

**2020/TDC (CBCS)/ODD/SEM/
CHMHCC-303T/290**

**TDC (CBCS) Odd Semester Exam., 2020
held in March, 2021**

CHEMISTRY

(3rd Semester)

Course No. : CHMHCC-303T

(Phase Equilibria and Chemical Kinetics)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

1. Answer any ten of the following questions :

2×10=20

- (a) Calculate the number of components and degree of freedom of the following equilibrium :



- (b) State and explain eutectic point of two-component system.

(2)

- (c) What is meant by metastable equilibrium?
- (d) Derive Gibbs' phase rule.
- (e) Define azeotropic mixture. Give one example.
- (f) State two applications of Nernst distribution law.
- (g) Define UCST with an example.
- (h) Explain the principle of fractional distillation of ideal solution.
- (i) What is pseudo-first-order reaction? Give one example.
- (j) Derive an expression for rate constant of second-order reaction for two different reactants.
- (k) Why does increase of temperature speed up a chemical reaction?
- (l) State and explain steady-state approximation.
- (m) Write two advantages of heterogeneous catalysis over homogeneous catalysis.
- (n) What are the factors that affect enzyme catalysis?
- (o) How do the surface area and temperature effect the rate of catalysis?

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(Continued)

(3)

- (p) Write a short note on selectivity of a catalyst.
- (q) "Enthalpy of chemisorption is higher than physisorption." Explain.
- (r) Why does physisorption decrease with increase in temperature?
- (s) Why in chemisorption only monolayer is formed?
- (t) Write two limitations of Freundlich adsorption isotherm.

SECTION—B

Answer any five questions

- 2. Explain the phase diagram of water and define triple point. 5+1=6
- 3. (a) Draw and discuss the phase diagram for a three-component system consisting water, chloroform and acetic acid. 4
 (b) Explain the effect of pressure on the melting point of ice with the help of Clapeyron-Clausius equation. 2
- 4. How is Nernst distribution law modified when (i) the solute undergoes association in one of the solvent and (ii) the solute enters into chemical combination in one of the solvents? 3+3=6

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(Turn Over)

5. Discuss the variation of mutual miscibility of phenol-water and aniline-hexane systems with temperature. $3+3=6$
6. Write short notes on : $3 \times 2 = 6$
(a) Opposing reaction
(b) Consecutive reaction
7. (a) Discuss the collision theory of bimolecular reaction. 3
(b) Describe the Lindemann theory of unimolecular reaction. 3
8. What is meant by acid-base catalysis? Explain the theory of acid-base catalysis with an example. $2+4=6$
9. Write short notes on : $2 \times 3 = 6$
(a) Active centre
(b) Catalytic poison
(c) Enzyme catalysis
10. How does chemisorption differ from physisorption? Discuss the factors which influence adsorption of a gas on a solid. $3+3=6$
11. Derive an expression for Langmuir's adsorption isotherm and explain its difference with Freundlich isotherm. $4+2=6$
