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**BAM/A-20**          **555**

CHEMISTRY

(Physical Chemistry)

Time : Three Hours]          [Maximum Marks : 30

**Note :** Attempt *five* questions in all selecting *one* question from each section. All questions carry equal marks.

## SECTION–I

**1.** (a) Write the different statements of 2nd law of thermodynamics.          3

   (b) Calculate the maximum efficiency of steam engine operating between 110° and 25°C. What would be the efficiency of the engine if the boiler temperature is raised to 140°C, the temperature of the sink remains same ?          3

**2.** (a) Write the general expression for entropy of gas by Third law of thermodynamics.          3

   (b) Write a note on Residual entropy.          3

## SECTION–II

**3.** (a) Write the statement of Law of mass action for reversible chemical reaction, and also write equilibrium constant for the reaction in terms of concentration and convert it in terms of pressure.          4

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(b) Water boils at 373K at one atmospheric pressure. At what temperature will it boil when atmospheric pressure becomes 528 mm of Hg ?                                   2

**4.** (a) Write a note on Langmuir absorption isotherm.          3

(b) Write the applications of BET equation.                    3

## SECTION–III

**5.** (a) Write distribution law for a solute in two immiscible solvents if solute undergoes associated with itself in one of the solvents, with suitable example.          3

(b) Calculate the equilibrium constant of Potassium tri-iodide complex.                                              3

**6.** (a) Define Triple point, Congruent melting point and Eutectic point.                                             3

(b) Write a note on Patinson's process for desilverisation of lead.                                                 3

## SECTION–IV

**7.** (a) Write a note on Relaxation effect.                      2

(b) A base has a dissociation constant equal to $1.8 \times 10^{-5}$ at 298K. Calculate its degree of dissociation at a concentraction of 0.1M at the same temperature.      4

**8.** (a) Write a note on Debye-Huckal Onsagar equation.     3

(b) Explain the conductometric titration graph of the following :

    (i)   HCl *vs.* $NH_4OH$.

    (ii)  $AgNO_3$ *vs.* KCl.        3

## SECTION–V

**9.**  (a)  Write a note on Redox electrodes.      2

    (b)  Calculate the EMF of a Zinc-Silver cell at 30°C when activity of $Zn^{2+}$ ions is 0.5 and the activity of $Ag^+$ ions is 10.

       Standard reduction potentials at 30°C are

      (i)   $Ag^+$, Ag electrode = 080 volt.

      (ii)  $Zn^{2+}$, Zn electrode = –0.76 volt.    4

**10.**  (a)  Derive an expression for $E_{cell}$ of Concentration cell without transference.      3

    (b)  Explain potentiometric titration of Mohr's salt against $KMnO_4$ with rough sketch.      3

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