B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH/APRIL 2012

Sixth Semester

Core Course—SOLUTION CHEMISTRY

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

Time : Three Hours   Maximum Weight : 25

Section A

Answer all questions.
A bundle of four questions carries a weight of 1.

I. 1 Mathematical expression for Faraday's First law of electrolysis is ————.

   2 Standard Hydrogen electrode is ————.

   3 Rusting of Iron is due to the formation of ————.

   4 Henderson-equation for a buffer mixture of weak acid and its sat is ————.

II. 5 ———— is an example of Lewis acid.

   6 Henry's law is ————.

   7 An example for acidic buffer is ————.

   8 For an ideal solution, ΔG of mixing is ————.

III. 9 One example for concentration cell is ————.

  10 Indicator used in the Titration between Oxalic acid and NaOH is ————.

  11 Mention one use of Reverse Osmosis.

  12 Define Molality.

State whether the following statements are true *or* false :

IV. 13 Phenol water system posses lower convolute temperature.

  14 Liquid junction potential is increased by using salt bridge.

  15 Precipitation of a compound occurs when solubility product exceeds Ionic products.

  16 Aqueous solution of $CuSO_4$ is acidic.
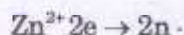
$(4 \times 1 = 4)$

Section B

Answer any five questions.
Each question carries a weight of 1.

17 Explain the principle involved in the conductance titration between Strong acid *vs.* Weak base.

18 How is Hydrogen oxygen fuel cells constructed ?

Turn over

19 Define Vant Hoff's factor. How is it related to the degree of dissociation of a solute ?

20 State and explain Nernst distribution law.

21 Write down the Nernst equation for electrode potential for the reaction :

$$Zn^{2+} 2e \rightarrow 2n \cdot$$

22 Explain Pearson's HSAB concept.

23 State and explain critical solution temperature.

24 Compare the laws of osmotic pressure with that of an ideal gas.

$$(5 \times 1 = 5)$$

Section C

Answer any **four** *questions.*
Each question carries a weight of 2.

25 Discuss Kohlrausche's law and its applications.

26 Calculate the osmotic pressure of an aqueous solution of Glucose containing 18 gm of it in 200 gm of water at 300 K ($R = 8.314K^{-1}mol^{-1}$).

27 Acetic acid CH_3COOH associates in Benzene to form double molecules. 1.65 of acetic acid when dissolved in 100 g of benzene raised the boiling point by 0.36^0. Calculate the Vant Hoffs' factor and the degree of association of acetic acid in Benzene (Molal elevation constant of Benzene is 2.57^0K kg mol^{-1}).

28 Given the following half cell reactions $Zn(s) + 2\bar{e} \rightarrow 2n^2(aq)$ $E^\circ el = -0.76$ V Cu I (s) + $\bar{e} \rightarrow Cu(s) + I^{\ominus}aq$ $E^\circ el = -0.17$ V. Calculate the standard potential E° of the cell.

29 Describe briefly how the solubility product of silver chloride may be determined by e.m.f. measurements.

30 Discuss on the theory behind the fractional distillation of Binary liquid-liquid solutions.

$$(4 \times 2 = 8)$$

Section D

Answer any **two** *questions.*
Each question carries a weight of 4.

31 (a) Outline Debye-Hückel's theory of strong electrolytes.

(b) Write briefly on potentiometric titrations.

32. Derive thermodynamically an expression for depression in freezing point. How can you determine the molecular mass of a solute using molal depression constant ?

33. (a) Construct a glass electrode and explain how will you determine the pH of a solution using it.

(b) How will you determine the transport number by Moving boundary method.

$$(2 \times 4 = 8)$$