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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec 2021

Course: Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional group Organic Chemistry II
Semester: III
Program: B.Sc. GE (Mathematics & Geology) **Time 03 hrs.**
Course Code: CHEM 1009G **Max. Marks: 100**

SECTION A
(Scan and upload)

S. No.		Marks	CO
Q 1a	A Zn rod is placed in 0.1M solution of $ZnSO_4$ at 25˚C. Assuming that the salt is dissociated to95% at this dilution, calculate the potential of the electrode at this temperature. Given; $E^{\circ}_{(Zn+2/Zn)} = -0.76V$.	**2**	
b	Calculate EMF of the cell in which the reaction is, $Mg(s) + 2Ag^{+}(aq) \rightarrow Mg^{+2}(aq) + 2Ag(s)$; Given; $[Mg^{+2}] = 0.130M$ and $[Ag^{+}] = 1.0x10^{-4}M$ & $E^{\circ}_{Ag+/Ag} = 0.80V$ and $E^{\circ}_{Mg+2/Mg} = -2.37V$.	**2**	**CO1**
Q 2 a	Discuss the Kohlrausch law with their findings.	**2**	
b	The specific conductance of water is $7.6x10^{-2}Sm^{-1}$ and the specific conductance of 0.1M aqueous solution of KCl is $1.1639Sm^{-1}$. A cell has a resistance of 33.20Ω when filled with 0.1M KCl solution and 300Ω when filled with 0.1M CH_3COOH solution. Calculate the molar conductance of acetic acid.	**2**	**CO1**
Q 3 a	The equivalent conductances of NH_4Cl, NaOH and NaCl at infinite dilution are 149.7, 247.8 and 126.45mho, respectively. Calculate λ for NH_4OH at infinite dilution.	**2**	
b	The resistance of a 0.01M solution of an electrolyte is 210Ω at 25̊ C. Calculate the molar conductance of the solution at the same temperature. The cell constant is $0.88cm^{-1}$	**2**	**CO1**
Q 4	Discuss the Degree of freedom for		
a	One component system existing in two phases	**2**	**CO1**
b	Two component system existing in one phase	**2**	

Q 5 **a.** **b.**	Discuss whether the following solutions show a positive or a negative deviation from Raoult's Law. Acetone + Ethanol Water + Methanol	**2** **2**	**CO1**
SECTION B **(Scan and upload)**			
Q 6 a. **b.**	State and explain moving boundary method with suitable diagram. A solution of AgNO3 was electrolysed between silver electrodes. Before electrolysis, 10g of the solution contained 0.01788g of AgNO3. After the experiment, 20.09g of the anodic solution contained 0.06227g of AgNO3. At the same time, 0.009479g of copper was deposited in the copper coulometer placed in series. Calculate the transport numbers of Ag+ and NO_3^- ions. (Ag = 108 and Cu = 63.6).	**5** **5**	**CO1**
Q 7	Write short note on (i) Anomers and Epimers (ii) Hoffman bromide degradation reaction (iii) The Strecker synthesis for amino acid	**3** **4** **3**	**CO2**
Q 8	Write the conversions (i) Benzyl halide to benzyl amine. (ii) p-bromoacetanilide from aniline (iii) Benzene from aniline	**3** **4** **3**	**CO2**
Q 9	What is a Eutectic point? Draw the phase diagram for Pb-Ag system and mention the Eutectic point on it. **OR** Differentiate between the Non-Ideal solutions with a Positive and Negative Deviation from the Raoult's Law.	**10**	**CO1**
SECTION-C **(Scan and upload)**			
Q 10	Draw and discuss the phase diagram for water **OR** i. Draw the phase diagram for Sulfur system and indicate the metastable equilibrium	**20** **10**	**CO1**

	ii.	What are colligative properties? Discuss any two colligative properties.	**10**	
Q 11	i.	Differentiate between reducing and non-reducing sugars. Discuss in detail any 2 chemical tests are used to differentiate between these sugars.	**10**	**CO3**
	ii.	Differentiate between anomers and epimers with one example for each.	**10**	