TB156195A **Reg. No.....**

Name.....

B. Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2018

(2015 Admission Regular)

SEMESTER VI – CORE(CHEMISTRY)

CH6B12TB - PHYSICAL CHEMISTRY

Time: Three Hours **Maximum Marks : 60**

PART A

I. Answer all questions. Each question carries 1 mark.

1. The rate constant of a zero order reaction has the unit.....
2. The maximum number of phases that can coexist in equilibrium in a one component system…...
3. Define Faraday.
4. What is rust chemically?
5. ---------- is the photosensitizer used in the isomerization of 2-butene.

(5 × 1 = 5)

PART B

II. Answer any five questions. Each question carries 2 marks.

6. What are promoters and catalytic poisons. Give examples.
7. Write any two differences between metallic conductance and electrolytic conductance.
8. The rate constant for a first order reaction is $4.5x\ 10^{-6}\ s^{-1}$ and the initial concentration is 0.1 mol L^{-1}. What is the initial rate of the reaction in mol $L^{-1}s^{-1}$
9. Write the electrode reactions of standard calomel electrode
10. Determine the number of phases, number of components and variance of the system in equilibrium:

$$CaCO_3(s) \rightleftharpoons CaO\ (s) + CO_2(g)$$

11. Explain the term 'triple point' in phase studies with suitable example.
12. What is meant by molar conductivity at infinite dilution? How is it determined for a strong electrolyte?
13. What is the potential of at 298 K of the electrode consisting of a silver rod dipping in 0.05 M silver nitrate solution? Given $E^0\ Ag^+/Ag = 0.80$ V

(5 × 2 = 10)

PART C

III. Answer any five questions. Each question carries 5 marks.

14. Discuss the Lindemann theory of unimolecular reactions with special reference to the use of steady state approximation.
15. Discuss the phase diagram of the water system
16. Calculate pH of the solution obtained by mixing 150 ml of 0.2 N HCl and 150 ml of 0.1N NaOH solution.
17. Give a note on (a) Debye – Falkenhagen effect (b) Wien Effect

18. The resistance of a 0.1 M solution of an electrolyte taken in a conductivity cell containing two platinum electrodes 4.0 cm apart and 10.7 cm^2 in area was found to be 70 ohms. Calculate the conductivity and molar conductivity of the solution.
19. What is over voltage? How is it caused? Discuss its importance.
20. Calculate the EMF of Zn-Ag cell at 30^0C, when activity of Zn^{2+} ion is 0.6 and activity of Ag^+ ions is 10. E^0Ag^+/Ag = 0.799 V and E^0Zn^{2+}/Zn = - 0.76 V
21. State and explain (i) Stark-Einstein law (ii) Photosensitization reaction

(5 × 5 = 25)

PART D

IV. Answer any two questions. Each question carries 10 marks.

22. a) Derive the integrated rate equation for second order reactions when there are two reactants and both have the same initial concentration.
    b) Discuss the phase diagram of the chloroform- water-acetic acid system.
23. a) What do you understand by Ostwald dilution law and explain it. Also tell the validity of Ostwald dilution law
    b) Explain Jablonski diagram in detai
24. a) What is meant by the term transport numbers? Explain the Hittorf's method of determining transport number.
    b)In a moving Boundary Experiment with a 0.1N solution, the boundary moved 4.44 m during 70 minutes when a current of 5.20 mA was used. The cross sectional area of the tube was 0.25 cm^3. Calculate the transport number of K^+ ions
25. (a) Discuss the principle, applications, advantages and disadvantages of potentiometric titrations
    (b) A cell is constructed from Cu/Cu^{2+} [E^0Cu^{2+}/Cu = 0.34 V] and Ag^+/Ag [E^0Ag^+/Ag = 0.80 V] half cells
    (i) Construct the cell
    (ii) Write all chemical reactions
    (iii) Calculate standard EMF of the cell
    (iv) Calculate EMF of the cell if concentration of $Cu^{2+}$is 0.25 M and Ag^+ is 0.6M

(2 × 10 = 20)