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Total No. of Pages : 02

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B.Sc. Hons. Chemistry (Sem.-4) PHYSICAL CHEMISTRY – III (PHASE EQUILIBRIUM AND CHEMICAL KINETICS) Subject Code : BHCL-212-19 M.Code : 79919 Date of Examination : 15-12-22

Time: 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of EIGHT questions carrying TWO marks each.
- 2. SECTION-B contains EIGHT questions carrying FOUR marks each and students have to attempt any SIX questions.
- 3. SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.

SECTION-A

1. Answer Briefly :

- a) Explain metastable equilibria with an example.
- b) What do you mean by steady state approximation? Give its significance.
- c) How does particle size effect the efficiency of a catalyst?
- d) Calculate the degrees of freedom and number of phases for mixture containing liquid water and water vapour at a pressure of 1 Atm.
- e) Differefitiaie between physiosorption and chemisorption.
- f) Give plots of rate vs concentration for different order reactions.
- g) What are capillary active and capillary inactive solutes?
- h) Define activation energy. Can it be negative?

SECTION-B

- 2. Write short notes on :
 - a) Gibb's phase rule
 - b) Steam Distillation

- 3. What are cooling curves? Discuss their role in thermal analysis.
- 4. Give mechanism and order of the reaction involving formation of Hydrogen bromide gas from hydrogen and bromine.
- 5. Comment upon the efficiency of nanoparticles as catalysts.
- 6. Discuss the kinetics of surface catalysed bimolecular reactions.
- 7. How does the rate of an enzyme catalysed reaction vary when the concentration of substrate is varied?
- 8. What type of adsorption is explained by Langmuir adsorption isotherm?
- 9. For a reaction involving fermentation of sugar in an enzymatic solution having 0.12 M sugar initially, the concentration gets reduced to 0.06M in 10 hours and 0.03 M in 20 hours. Evaluate the order and rate constant of the reaction. Also give integrated rate expression.

SECTION -C

- 10. a) How can one evaluate the degree of association or dissociation of a solute using Nernst distribution law.
 - b) Discus the kinetics of opposing reactions with an example.

OR

- a) Discuss Claussius Ctapeyron equation in relation to phase diagram of any one component system (Also draw the diagram).
- b) The activation energy of a reaction is 94.14 kJ/mol and rate constant at 30°Cis 1.8 \times 10⁻⁵ sec⁻¹. Calculate the frequency factor A.
- 11. What are adsorption isotherms? Derive expression for Gibb's adsorption isotherm.

OR

What are acid and base catalysed reactions? How does the pH effects the rate of different types of catalysed reactions?

NOTE : Disclosure of Identity by writing Mobile No. or Marking of passing request on any paper of Answer Sheet will lead to UMC against the Student.