

This question paper contains 4 printed pages]

**AG—190—2018**

**FACULTY OF SCIENCE**

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

**NOVEMBER/DECEMBER, 2018**

**(CBCS Pattern)**

**CHEMISTRY**

**Paper VII (CH-423)**

**(Physical Chemistry)**

**(Saturday, 1-12-2018)**

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

*Time—3 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.*

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

$$R = 0.08206 \text{ lit atm K}^{-1} \text{ mol}^{-1}$$

1. Attempt any *three* of the following :

15

(a) Explain the various factors affecting the overpotential.

(b) Define surface tension. How will you determine surface tension by capillary rise method ?

(c) Give an account of oscillatory reactions.

(d) At 25°C, the plot of  $\frac{\pi}{c}$  versus  $c$  gave an intercept  $3.2 \times 10^{-3} \text{ atm kg}^{-1}$ . Calculate the molar mass.

(e) How will you study the kinetics of fast reactions by flow method ?

P.T.O.

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

- (a) Define polymer. Explain isotactic, atactic and syndiotactic polymers.
- (b) Discuss the kinetics of pyrolysis of acetaldehyde.
- (c) Explain the condensation polymerisation. Discuss the kinetics of it.
- (d) Give the merits and demerits of DME used in polarographic analysis.
- (e) Discuss exchange current density.

3. Attempt the following :

- (a) Derive Gibbs' adsorption equation. Give its significance. 8

Or

Discuss the kinetics of the reaction between  $H_2$  and  $Br_2$ .

- (b) (i) Derive Laplace equation for curved surface. 7
- (ii) How will you determine the surface area by using BET equation ?

Or

What is the principle of polarography ? Explain half wave potential.  
Give any *three* applications of polarography.

4. Attempt the following :

- (a) Describe in detail the collision theory of reaction rate. 8

Or

A first order reaction has rate constant equal to  $1.25 \times 10^{-4} \text{ sec}^{-1}$  at 300 K and  $8.5 \times 10^{-4}$  at 320 K. Calculate the activation energy of the reaction.

- (b) Discuss in detail the types of corrosion. 7

Or

A sample of a high polymer consists of equal number of molecules with  $M_1 = 15000$  and  $M_2 = 150000$ . Calculate  $\bar{M}_w$  and  $\bar{M}_n$ .

5. (A) Select the *correct* alternative from the following MCQ's : 5
- (i) The rate constant of a first order reaction is  $6.93 \times 10^{-2}$  sec<sup>-1</sup>. The half life time of the reaction is :
- (a) 0.1 sec
  - (b) 1 sec
  - (c) 10 sec
  - (d) 100 sec
- (ii) The polarographic technique of analysis was devised by :
- (a) Sir C.V. Raman
  - (b) Ramchandran
  - (c) Berzelius
  - (d) Heyrovsky
- (iii) For a polydispersed polymer sample :
- (a)  $\bar{M}_w > \bar{M}_n$
  - (b)  $\bar{M}_w = \bar{M}_n$
  - (c)  $\bar{M}_w < \bar{M}_n$
  - (d) None of the above
- (iv) Physical adsorption takes place with the formation of ..... layer whereas chemical adsorption with the formation of ..... layer.
- (a) Monomolecular, multimolecular
  - (b) Multimolecular, monomolucular
  - (c) Monomolecular, monomolecular
  - (d) Multimolecular, multimolecular

P.T.O.

(v) The SI unit of surface tension is :

(a)  $\text{Nm s}^{-1}$

(b)  $\text{Nm s}^{-2}$

(c)  $\text{Kg s}^{-1}$

(d)  $\text{Kg s}^{-2}$

(B) Write short notes on any *two* of the following : 10

(i) Surface film on the liquid

(ii) Effect of the solvent on the rate of reaction

(iii) Thermodynamics of micellisation.