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AY—190—2018

FACULTY OF SCIENCE

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

MARCH/APRIL, 2018

(CBCS Pattern)

CHEMISTRY

Paper VII (CH-423)

(Physical Chemistry)

(Monday, 16-4-2018)

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 (4) at once only $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$.

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

(a) Define over voltage. Explain hydrogen overvoltage.

(b) Discuss the formation of the surface film on the liquid surface.

(c) How will you determine the order of reaction by half life method ?

(d) The intercept of the plot of n_r^{-1}/c versus c is $50.1 \times 10^{-3} \text{ m}^3 \text{ kg}^{-1}$. Calculate \bar{M}_{visc} if constants are $a = 0.69$ and $k = 1.7 \times 10^{-3} \text{ m}^3 \text{ kg}^{-1}$.

(e) Give an account of flash photolysis.

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

(a) Give an account of surface active agents with their classification.

(b) Derive Arrhenius equation.

P.T.O.

- (c) What do you mean by addition polymerisation ? Discuss the kinetics of it.
- (d) Discuss the half wave potential.
- (e) Explain the effect of light at the semiconductor solution interface.

3. Attempt the following :

- (a) Define adsorption isotherm. Derive Gibb's adsorption isotherm. 8

Or

Describe transition state theory of reaction rate.

- (b) Define osmotic pressure. Describe the osmotic pressure measurement technique for the determination of molar mass of the polymer. 7

Or

What is the principle of Polarography ? Describe in detail the theory and working of the polarographic cell.

4. Attempt the following :

- (a) Explain the term homogeneous catalysis with suitable example. Discuss the kinetics of enzyme catalysis. 8

Or

From the following data of initial concentration and rate, determine the order of the reaction, $aA \rightarrow \text{products}$ and its rate constant.

[A] Mol lit ⁻¹	Rate mol lit ⁻¹ sec ⁻¹
0.1	9×10^{-5}
0.2	36×10^{-5}
0.4	144×10^{-5}

- (b) Explain the term corrosion with suitable examples. Explain the various factors influencing the corrosion. 7

Or

A protein sample consists of equimolar mixture of haemoglobin ($M = 15.5 \text{ kg mol}^{-1}$), ribonuclease ($M = 13.7 \text{ kg mol}^{-1}$) and myoglobin ($M = 17.2 \text{ kg mol}^{-1}$). Calculate the number average and mass average masses.

5. (A) Select the *correct* alternative from the following MCQs : 5

(i) What is the order of a reaction which has the following rate expression ?

$$\text{rate} = K [A]^{3/2} [B]^{-1}$$

(a) $3/2$

(b) 1

(c) -1

(d) $1/2$

(ii) The intercept of the Tafel plot in i versus η will give :

(a) Overpotential

(b) Current density

(c) Exchange current density

(d) Transfer coefficient

(iii) Isotactic polymers are those in which all the asymmetric carbon atoms can have :

(a) Same (d- or l-) configuration

(b) Random sequence of d-and l- configuration

(c) regular alternation of d- and l-

(d) Configuration always d- configuration

P.T.O.

- (iv) Adsorption is process.
- (a) Endothermic
 - (b) Exothermic
 - (c) Iso-enthalpic
 - (d) Iso-entropic
- (v) Surface tension of the substance becomes above the critical temperature.
- (a) One
 - (b) Zero
 - (c) Infinity
 - (d) Half of the original value
- (B) Write short notes on any *two* of the following :
- (i) CMC
 - (ii) Primary salt effect
 - (iii) Catalytic activity at the surface.

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