

GANPAT UNIVERSITY  
M.Sc. First Semester Examination (C.B.C.S) Nov-Dec, 2014  
Subject: Chemistry (Organic)  
Paper: CHA 101 ICH Inorganic Chemistry

Time: 3 hours

Total Marks: 70

**Instructions:**

1. Attempt any three questions from each section, of which question No. 4 and 8 are compulsory
2. Answer each section in separate answer book.

**SECTION: I**

- ✓ 16/20/17
- Q-1 a. Derive secular equation by help of  $\frac{dE}{dc^2}$  07  
b. Prove that the Bond angle for Td molecule is  $109^{\circ} 28'$  of Hybridization 07
- Q-2 a. Write note on the wave function  $\Psi$  & its physical meaning 07  
b. Derive the equation  $E = \frac{n^2 h^2}{8ml^2}$  07
- Q-3 a. Write rules for setting up Quantum mechanical operator. 07  
b. Discuss postulate II for quantum mechanics. 07
- Q-4 Answer the following questions. 07  
a. Write the wave function for SP hybrid orbital  
b. Explain the physical importance of H<sub>11</sub> & S<sub>12</sub>.  
c. Explain the definition of the operators  
d. Calculate the magnetic momentum for [CoF<sub>6</sub>]<sup>3-</sup>  
e. Write uncertainty principle.  
f. Write the schrodinger equation for H<sub>2</sub><sup>+</sup> molecule.  
g. What is degeneracy.

**SECTION: II**

- Q-5 a. Explain factors affecting the stability of complex ion. 07  
b. Explain Bjerrum method. 07
- Q-6 a. Explain all the rules of multiplication are followed for H<sub>2</sub>O<sub>2</sub> (Trans planner). 07  
b. Explain the great orthogonality theorem for Irreducible representation. 07
- Q-7 a. Find out  $\sqrt{3N}$  ( $\gamma_{3N}$ ) following PoCl<sub>3</sub>, CO<sub>2</sub>, CH<sub>4</sub> 07  
b. Prove the following matrix are conjugate matrix 07  
$$A = \begin{bmatrix} 3 & 6 \\ 1 & 2 \\ 2 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 3 & 9 \\ 6 & 7 & 8 \end{bmatrix}$$
- Q-8 Answer the following questions. 07  
a. Give the definition of A<sub>2</sub> & B<sub>2</sub>.  
b. Give an example for C<sub>4v</sub> and D<sub>4h</sub> point group with symmetry element.  
c. Write the matrix for C<sub>n</sub> symmetry element.  
d. Explain in short thermodynamic stability.  
e. Explain in short Inverse matrix with example.  
f. What is reducible representation?  
g. Find out the point group and symmetric element by figure of Allene atom.

-----END OF PAPER-----

GANPAT UNIVERSITY  
M.Sc. First Semester Examination (C.B.C.S) Nov-Dec, 2014

Subject: Organic Chemistry

Paper: CHA-102 OCH - Organic Chemistry

Time: 3 hours

Total Marks: 70

Instructions:

1. Attempt any three questions from each section, of which question No. 4 and 8 are compulsory
2. Answer each section in separate answer book.

SECTION: I

✓ 16/20/17

- Q-1
- A. What is  $S_N2$  Mechanisms? Explain With Example. 7
  - B. State Huckel's Rules for determining whether a molecules is aromatic. Give at least four example 7
- Q-2
- A. How to analyze the Unsaturation by Bromination Method Explain in detail. 7
  - B. How to analyze the Amino Group by Acylation Method Explain in detail. 7
- Q-3
- A. What are Stereo Selective and Stereo Specific reaction? Discuss Stereo Specific Reaction with example 7
  - B. Discuss conformational analysis of Cyclohexane's and Halocyclohexanone. 7
- Q-4
- Give the following question answer 07
- A. Reactivity of substrates in the  $S_N1$  reaction.
  - B. Give the rules of Anti- Aromaticity
  - C. In  $E_1$  Reaction how many steps are occurs.
  - D. Give the Aromaticity of Cyclobutadienyl dication.
  - E. What is Chirality?
  - F. Give the Definition of Enantiomer.
  - G. Give the Definition of Diastereomers.

