CLASS: IMSC   SEMESTER : III
BRANCH: CHEMISTRY   SESSION : MO/19

SUBJECT: CH202 PHYSICAL CHEMISTRY-III: PHASE EQUILIBRIA & CHEMICAL KINETICS
TIME: 3 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a)	Define Gibbs phase rule. How can you derive it thermodynamically?	[5]
Q.1(b)	Draw the phase diagrams for two-component systems in which the two components form (i) a eutectic mixture (ii) a stable compound with congruent melting point (iii) a compound with incongruent melting point. Apply the phase rule to this diagram.	[5]
Q.2(a)	Derive Gibbs-Duhem-Margules equation. Show that if in a binary solution, component A obeys Raoult's law, and then component B would also obey Raoult's law.	[5]
Q.2(b)	A mixture of aniline and water boils at 98^0C under 1 atm pressure. The vapour pressure of aniline at this temperature is 0.05 atm. If the mass ratio of aniline to water in the distillate is 13%, calculate the molar mass of aniline.	[5]
Q.3(a)	For parallel reaction show that the ratio of the concentration of the products at any time is constant. Also derive the expression for effective half-life for parallel reaction.	[5]
Q.3(b)	Discuss in details the activated complex theory of bimolecular reaction. Explain how this theory helps in evaluationg standard enthalpy of activation and standard entropy of activation. Show that for reaction involving simple molecules, the collision theory and ACT give identical results.	[5]
Q.4(a)	What are the characteristics of catalyzed reaction? Explain the kinetics of acid-base catalysis.	[5]
Q.4(b)	Derive Michaelis-Menten equation and explain the rate vs concentration of the substrate plot.	[5]
Q.5(a)	Discuss briefly Langmuir's theory of adsorption. Derive an expression for Langmuir's adsorption isotherm. Show that at normal pressure, Langmuir's unimolecular adsorption isotherm becomes identical with Freundlich adsorption isotherm.	[5]
Q.5(b)	Explain Freundlich adsorption isotherm. How the constant k and n are determined?	[5]

:::::29/11/2019:::::M