   (f) What is Triple point ?
   (g) What are Ideal and Non-ideal solutions ?
   (h) "Distribution law is applibcable only if the solvents are immiscibel". Given statement is true

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