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Name: .....

Reg. No.....

**SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2020**

(CUCBCSS-UG)

(Regular/Supplementary/Improvement)

**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. Each question carries 1 mark.

1. The high mobility of  $H^+$  ion is due to the formation of ----- ion
2. Faraday's first law of electrolysis is used to find out ----- of substances.
3. For a salt of weak acid and weak base the degree of hydrolysis can be calculated using the relation -----
4. The pH of water at 298 K is 7. On heating water to 350K the pH of water will be -----
5. Conditions for ideal solutions are ----- and -----
6. The order of osmotic pressure of equimolar solution of  $BaCl_2$ ,  $NaCl$  and glucose is -----
7. The co-ordination number of the ions in  $CsCl$  crystal lattice is -----
8. The electron trapped in an anion vacancy in metal excess defect is called -----
9. The conductance of  $1\text{ cm}^3$  of the solution is called -----
10. The unit cell with  $a \neq b \neq c$ ,  $\alpha \neq \beta \neq \gamma \neq 90^\circ$  is a ----- crystal.

**(10 x 1 = 10 Marks)**

**Section B**

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

11. How is molar conductance related to specific conductance?
12. What are reversible electrodes? Give examples.
13. Write down the Nernst equation for copper electrode in  $CuSO_4$  solution.
14. Define Define Raoult's law. What are ideal solutions?
15. What are intrinsic and extrinsic semi conductors?
16. How many Bravais's lattices are consistent with crystal systems? Sketch the Bravais's lattices of cubic unit cells.
17. What are the components of a saturated Calomel electrode?
18. What is Arrhenius theory of acids and bases?
19. What are the different classes of liquid crystals?

20. Explain why the addition of non-volatile solute increases the boiling point of a liquid?
21. List out the different colligative properties exhibited by dilute solutions.
22. Write down the correct order of equivalent conductance of NaCl, KCl, and CsCl solutions at infinite dilution with reasons for the same.

**(10 x 2 = 20 Marks)**

### Section C

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

23. A solution of HCl was electrolysed using Pt electrode. The cathode compartment contains 0.1820g of HCl before electrolysis and 0.1676g. after electrolysis. The weight of Ag deposited in the coulometer in series with the apparatus was 0.2525g. Calculate the transport number of H<sup>+</sup> and Cl<sup>-</sup> ions.
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. Derive the equation for the EMF of a concentration cell with transference
26. Explain Frenkel and Schotky defects in crystals.
27. Derive the equation for the EMF of a concentration cell with transference.
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 °C. Calculate Van't Hoff's factor and degree of association of acetic acid in benzene.
29. What is asymmetric effect and electrophoretic effect of strong electrolytes?
30. Discuss the hydrolysis of salt formed from weak base and a strong acid and derive the equation for pH of that solution.

**(5 x 6 = 30 Marks)**

### Section D

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

31. a) Derive Bragg's equation,  
b) Briefly explain the Rotating crystal method and powder method for the determination of crystal structure
32. Explain the different applications of conductivity measurements.
33. Derive the expression for  $\Delta G$ ,  $\Delta H$  and  $\Delta S$  reversible cell. What is the use of these expression?
34. Write short note on
 

a) Non ideal solutions	b) Azeotropic mixtures
c) Depression in freezing point	d) Vant-Hoff's factor

**(2 x 10 = 20 Marks)**

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