DC-003-001103   Seat No. _____

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

March - 2022

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.

(2) All questions are compulsory in very short answer and carry 20 marks.

(3) Question 2 and 3 are descriptive type and carry 25 marks each.

SECTION -1

1   ANSWER IN SHORT :   **20**

(1) Who discovered atomic number ?

(2) Define collision radius.

(3) What is the trend of electron affinity as compared with ionization energy?

(4) Who gave valance bond theory using Schrodinger equation and approximation method.

(5) The angle between H-C-H is 109°28' then it is _____ type of hybridization and if it is octahedral arrangement then it is _____ hybridization.

(6) Define shielding effect.

(7) What is Zigler-Natta catalyst and give its use ?

(8) In which type of organic reaction there is Walden inversion ?

(9) Give β-elimination reaction for dibromoethane.

(10) Give structure of a) Spiro[4,5] decane b) spiro [2,4] hepta-4,6-diene

(11) Give the reaction of oxidation of cyclo hexane with alkaline $KMnO_4$.

(12) Define and give example of Intensive Properties.

(13) What is State Function?

(14) Define Adsorption and Desorption.

(15) Define term Molarity and Molality.

(16) What is Normality ? Give its mathematical form.

(17) What will be equivalent weight of H_3PO_4, its molecular weight is 98gms.

(18) Define acid according to Arrhenius concept.

(19) Give example of buffer solution present in our body

(20) What is buffer capacity?

SECTION-II

2 (A) Explain any **three** of the following (Short Answers)   6

    (1) What will be the trend of ionization potential in the group and period ?

    (2) What is hybridization? Correlate it with energy of molecule.

    (3) Why the salts of transition elements are colorful.

    (4) What will be μ magnetic moment value of Ti^{+3} and Cr^{+2} ?

    (5) Give example of SN^1 type of reaction and draw energy diagram of it.

    (6) Give Williamson ether synthesis reaction.

(B) Explain any **three** of the following :   9

    (1) Explain isoelectronic ions citing examples.

    (2) Explain dsp^3 hybridization with example.

    (3) Transitional elements can be used as catalysts. Justify.

    (4) Differentiate E^1 and E^2 type of reaction.

    (5) Give 2 reaction for synthesis of cyclobutane.

    (6) Define Saytzaff's rule and give transition state mechanism.

(C) Explain any **two** of the following :   10
    (1) Explain Pauling's method for determination of iomc radii.
    (2) Explain VSEPR theory
    (3) Write note on nonstoichiometric and interstitial compounds.
    (4) Explain strain less theory of Sachse - Mohr.
    (5) Explain any one of the elimination reaction with mechanism.

3 (A) Explain any **three** of the following (Short Answers)   6
    (1) Define Bond Dissociation Enthalpy.
    (2) Give the limitations of Zeroth Law Of Thermodynamics
    (3) Give the limitations of Fraundlich's adsorption Isotherm.
    (4) What is the limitation of Langmuir's theory relating temperature
    (5) Calculate the Molarity of a solution containing 5 g of NaOH in 450 mL solution
    (6) The physiological saline is NaCI 0.9% (w/v) What is Molar concentration of NaCl in this solution? (A.Wt of Na: 23, Cl: 35.5).

 (B) Explain any **three** of the following :   9
    (1) What is Joule Thomson effect, Joule Thomson coefficient and Inversion temperature ?
    (2) Differentiate Physiorption from Chemisorptions any three differences.
    (3) Differentiate ppm and ppt.
    (4) What will be the molarity, if 212 gm Na_2CO_3 is dissolved in 10 lit. of water and how much dilution is required to prepare 0.05 mole of solution. (Na=23 C=12 0=16) ?
    (5) Give mechanism of acidic and basic buffer.
    (6) Define term mole fraction and calculate pH of 0.001M HCI solution.

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

    (1) Explain heat capacity and derive the relation at constant pressure and volume.

    (2) Explain in detail Langmuir's isotherm equation.

    (3) Commercial available concentrated HCl contains 38% HCl by mass and has density $1.19 gm/cm^3$. What is the molarity of the solution ? and what volume of it will be required to get 2 litre of 5M of HCl.

    (4) Derive the equation relating K_w, K_a and K_b and then derive pH value for the salt of weak acid and weak base.

    (5) Calculate the pH. of the buffer solution having 0.02mnole/lit. sodium acetate and 0,15 mole/lit. of acetic acid. K_a HAc is 1.8×10^{-5}.

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