

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2023)

CLASS: IMSc
BRANCH: CHEMISTRY

SEMESTER : IV
SESSION : SP2023

SUBJECT: CH217 PHYSICAL CHEMISTRY - IV

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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- Q.1(a) Explain the main points of Theories of electrolytic dissociation. What are the factors controlling the Degree of dissociation and limitations of Arrhenius Theory [3]
- Q.1(b) Define Equivalent conductance and molar conductance. Show graphically and explain the variation of molar conductance with dilution [2]
- Q.2(a) Define transport no. and write the statement of Kohlrausch's law. With this law, calculate the molar conductance of CH₃COOH and AgCl. [3]
- Q.2(b) Derive the relation $t^0_+ = \frac{\lambda^0_+}{\lambda^0_m}$ [2]
- Q.3(a) What is Beer-Lambert's Law? Write its different forms and its limitations. Show graphically a plot of T Vs C and λ Vs C. [3]
- Q.3(b) A monochromatic radiation is incident on a solution of 0.05 molar concentration of an absorbing substance. The Intensity of radiation is reduced to one-fourth of the initial value after passing through 10cm length. Calculate the molar extinction coefficient of the substance. [2]
- Q.4(a) Discuss the Collision theory of reaction rate. What are the limitations of collision theory. [3]
- Q.4(b) Discuss the factors affecting the rate of a reaction. [2]
- Q.5(a) Derive an expression for the rate constant of first order reaction. Write the expression for half-life period. [3]
- Q.5(b) For a given First order reaction, K is $2.6 \times 10^{-10} \text{ S}^{-1}$ at 300 °C and $6.7 \times 10^{-4} \text{ S}^{-1}$ at 500°C. Calculate the energy of activation. [2]

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