Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, Dec 2020

Course: Solutions, Phase Equilibrium, ---Chemistry II — **Semester: III**

Program: B.Sc. GE (Physics & Chemistry) — **Time 03 hrs.**

Course Code: CHEM 1009 — **Max. Marks: 100**

SECTION A

1. Each Question will carry 5 Marks

2. Instruction: Complete the statement / Select the correct answer(s)

S. No.	Questions	CO
Q 1a.	The standard cell potential for the following redox reaction are---------- $2\ Fe^{3+}(aq) + 2\ I^{-}(aq) \rightarrow 2\ Fe^{2+}(aq) + I_2(aq)$ Given: $E^{o}_{I2/I-} = +0.535$ V, $E^{o}_{Fe3+/Fe2+} = 0.387$V	CO1
b.	The standard cell potential for the reaction $6\ [Fe(CN)_6]^{3-}(aq) + 2\ Cr^{3+}(aq) + 7\ H_2O(aq) \rightarrow Cr_2O_7^{2-}(aq) + 14\ H^{+} + 6\ [Fe(CN)_6]^{4-}(aq)$ has a value of –0.97 V at 298 K. Predict whether the reaction, as written, will be spontaneous in the forward direction at this temperature----------	
Q 2 a.	As the dilution increased, the specific conductivity----------	CO1
b.	Resistance of 0.2 M solution of an electrolyte is 50 Ω. The specific conductance of the solution is 1.3 Sm^{-1}. If resistance of the 0.4 M solution of the same electrolyte is 260 Ω, its molar conductivity is------	
Q 3 a.	The molar conductivity for $Ba(OH)_2$, $BaCl_2$ and NH_4Cl are 523.28, 280.0 and 129.8 S cm^2mol^{-1} respectively. Calculate the molar conductivity of NH_4OH is ----------	CO1
b.	The conductivity of N/50 solution of a cell of KCl at 25^0C is 0.002765 S cm^{-1}. If the resistance of a cell containing this solution is 400 Ω, the cell constant will be----------	
Q4 a. b.	A mixture of acetone and water shows _____ deviation from the Raoults Law A mixture of carbon tetrachloride and ethanol shows _____ deviation from Raoults Law.	CO1
Q5 a. b.	The addition of salt to water causes _____ in the freezing point of water. The addition of NaCl to water caused _____ in the vapour pressure water.	CO1

Q6 a. b.	At the triple point of water, there are three phases namely _____, _____, and _____. At the triple point of water, the degree of freedom is _____	**CO1**
SECTION B **1. Each question will carry 10 marks** **2. Instruction: Write short / brief notes**		
Q 7 a. b.	State and explain Hittoff rule. In a moving boundary experiment with 0.1N KCl using 0.065N LiCl as indicator solution, a constant current of 0.005893amp was passed for 2180 seconds and the boundary was observed to move through 5.60cm in a tube of 0.1142cm^2 cross-section. Calculate the transport numbers of K+ and Cl- ions.	**CO1** **CO1**
Q 8 a. b. c.	Write short note on Gabriel Phthalimide Synthesis Isocyanide test for amines The Schiemann reaction	**CO2**
Q9	Write the conversions (i) o-bromoaniline from aniline. (ii) Phenol from aniline (iii) Ethyl isocyanide from ethyl amine	**CO2**
Q10	Draw the phase diagram for Sulfur and mention the number of phases under each plot.	**CO2**
Q11	What is the difference between molarity and molality? Which is more appropriate to define the colligative properties of a solution?	**CO2**
SECTION-C **1. Each Question carries 20 Marks.** **2. Instruction: Write long answer.**		
Q 12 a. b.	Calculate the number of phases, components and degree of freedom for the following: i. Aqueous solution of ammonia ii. Mixture of salt and water iii. 3:1 solution of Acetone and water iv. Solid sulfur **OR** Which will experience a greater freezing point depression, a 0.1 M solution of Benzene in carbon tetrachloride, or a 0.1 M solution of Benzene in chloroform. Explain. An aqueous sucrose solution of unknown concentration is found to have a freezing point of -0.912 ^oC. What is the normal boiling point and partial pressure (in torr) of water at 25 oC of this solution. Sucrose is a non-volatile, non-electrolyte.	**CO3**