15U612   (Pages: 2)   Name: …………..……….

Reg. No…………..………

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH 2018
(CUCBCSS - UG)
CC15U CHE6 B11 - PHYSICAL CHEMISTRY III
Chemistry - Core Course
(2015 Admission)

Time: Three Hours   Maximum: 80 Marks

Section A
Answer in one word or sentence
Answer *all* questions.

1. The fraction of the total current carried by an ion is called ---------------

2. Faraday's second law of electrolysis is used to find out --------------- of substances.

3. A calomel electrode is reversible with respect to ---------------

4. Quinhydrone is an equimolecular mixture of --------------- and ---------------

5. The hydrolysed solution of copper sulphate is --------------- in nature.

6. Vant Hoff's factor of $Ca(NO_3)_2$ is ---------------

7. The osmotic pressure of 5% solution of cane sugar at 15^0C is ---------------

8. Calculate the miller indices of a plane which cut through the crystal axis at 6a, 3b, 3c.

9. Silicon doped with arsenic is --------------- semiconductor.

10. ZnO is white when cold and yellow when heated. It is due to the development of -------

(10 x 1 = 10 Marks)

Section B
Answer any *ten* questions. Each question carries 2 marks.

11. Calculate the pH of 10^{-7} M of HCl solution.

12. Write down the Debye Huckel Onsagar equation and explain the terms.

13. State the Faraday's laws of electrolysis.

14. Write down the expression interplanar spacing in cubic unit cell.

15. What are the Bravais's lattices consistent with cubic unit cell? Calaculate the number of atoms in those unit cells.

16. What are reversible electrodes? Describe giving examples.

17. Calculate the emf of the cell Cd, Cd^{2+} || Cu^{2+}, Cu E^0 (Cu^{2+},Cu) = 0.34V and E^0 (Cd^{2+}, Cd)= -0.40 V.

18. State the Henderson equation.

19. Define Rault's law.

20. List out the different collegative properties exhibited by dilute solutions.

21. Write down the correct order of equivalent conductance of NaCl, KCl , and CsCl solutions at infinite dilution with reasons for the same.

22. What are the different classifications of liquid crystals?

(10 x 2 = 20 Marks)

Section C
Answer any *five* questions. Each question carries 6 marks

23. Explain the moving boundary method for the determination of transport number.

24. The diffraction pattern for a cubic system was observed from (111), (200), (220), (311) and (222) planes. Identify the crystal system with suitable explanation.

25. Explain the pH determination using glass electrode.

26. A metallic element exist as a cubic unit cell with a = 2.85 Å, d =7.20 gm/cm^3. How many unit cells will be present in 100gm of the metal?

27. Derive the expression for the entropy change accompanying a cell reaction from the temperature coefficient of EMF.

28. Acetic acid associates to form double molecules. 1.65 g of acetic acid when dissolved in 100g of benzene raised the boiling point by 0.36 ^{0}C. Calculate Van't Hoff's factor and degree of association of acetic acid in benzene.

29. Calculate the pH of the solution obtained by mixing 6.0 g of acetic acid and 12.30 g of sodium acetate and making the volume of the solution to 500ml. K_a for acetic acid is $1.8*10^{-5}$.

30. Explain Frenkel and Schottky defects in crystal systems.

(5 x 6 = 30 Marks)

Section D
Answer any *two* questions. Each question carries 10 marks.

31. a) Derive the Bragg's equation.

    b) Briefly explain the Rotating crystal method and Powder method for the determination of crystal structure.

32. Explain different type of conductometric titrations. What are the advantages of conductometic titrations ?

33. a) Explain non ideal solutions with positive and negative deviations.

    b) 60.0 g of a solution containing 0.507 g of $AgNO_3$ was electrolysed between Ag electrodes. After the electrolysis 50.0 g of anodic solution was found to contain 0.520g of $AgNO_3$. A current of 2amp was passed for 50 seconds. Calculate the transport number of Ag and Nitrate ions.

34. Write short note on

    a) Single electrode potentials.   b) Concentration cells.

    c) Calomel electrode.   d) Quinhydrone electrode.

(2 x 10 = 20 Marks)

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