Reg. No……..…….. Name…… **20U644**

B. Sc. DEGREE END SEMESTER EXAMINATION - MARCH 2020

SEMESTER **– 6: CHEMISTRY (CORE COURSE)**

COURSE: **15U6CRCHE12: PHYSICAL CHEMISTRY IV**

(Common for Regular 2017 Admission & Supplementary 2016 /2015 Admissions)

Time: Three Hours Max. Marks: 60

SECTION A

Answer all questions. Each question carries 1 mark.

1. Write the Henderson equation for acidic buffer.
2. Conjugate base of H_2O is …….
3. Calculate the p^H of 10^{-4} M NaOH at 298K.
4. Define specific conductance.
5. Find the atomic weight of monovalent element, if 23g of it is deposited by 1F of electricity.
6. What is Walden's rule?
7. Write the net reaction in H_2-O_2 fuel cell.
8. Which electromagnetic radiation is used in ESR spectroscopy? (1 x 8 = 8)

SECTION B

Answer any six questions. Each question carries 2 marks

9. What is the role of NH_4Cl in the precipitation of Al^{3+} ions as $Al(OH)_3$?
10. How the acid strength of acetic acid differ in solvent water and liquid ammonia?
11. Calculate the ionic strength of 0.15m KCl solution.
12. Write the applications of electrochemical series.
13. Find the solubility of $PbSO_4$ in water. The solubility product of $PbSO_4$ is 1.6×10^{-8} $mol^2 litre^{-2}$
14. Differentiate between Curie temperature and Neel temperature.
15. What is meant by activity of electrolyte? Write the expression to calculate the activity of Na_2SO_4 in terms of molality (m) and mean activity coefficient ($\gamma_\pm$)
16. Discuss on the factors that are responsible for variation in molar conductance with concentration for strong electrolyte. (2 x 6 = 12)

SECTION C

Answer any four questions. Each question carries 5 marks

17. a) Calculate the pH of 10^{-7} M aqueous solution of HCl at 25°C. [$K_w = 10^{-14}$ mol^2 dm^{-6}].
    b) How ionic product (K_w) of water is temperature dependent?
18. How it is possible to determine ΔH, ΔS, ΔG of a cell reaction by measuring emf of the cell?
19. Explain the potentiometric titration involving acids and bases.

20. Write Debye Huckel limiting law. Express it graphically.
21. Draw calomel electrode and write the electrode reaction.
22. What is transport number of H^+ and Cl^- ions if the boundary of the moving boundary method moves by 7.5cm through a tube of cross section 1.24cm^2 containing 0.1N HCl solution? 0.1209g of Ag deposited in coulometer. (5 x 4 = 20)

SECTION D

Answer any Two questions. Each question carries 10 marks

23. a) Discuss on the pH of aqueous solution of i) NH_4Cl ii) CH_3COONH_4 iii) NaCl iv) CH_3COONa
    b) Calculate the percentage ionic character of a diatomic molecule of bond length 96 pm if its dipolemoment is 1.51D.
24. Define transport number and explain how it is determined using Hittorf's method.
25. What is liquid junction potential (L.J.P). Show that L.J.P is zero when the transport number of anions and cations (t_- and t_+) is same.
26. a) What is overvoltage? Discuss on any one of its applications.
    b) Write two applications of conductance measurements. (10 x 2 = 20)

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