

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.SC. FOURTH SEMESTER (January – June), 2012

Mid-Semester Examination, March 2012

Date : 20/03/2012

CHEMISTRY (General)

Time : 2 pm – 3 pm

Paper : IV

Full Marks : 25

[Answer separate Answer Books for each group]

Group – A

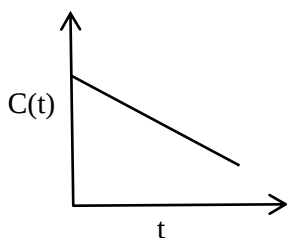
(Answer any one question)

1. a) Compare KMnO_4 and $\text{K}_2\text{Cr}_2\text{O}_7$ as an analytical reagent. [1½]
b) Write down the requirements of Gravimetric estimation. [1½]
c) Write notes on (any one) : [2]
 i) Applications of Common ion effect in analytical chemistry
 ii) Applications of Solubility Product Principle in analytical Chemistry
d) Carry out the following conversions : [2·5×2]
 i) D-glucose to D-Mannose
 ii) D-Arabinose to D-Glucose
2. a) Write short notes on : [2·5×2]
 i) Mutarotation
 ii) Osazone formation
b) i) Write down the principle of chromatography. [2]
 ii) What do you mean by R_f in chromatography [1]
c) Give examples of— [2]
 i) metal ion Indicator
 ii) Redox indicator
 iii) Acid-base indicator
 iv) Adsorption indicator

Group – B

(Answer any one question)

3. a) Draw the Carnot cycle in a P - V diagram. Also mention the paths. [2]
b) Establish the relation between K_p and K_C and therefrom obtain te appropriate equation to discuss the effect of pressure on the equilibrium. $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$ [3]
c) Show that the half life of a 2nd order reaction is inversely proportional to the initial concentration. [2]
d) In a chemical reaction the reactant concentration is found to depend on time as shown below.



What is the order of the reaction

[1]

4. a) State any one form of 2nd law of thermodynamics. [1]
- b) Calculate the change in entropy when 20 gms of ice at 0°C is converted into water at the same temp. [Latent heat of fusion of ice = 80 cal/gm] [2]
- c) i) Draw the energy profile diagram (plot of energy against reaction coordinate) for an one step exothermic reaction. [3]
[Show the transition state and the activation energy in the graph]
- ii) How would this change in presence of a positive catalyst. [1]
- d) How does the rate constant of a chemical reaction varies with temperature? [1]

Group – C

(Answer **any one** question)

5. a) pH of pure water is temperature dependent phenomenon. Explain. [2]
- b) The aqueous solution of sodium fluoride is alkaline whereas in case of sodium chloride it is neutral. Explain in terms of proton. [2]
- c) $\text{CS}_2\text{SO}_3 + \text{SOCl}_2 \xrightarrow{\text{SO}_2(\ell)}$ complete the reaction and explain with appropriate acid-base concept. [2]
- d) Write the conjugate acid, base of the following species HCO_3^- and CH_3OH . [1]
6. a) All Bronsted bases are Lewis bases but all Bronsted acids are not Lewis acid. Explain with example. [2]
- b) What do you mean by ionic product and ionisation constant of water. Explain mathematically. [2]
- c) Write down the mechanism of buffer action by taking example of both acidic and basic buffer. [2]
- d) Calculate the pH of a buffer a solution produced by mixing 0.01(M) CH_3COOH and 0.03(M) CH_3COONa . (Given pK_a of acetic acid = 4.8) [1]

