C 25732 (Pages : 3) Name...........................

Reg. No................................

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2012

(CCSS)

Chemistry—Core Course X

CH 6B 17—PHYSICAL CHEMISTRY—III

Time : Three Hours Maximum : 30 Weightage

I. Answer all the questions. Each question carries a weightage ¼. This part contains multiple choice, fill in the blank and one word answer questions.

1 The unit of rate constant for a reaction. is found to be the same as the unit of rate. The order of the reaction will be

   (a) Zero.   **(b)** One.

   (c) Three.   (d) two.

2 The dependence of reaction rate upon the concentration of various reactants in the reaction can be obtained from :

   (a) Arrhenius equation.   (b) Van't Hoff equation.

   (c) Rate law.   (d) Specific reaction rate.

3 According to collision theory, for an effective collision :

   (a) The colliding molecules should possess a minimum energy called threshold energy.

   (b) Collision should be properly oriented.

   (c) Colliding molecules should possess activation energy.

   (d) Both (a) and (b).

4 Which law states that each molecule taking part in a photochemical reaction absorbs one photon

5 The molar conductance of a strong electrolyte increases with dilution and reaches a maximum constant value called _____

6 The ionic product of water increases with increase in temperature, because the self ionisation of water is _____

7 **The relation** $C_{Am} = \infty_{Am} - b \; c$**,** is the mathematical formulation of

   (a) Ostwald dilution law.   **(b)** Debye-Falkenhagen equation.

   (c) Kohlrausch's law.   **(d)** Debye, Huckle Onsagar relation.

Turn over

8 Aqueous solution of which of the following substance is acidic in nature ?

    (a) NH_4Cl.   (b) Na_2CO_3.

    (c) NH_4COOH_3.   (d) CH_3COONa.

9 The value of electrode potential of a half cell is independent of :

    (a) Temperature.   (b) Nature of the ions.

    (c) Volume of the solution.   (d) Concentration of ions.

10 Standard emf of a cell and the standard free energy change of the reaction are related as
————————

11 The capacity of a computer memory is measured in —————————

12 C language has been developed by :

    (a) James Martin.   (b) Dennis Ritche.

    (c) Eckert and Mouchly.   (d) Kenneth Kurtz.

                                         (12 x ¼ = 3 weightage)

II. Answer *all* the questions. Each carries a weightage 1 :

13 Write any four characteristics of a first order reaction.

14 The rate of reaction doubled, when the temperature is increased from 27°C to 37°C. Calculate the activation energy of the reaction.

15 What are photosensitization reactions ?

16 Distinguish between fluorescence and phosphorescence.

17 The equivalent conductance of 0.05N solution of CH_3COOH is 110 $ohm^{-1} cm^2 eq^{-1}$. Calculate the degree of dissociation of CH_3COOH at this concentration, if the ionic conductance of H+ and CH_3COO^- are 349.5 and 40 $ohm^{-1} cm^2 eq^{-1}$ respectively.

18 Discuss the construction of a standard hydrogen electrode.

19 In the electrochemical cell $Fe^{2+} \mid Fe^{3+} \parallel C4+ \mid Ce^{2+}$, $E Ce^{4+}/Ce^{2+}$ is 1.44 V and

    $E° Fe^{2+}/Fe^{2+}$ is 0.68 V. Calculate the equilibrium constant for the cell reaction.

    $Fe^{2+} + Ce^{4+} \quad Fe^{2+} + Ce^{2+}$ at 25°C
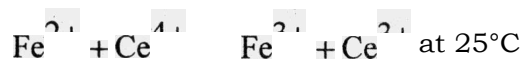
20 Why C language is classified as the Middle Level Language ?

21 What are constants and variables in C program ?

                                         (9 x 1 = 9 weightage)

III. Answer any *five* questions. Each carries a weightage 2. ·

22 Explain the adsorption theory of catalysis.

23 When a monochromatic radiation is passed through 0.05m solution of a substance, the intensity of the radiation is reduced to 25% of the initial value after passing through 10 cm length of the solution. Calculate the value of absorbance and molar extinction coefficient of the substance.

24 Write the principle of conductometric titration and give any four advantages of the method.

25 Explain the term solubility product. The solubility of a sparingly soluble metal chloride MX_2 in water is $1 \times 10^{-1} M$. Calculate the solubility product.

26 What are buffer solutions ? How are they classified ? Explain the mechanism of buffer action.

27 Explain the potentiometric method of determining the pH of a solution.

28 Write the C program for the determination of half life period of a radioactive nucleus.

(5 x 2 = 10 weightage)

IV. Answer any *two* questions. Each question carries a weightage 4.

29 (a) Derive the integral rate equation for a second order reaction of the type 2A products.

(b) Write any two methods for the determination of order of a reaction.

30 (a) Define transport number of an ion. Discuss the moving boundary method for the measurement of transport number.

(b) A 0.1 molar aqueous solution of LiCl is placed in a moving boundary cell of area of cross section 1.17 cm^2. The solution is electrolysed for 131 minutes with a constant current of

9.42×10^{-3} A, when the Li boundary is observed to move a distance of 2.08 cm. Calculate

the transference number of Li ions.

31. (a) What are the fuel cells ? Explain the working of H_2–O_2 fuel cell.

(b) Write note on

(i)   Liquid junction potential.

(ii) Half-wave potential.

(2 x 4 = 8 weightage)