

This question paper contains 3 printed pages]

L—190—2019

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

MARCH/APRIL, 2019

(CBCS Pattern)

CHEMISTRY

Paper VII (CH-423)

(Physical Chemistry)

(Saturday, 27-4-2019)

Time : 10.00 a.m. to 1.00 p.m.

Time— Three Hours

Maximum Marks—75

N.B. :— (i) Attempt All questions.

(ii) Use of calculator and logarithm table is allowed.

(iii) Attempt Q. No. 5(A) at once only

$$R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}.$$

1. Attempt any *three* of the following : 15

(a) Define overpotential. Explain the metal overpotential.

(b) Derive Laplace equation for curved surface.

(c) Describe any *two* methods for the determination of the order of a reaction.

(d) The intrinsic viscosity of polystyrene in toluene at 25°C is 0.050 m³kg⁻⁵. Determine the concentration of polystyrene in toluene if the relative viscosity is 1.317.

(e) How will you make the study of kinetics of fast reactions by nuclear magnetic resonance technique.

2. Attempt any *three* of the following : 15

(a) Define polymerisation. Explain the addition and condensation polymerisation with suitable examples.

(b) Discuss the kinetics of decomposition of ethane.

(c) Give an account of critical micelle concentration.

P.T.O.

- (d) Discuss the applications of polarographic technique.
- (e) Write a note on Tafel plot.
3. Attempt the following :
- (a) Derive BET equation. 8
- Or*
- Discuss the kinetics of photochemical reaction between H_2 and Cl_2 .
- (b) Define \bar{M}_w and \bar{M}_n . How will you determine the molar mass of a polymer by viscosity measurements. 7
- Or*
- Derive Butler-Volmer equation.
4. Attempt the following :
- (a) Discuss in detail the activated complex theory. 8
- Or*
- For a first order reaction, the rate constant was found to be 7×10^{-7} at 300 K and 9×10^{-4} at 375 K. Calculate the energy of activation.
- (b) Define corrosion. Mention the causes of corrosion. Explain the chemical corrosion. 7
- Or*
- Determine the mass average and number average molar mass, if equal masses of polymer molecules with $M_1 = 20 \times 10^5$ and $M_2 = 2 \times 10^4$ are mixed.
5. (A) Select the *correct* alternative from the following MCQs : 5
- (i) The rate constant of a reaction is $0.693 \text{ mol lit}^{-1} \text{ sec}^{-1}$, then the order of the reaction is
- (a) zero (b) one
- (c) two (d) three

(ii) Which among the following plot will give a polarogram ?

- (a) Current versus potential
 (b) Concentration versus potential
 (c) Concentration versus current
 (d) $\frac{1}{\text{current}}$ versus potential

(iii) For a monodisperse polymer sample.....

- (a) $\frac{\bar{M}_w}{\bar{M}_n} = 0$ (b) $\frac{\bar{M}_w}{\bar{M}_n} > 0$
 (c) $\frac{\bar{M}_w}{\bar{M}_n} = 1$ (d) $\frac{\bar{M}_w}{\bar{M}_n} < 0$

(iv) Adsorption is a process for which

- (a) ΔH is positive, Δs is negative
 (b) ΔH is negative, Δs is positive
 (c) ΔH is positive, Δs is positive
 (d) ΔH is negative, Δs is negative

(v) An increase in temperature,the surface tension.

- (a) does not changes
 (b) increases
 (c) decreases
 (d) increases up to certain temperature then decreases.

(B) Write short notes on (any two) :

10

- (i) Surface active agents
 (ii) Secondary salt effect
 (iii) Homogeneous catalysis.