UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 3rd Semester Examination, 2020

CC7-CHEMISTRY

PHYSICAL CHEMISTRY

Full Marks: 40

ASSIGNMENT

The figures in the margin indicate full marks.
All symbols are of usual significance.

Answer any *four* questions from the following 10×4 = 40

1. (a) Derive the rate law for the second order reaction: $2A \rightarrow P$. 4+3+3
   (b) Derive an expression for the half-life of a first order reaction.
   (c) Discuss two methods by which the order of a reaction can be obtained.

2. (a) What are the assumptions for the Langmuir Adsorption Isotherm? 3+4+3
   (b) Derive the expression for Langmuir Adsorption Isotherm.
   (c) What are the limitations of Langmuir Adsorption Isotherm?

3. (a) Derive the Michaelis-Menten Equation. 4+3+2+1
   (b) Show that Michaelis constant is equal to the concentration of the substrate at which the rate of the enzyme catalyzed reaction falls to half of its maximum value.
   (c) What is Turnover Number?
   (d) What is Co-enzyme?

4. (a) Zero Order reactions must be multistep. Explain. 3+3+4
   (b) Reactions of Higher order are rare — Explain critically.
   (c) Compare the kinetics of Opposing reaction with that of Parallel reaction.

5. (a) Write a note on: Chain reactions. 4+4+2
   (b) Compare the Collision Theory of reaction rate with Transition State Theory.
   (c) What do you mean by Heterogeneous Catalysis?

6. (a) Define Gibbs Phase Rule. 2+2+2+4
   (b) How can you derive the Gibbs Phase Rule thermodynamically?

(c) Under what conditions the phase rule:

$$F = C - P + 2 \text{ changes to } F = C - P + 1.$$

(d) Discuss the phase diagram of Pb-Ag System.

7. (a) Derive Clapeyron-Clausius Equation of solid-vaporic equilibrium. 4+4+2
   (b) Discuss the phase diagram of Water System.
   (c) Explain Eutectic Point.

8. (a) Derive the Gibbs-Duhem Margules Equation. 4+4+2
   (b) What is an Azeotrope? Explain with an example.
   (c) State the Nernst Distribution Law.

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