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Name................................

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2017

Sixth Semester

Core Course — SOLUTION CHEMISTRY

(Common for B.Sc. Chemistry — Model I and Model II, B.Sc. Petrochemicals and
B.Sc. Chemistry — Environment and Water Management)

[2013 Admission onwards]

Time : Three Hours   Maximum Marks : 60

Section A

Answer all questions.
Each question carries 1 mark.

1. The ebullioscopic constant of a solvent is the ratio of the elevation in boiling point to _____.

2. Volume change of mixing for an ideal solution, ΔV mix = _____.

3. The pH of 0.0001 M HCl solution is _____.

4. The colour of methyl orange in alkaline solution is _____.

5. The unit of specific conductance is _____.

6. What is cell constant?

7. The electrode at which reduction occurs is called _____.

8. The cell potential becomes equal to E^0 when equilibrium constant is _____.
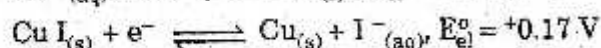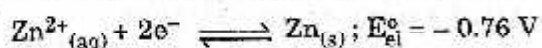
$(8 \times 1 = 8)$

Section B

Answer any six questions.
Each question carries 2 marks.

9. State Raoult's law.

10. What are isotonic solutions?

11. What are conjugate acid-base pairs? Illustrate with an example.

12. What is meant by salt hydrolysis?

13. The molar ionic conductance at infinite dilution of silver ions is 61.92×10^{-4} S m^2 mol^{-1} at 25° C. Calculate the ionic mobility of silver ions at 25° C at infinite dilution.

14. State Faraday's laws of electrolysis.

15. Discuss the temperature dependence of Ionic conductance.

16. Write the electrode reaction in quinhydrone electrode.

17. What is electrochemical series?

18. Given the following half-cell reactions :

$Zn^{2+}_{(aq)} + 2e^- \rightleftharpoons Zn_{(s)}$; $E^o_{el} = -0.76$ V

$Cu I_{(s)} + e^- \rightleftharpoons Cu_{(s)} + I^-_{(aq)}$, $E^o_{el} = {}^+0.17$ V

Calculate the standard potential E^o, of the cell $Zn, Zn^{2+}_{(IM)} \mid I^-_{(IM)}, Cu I ; Cu$.

$(6 \times 2 = 12)$

Section C
Answer any four questions.
Each question carries 4 marks.

19. The Henry's law constant for H_2 (g) in water is 5.34×10^7 torr. Calculate the solubility of this gas in water at $25°$ C, if its partial pressure over the solution is 760 torr. Assume that the density of the solution is same as the density of the solvent.

20. Using the Lewis acid-base concept, determine the trend in the acid strengths in the series $HCl O_4$, $HCl O_3$, $HCl O_2$.

21. A decinormal solution of $AgNO_3$ was electrolysed between platinum electrodes. After passing a small current for two hours, a fall of concentration of 0.00.51 24 gram equivalent occurred in the anodic solution. The mass of copper deposited in a copper coulometer placed in series was found to be 0.03879 g. Calculate the transport numbers of silver and nitrate ions in $AgNO_3$ [eq. mass of copper = 31.8].

22. Discuss the variation of molar conductance with dilution in the case of strong and weak acids.

23. Write note on electrolyte concentration cells.

24. What is over voltage? Discuss the application of over-voltage in corrosion of metals.

$(4 \times 4 = 16)$

Section D
Answer any two questions.
Each question carries 12 marks.

25. Discuss the vapour pressure properties of two immiscible liquids. How are these facts utilized in determining molar mass of a liquid by steam distillation?

26. Define the terms solubility and solubility product of a substance. Explain giving atleast four examples, the use of the concept of solubility product in qualitative analysis.

27. Discuss the Debye-Huckel theory of mean ionic activity coefficients. Derive the Debye-Huckel limiting law equation. How can this equation be verified?

28. Discuss four applications of EMF measurements.

$(2 \times 12 = 24)$

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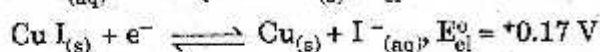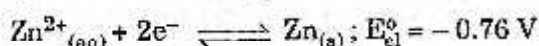$(8 \times 1 = 8)$

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