D 40059 (Pages : 3) Name.....

Reg. No.....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2018

(CUCBCSS—UG)

Chemistry

CHE 6B 11—PHYSICAL CHEMISTRY–III

Time : Three Hours Maximum : 80 Marks

Section A

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

1. Write the equation relating equivalent conductance and concentration of a strong electrolyte.
2. Define electrochemical series.
3. What is a fuel cell ?
4. Write the Nernst equation for electrode potential.
5. Why is it necessary to use a salt bridge in a Galvanic cell ?
6. Define buffer capacity.
7. Why does specific conductance of a solution decreases with dilution ?
8. What is meant by imperfection or defect in a crystal ?
9. Which colligative property is preferred for the molar mass determination of macromolecules ?
10. Calculate the Miller indices for crystal planes with intercepts 2a, 1b, 3c.

(10 × 1 = 10 mark

Section B

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

. How will you determine ionic product of water by conductance measurement ?

. Explain the Lewis concepts of acids and bases.

Write down the electrode reaction and cell reaction in the following cell :

$Pt,H_2(g)$, H+(aq) // $Cl^-_{(aq)}$, AgCl, Ag.

Write two advantages of H_2-O_2 fuel cell over ordinary cell.

What is a standard cell ? Give an example.

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16. A 5% solution (by mass) of cane sugar (mol. mass 342) in water has a f.p of 271K. Calculate the f.p of 5% solution (by mass) of glucose (mol. mass 180) in water . F.p of pure water is 273.15K.
17. Why is a solution of ferric chloride is acidic ?
18. Under what condition van't Hoff factor is (i) equal to 1 and (ii) greater than one ? Explain your answer.
19. Evaluate the spacing between (111) planes in a face centred cubic lattice (edge length = a).
20. Specific conductance of a decimolar solution of NaCl at 25°C is 1.24 Sm^{-1}.The resistance of the cell containing solution was 65 ohm. What is the cell constant ?
21. What are liquid crystals ? How are they classified ?
22. Calculate the ionic strength of a solution containing 0.2 M NaCl and 0.1 M $BaCl_2$.

(10 × 2 = 20 mark

Section C

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

23. The specific and equivalent conductance of a saturated solution of of AgBr respectively are 2.4 10^{-7} S cm^{-1} and 140.3 S cm^{-2} eq^{-1}. Calculate the solubility of AgBr. The conductivity of water u for solution = 1.21×10^{-7} S cm^{-1}.
24. State and explain Kohlrausch's law of independent migration of ions. How can it be used to the degree of dissociation of a weak electrolyte ?
25. Explain Potentiometric titrations by taking examples of strong acid - strong base titration
26. Derive the Bragg equation.
27. Derive an equation to calculate the pH of a buffer solution.
28. Distinguish between ideal and non ideal solutions.
29. How can you determine the solubility product of a sparingly soluble salt usin measurement ?
30. 2.0g of benzoic acid in 25g of benzene show a freezing point depression of 1.62K. K_f of be 4.9K kg mol^{-1} Calculate the degree of association.

(5 × 6 = 3

Section D

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

31. (a) State and explain Faraday's laws of electrolysis.

(b) A current was passed in series through a solution of a salt of a metal X and a solution of $ZnSO_4$, using Pt electrodes. After a certain time 0.348g of X and 1.264g of Zn were deposited. Calculate the equivalent mass of X. Equivalent mass of Zn is 32.7.

32. (a) What are concentration cells ? How are they classified ? Give one example for each type and also write the electrode and cell reaction.

(b) Calculate the EMF of the cell : $Pt,Br_2(g ; 0.1 \text{ atm}) / Br^-(aq; 0.5 \text{ M}) / Br_2(g ; 1 \text{ atm}),Pt$ at 298K.

33. (a) Explain the terms :

(i) Colligative property.

(ii) Osmotic pressure.

(iii) Liquid junction potential.

(b) A solution containing 8.4g per dm^3 urea (molar mass = 60) is isotonic with a 5% solution of an organic nonvolatile solute. Calculate the molar mass of the latter.

34. (a) Discuss the principle and applications of EMF measurement in acid base titration.

(b) Briefly explain the stoichiometric defects in Crystals.

(2 × 10 = 20 marks)