E 5030 (Pages : 3) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, APRIL 2013

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.*

Each bunch of **four** *questions carries a weight of* 1.

I. 1 Faraday's constant is related to electrochemical equivalent by the relation ————.

2 Write the mathematical expression of Faradays IInd law.

3 Isotonic solutions are solutions with ————.

4 $\lambda\alpha$ for weak electrolyte is determined by using ————.

II. 5 ———— an example for Redox indicator.

6 Example for colligative property is ————.

7 Mathematical expression for Henry's law is ————.

8 The Quin hydrone electrode is represented as ————.

III. 9 Van't Hoff's factor i = ————.

10 The mathematical expression for equivalent conductance is ————.

11 Define critical solution temperature.

12 ———— is an example for Galvanic cell.

IV. State whether the following statements are True *or* False :

13 For titration between oxalic acid and Na_2CO_3 solution phenolphthalein is used as the indicator.

14 Specific conductance increases with dilution.

15 Abnormal molecular mass obtained for Benzoic acid is due to it exits as dimer.

16 One application of e.m.f. measurement is to determine the pH of a solution.

(4 × 1 = 4)

Turn over

Section B

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

17 Define Ionic mobility ? How is it related to ion conductivity.

18 Specific conductance decreases although the molar conductance increases with dilution. Why.

19 How does a basic buffer function ?

20 What do you mean by over voltage ?

21 What is liquid function potential ? How can it be minimized ?

22 Hydrogen and hydroxyl ion have abnormal ion conductivity ? Give reason.

23 What is reversible osmosis ? How can it be used in the purification of sea water.

24 Explain critical solution temperature taking phenol-water system as example.

(5 × 1 = 5)

Section C

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

25 The freezing point depression of a $\frac{1}{200}$ molal solution of sodium sulphate ($Na_2 SO_4$) in water was found to be 0.0265. Calculate the degree of dissociation of the salt at this concentration (K_f for water is 1.86° K kg mol^{-1}.

26 Discuss briefly on the principles involved in steam distillation ?

27 What are fuel cells ? Discuss briefly on the construction and working of hydrogen-oxygen fuel cells.

28 What do you mean by hydrolysis of salt ? Obtain an expression for degree of hydrolysis for a salt of strong acid and weak base.

29 Discuss the principles of potentiometric titrations in detail.

30 Write briefly on theory of acid base indicators.

(4 × 2 = 8)

Section D

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

31 Sketch the vapour pressure composition and Bpt composition curves of an ideal system and systems with +ve and –ve deviation.

(i) Explain fractional distillation using the above curve.

(ii) Why is not possible to separate completely the components of a binary liquid mixtures with positive deviation using fractional distillation.

32 What are concentration cells ? Derive expression for the e.m.f. of a concentration cell without transference.

33 (a) How are the transport number of ions determined by Hittorf's method.

(b) A buffer solution contains 0.2 mole of acetic acid and 0.25 mole of potassium acetate per litre. Calculate the change in pH of the solution of 0.5 ml of IN hydrochloric acid is added to it. The dissociation constant of acetic acid at room temperature is 1.8×10^{-5} (The volume change on adding HCl may be neglected.)

$(2 \times 4 = 8)$