Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination (Online Mode), Dec 2020

Course: Physical Chemistry IV **Semester: IV**
Program: B. Sc. (H) Chemistry **Time:** 3 hrs
Course Code: CHEM2006 **Max. Marks:** 100

SECTION - A **6 x 5 = 30 Marks**

1. Each Question will carry 5 Marks
2. Instruction: Complete the statement / Select the correct and type answer(s)

Q 1	The rate constant for a second order reaction is 3.33 x 10^{-2} dm^3 mol^{-1} s^{-1}. If the initial concentration of the reactant is 0.05 mol dm^{-3}. Calculate the half-life? (a) 33.3 min (b) 10 min (c) 60 min (d) 5 min	CO1
Q 2	Molar ionic conductance at infinite dilution of Na^+ and Cl^- ions are 50.11 x 10^{-4} and 76.34 x 10^{-4} S m^2mol^{-1}, respectively. Calculate the transport number of Na^+ and Cl^- ions.	CO1
Q 3	The rate constant of a reaction at 500 K and 700 K are 0.02 S^{-1} and 0.07 S^{-1}, respectively. Calculate the value of E_a of the reaction (R= 8.314$JK^{-1}mol^{-1}$) (a) 8.3124 KJ (b) 18.263 KJ (c) 36.55 KJ (d) 9.1315 KJ	CO1
Q 4	A substance when dissolved in water at 10^{-3} M concentration absorbs 10 per cent of an incident radiation in a path of 1 cm length. What should be the concentration of the solution in order to absorb 90 per cent of the same radiation? (a) 0.218 mol dm^{-3} (b) 0.0218 mol dm^{-3} (c) 0.9 mol dm^{-3} (d) 0.09 mol dm^{-3}	CO1
Q 5	The molar extinction coefficient of phenanthroline complex of iron (II) is 12,00 dm^3 mol^{-1} cm^{-1} and the minimum detectable absorbance is 0.01. Calculate the minimum concentration of the complex that can be detected in a Lambert-Beer law cell of path length 1.00 cm. (a) 8.33 x 10-6 M (b) 83.3 x 10^{-6} M (c) 1.2 x 10^{-6} M (d) 12.00 x 10^{-6} M	CO2
Q 6	At room temperature the molar conductance of H_2O is 1.0 x 10^{-6} S m^2 mol^{-1} and the molar conductance at infinite dilution is 550 S m^2 mol^{-1}. The degree of dissociation of water is; (a) 1.72 x 10-9 (b) 1.82 x 10-9 (c) 1.92 x 10-9 (d) 1.0 x 10-9	CO3

SECTION – B **10 x 5 = 50 Marks**

1. Each question will carry 10 marks
2. Instruction: Write short / brief notes/upload file

Q 1	What is meant by transport number of an ion? How is it determined using Hittorf's method and Moving Boundary method?	CO1
Q 2	A solution of silver nitrate containing 12.14 g of silver in 50 ml of solution was electrolyzed between platinum electrodes. After electrolysis, 50 ml of the anode solution was found to contain 11.55 g of silver, while 1.25 g of metallic silver was deposited on the cathode. Calculate the transport number of Ag^+ and NO_3^- ions.	CO3
Q 3	Write a brief note on Norrish Type-I and Norrish Type-II reactions.	CO2
Q4	The rate constant of a second-order reaction is 5.70×10^{-5} dm^3 mol^{-1} s^{-1} at 25 ^{0}C and 1.64×10^{-4} dm^3 mol^{-1} s^{-1} at 40 ^{0}C. Calculate the activation energy and the Arrhenius pre-exponential factor.	CO2
Q 5	Write short notes on the following: (i) Promoters and inhibitors (ii) Effect of pH on enzyme catalysis	CO2

Section – C **1 x 20 = 20 Marks**

1. Each Question carries 20 Marks.

2. Instruction: Write long answers /upload file.

Q 1	What is the principle underlying conductometric titrations? Discuss the titration curves obtained in the titration of; (i) A strong acid with a weak base (ii) A mixture of HCl and CH_3COOH with sodium hydroxide. (iii) A strong acid with a strong base (iv) Silver nitrate against potassium chloride ***OR*** Integrate rate expression for second order reaction (A + B → P). Derive expressions for half-life time of a first-order, second-order, third-order and nth order reaction.	CO3 CO3 CO3 CO3