[Time: 1hr] **[Marks:25]**

Please check whether you have got the right question paper

N.B.: 1. All questions are compulsory.
2. Figure to the right indicates full marks.
3. Use of non – programmable scientific calculator is allowed.

Useful constants

$c = 2.998 \times 10^{8}$ m.s^{-1} $e = 1.602 \times 10^{-19}$ C

$R = 8.314$ J.K^{-1}mol^{-1} $k = 1.3811 \times 10\text{-}23$ J.K^{-1}

$= 2.0$ cal.K^{-1} mol^{-1}

$h = 6.626 \times 10^{-34}$ Js $1J = 6.24 \times 10^{18}$ eV

$m_e = 9.110 \times 10^{-31}$ kg $1eV = 8.06 \times 10^{3}$ cm^{-1}

$NA = 6.022 \times 10^{23}$ mol^{-1} 1 amu $= 1.66 \times 10^{-27}$ kg

Atomic mass of H = 1, C = 12, N = 14, O = 16, S = 32, Cl = 35.5

1. A) Attempt ***any two*** of the following:

i) Explain the Rice-Ramsperger-Kassel-Marcus theory. 04

ii) Show that the rate of polymerization reaction is proportional to square root of its initial concentration of the monomer. 04

iii) The rate of formation of C in the reaction, $2A + B \rightarrow 2C + 3D$ is $5 mol L^{-1}s^{-1}$. State the rate of reaction and the rates of formation or consumption of A, B and D. 04

iv) Explain the formation and decomposition of phosgene. 04

2. A) Attempt ***any two*** of the following:

i) a) Explain the Electrophoretic effect for the conductance of strong electrolytes. 02

b) Calculate the mean ionic activity coefficient of 0.05m $Al_2(SO_4)_3$ in aqueous solution at 298K. (Given: A = 0.509 at 298 K) 02

ii) With the help of diagram explain construction and working of Phosphoric acid fuel cell. 04

iii) Calculate the resting membrane potential for the following: 04

Ion Species	Intracellular concentration in mM	Extracellular concentration in mM
Ca^{+2}	150	5
Cl^{-}	0.002	12

(Given that $\frac{2.303RT}{F}$ at $298K = 61$)

iv) Explain Debye-Falkenhagen effect and Wein effect for the conductance of strong electrolytes. 04

3. A) Attempt ***any three*** of the following:

i) Explain Consecutive reaction with two examples. 03

ii) Explain three explosion limits of non – stationary chain reaction. 03

iii) Discuss the gas phase combustion reaction between H_2 and O_2. 03

iv) Write a note on the electrochemical enzyme – catalysed oxidation of Styrene. 03

v) Write the Debye-Huckel-Onsager equation and explain its validity for aqueous solutions. 03

vi) Draw well labelled diagram, one advantage and one application of Solid – Oxide fuel cell. 03

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