MBG-003-001103

Seat No. _____

B. Sc. (CBCS) (Sem. I) Examination

November / December – 2016

Chemistry : Paper-101

[Old Course]

Faculty Code : 003
Subject Code : 001103

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions:

1) There are **three** main questions, all are compulsory
2) Question **1** carries **20** marks
3) Question **2 and 3** are descriptive questions which carry **25** marks each

1. Answer the following questions **20 marks**

1. How many lone pair of electrons is present in NH_3 molecule?
2. What is the F-S-F bond angle in SF_6 ?
3. Higher the effective nuclear charge Z* across a period, the electron affinity will be _____
4. Pauling fixed _____ as the electronegativity value of Fluorine.
5. What is the geometry of PCl_5 molecule?
6. Which rule determines the stability of the product formed in an elimination reaction?
7. Name the product formed on oxidation of cyclohexane with alkaline $KMnO_4$
8. What is sorption?
9. Write the chemical equation for the reaction of methyl chloride with aq. NaOH
10. Write the structural formula of bicyclo 2,2,0 hexane
11. What is the pH of $1x10^{-3}$ M HCl solution?
12. Adsorption of oxygen gas over tungsten is an example of _____ adsorption
13. What is an open system?
14. Define : Isobaric process
15. Give an example of a salt of weak acid and strong base?
16. What if the normality of 0.5M H_2SO_4 ?
17. What is the value of Kw at 25^0C
18. Give an example of basic buffer
19. What is the common name for 2-chloro-2-methylpropane?
20. Define adsorbate

2. A) **Answer any three of the following:** (06)

a) Define electronegativity and electron affinity.

b) Write the electronic configuration of Cr and Cu^{+1}

c) Give the reactions of ethylbromide with (i) Na_2S (ii) CH_3CH_2ONa

d) Give the structural formula for bicyclo [2,2,2]octane and bicyclo [2,2,1]heptane

e) Explain trend in atomic radius across a row.

f) Give limitations of VBT

B) **Answer any three of the following:** (09)

a) Explain any three factors affecting ionization potential

b) Explain hybridisation in BH_3 molecule

c) Explain : transition elements are used as catalysts

d) Give the reactions of cyclopropane with (i) HCl (ii) Br_2 (iii) H_2/Ni

e) Explain Baeyer's Strain theory.

f) Explain E^1 reaction with mechanism

C) **Answer any two of the following:** (10)

a) Explain VSEPR theory

b) Explain atomic properties of elements of the first transition series

c) Explain Pauling's method for the determination of ionic radii

d) Give the difference between SN^1 and SN^2 reactions

e) Explain the different methods for the synthesis of small ring cycloalkanes

3. A) **Answer any three of the following:** (06)

a) Write two limitations of Freundlich equation

b) Explain closed and isolated systems

c) Give the conditions of primary standard solutions

d) Explain Lowry Bronsted Acids and Bases with suitable examples

e) The pH of HNO_3 solution is 2. Calculate the concentration of H^+ ions in the solution.

f) How many grams of Na_2CO_3 would be required to prepare 500 ml 0.05M solution? (At. wt. Na = 23, O=16, C=12)

B) **Answer any three of the following:** (09)

a) Explain the terms internal energy and enthalpy

b) State the zeroth law of thermodynamics.

c) Explain the different types of adsorptions.

d) Calculate pH for 0.1 M CH_3COOH solution. Ka for CH_3COOH is $1.8x10^{-5}$.

e) Define: Mole fraction, Molarity and percentage w/w

f) What is Joule Thomson effect, Thomson co-efficient and inversion temperature

C) **Answer any two of the following:** (10)

a) Define heat capacity and derive Cp-Cv=R

b) Write the difference between physical and chemical adsorption.

c) Derive the equation for relation between kh, kw and kb for salts of weak base and strong acid.

d) Define buffer solution. Explain mechanism of buffer solution.

e) Calculate pH of a buffer solution containing 0.2M CH_3COONa and 0.15 M CH_3COOH (Ka of $CH_3COOH = 1.8x10^{-5}$)