## SECTION: II

- Q-5      A. What is enantiotopic Ligand? Explain with suitable example.      7  
            B. What is Prostereoisomerisms? Explain with suitable example.      7
- Q-6      A. Give the Wallach Synthesis of Imidazole and also give the chemical      14  
            properties of Imidazole.
- Q-7      A. Explain Claisen Ester Condensation in detail.      7  
            B. What is Steric Hindrance? Explain the Steric Hindrance in      7  
            Esterification and Hydrolysis.
- Q-8      Give the following question answer      7
- A. Give the EAA Keto-Enol Equilibrium  
            B. What is Topicity?  
            C. What is Heterocyclic Compound?  
            D. Give the any two Biological importance of Heterocycle.  
            E. Give the Structure of Thiazole.  
            F. Give the structure of Oxetanes.  
            G. What is the side effect of Aziridine?

-----*Best Of Luck*-----

GANPAT UNIVERSITY

M.Sc. Chemistry (Organic and Analytical) Sem-I CBCS Regular Nov-Dec, 2014

CHEMISTRY

CHA 103 PCH - Physical Chemistry

[Time: 3 hours]

[Total Marks: 70]

Instructions:

1. Attempt any three questions from each section, of which question No. 4 and 8 are compulsory.
2. Answer each section in separate answer book

SECTION: I

- Q-1 (A) Discuss the variation of chemical potential with temperature and pressure. 7  
(B) Derive Gibbs – Duhem equation. 7
- Q-2 (A) Write a short note:- Gibbs adsorption isotherm. 7  
(B) The heat capacity,  $C_p$  (in  $\text{JK}^{-1}\text{mol}^{-1}$ ) of a substance is given by the following equations:  $C_p(\text{s}) = 16.74 \times 10^{-5} T^3$  ( $0 < T < 50\text{K}$ ),  
 $C_p(\text{s}) = 20.92$  ( $50 < T < 150\text{K}$ ),  $C_p(\text{l}) = 25.10$  ( $150 < T < 400\text{K}$ )  
At the melting point (150K),  $\Delta H_f = 1255.2 \text{ J mol}^{-1}$ . Calculate the absolute entropy of the substance in the liquid state at 300K. 7
- Q-3 (A) Calculate the fugacity of a gas at 450 atm. pressure and 300K 7  
[ $\alpha = -7.5 \times 10^{-4} \text{ dm}^3 \cdot \text{mol}^{-1}$ ]  
(B) Give the difference between chemisorptions and physical adsorption. 7
- Q-4 Attempt all: 7
- (a) What is the name of  $\gamma = \frac{\rho g h R}{2 \cos \theta}$  equation?
  - (b) Write a factor affecting on adsorption.
  - (c) What is the  $\Delta S$  of  $\text{H}_2\text{O}$  at  $100^\circ\text{C}$ ? [ $L_v = 40.627 \text{ KJ / mole}$ ]
  - (d) Write a slope value of  $x/m \rightarrow \log P$  graph?
  - (e) Write a third law of thermodynamics.
  - (f) Write a method for determining activity and activity coefficient.
  - (g) How many layers are adsorbed in a chemical adsorption?

**SECTION:II**

- Q-5 (A) Give the difference between smectic and nematic liquid crystal. 7  
(B) Write a short note: opposing reaction. 7
- Q-6 (A) Write a short note : Lindemann theory. 7  
(B) A second order reaction in which the initial concentrations at both  
The reactions are same is 25% complete in 600sec. How long will it  
take for the reaction to go to 75% complete? 7
- Q-7 (A) Write a short note : The glass state. 7  
(B) For a first order reaction, the rate constant is found to be  $7.0 \times 10^{-7}$  at  
 $7^\circ\text{C}$  and  $9 \times 10^{-4}$  at  $57^\circ\text{C}$ . Calculate the energy of activation and its  
specific reaction rate at  $127^\circ\text{C}$ . 7
- Q-8 Attempt all: 7  
(a) Solid changes in to turbid liquid is known as \_\_\_\_\_ .  
(b) Write the units of rate constant for  $n^{\text{th}}$  order reaction.  
(c) What is the order of reaction of  $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$ ?  
(d) What type of liquid crystal in soap?  
(e) Write a mean difference between Molecularity and order of reaction.  
(f) Write the unit of reaction rate.  
(g) Give the relation between half time and rate constant of  $2^{\text{nd}}$  order  
( $a=b$ ) reaction.

-----END OF PAPER-----

**GANPAT UNIVERSITY**  
**M.SC. FIRST SEMESTER EXAMINATION (C.B.C.S) NOV-DEC, 2014**  
**SUBJECT: ORGANIC / ANALYTICAL CHEMISTRY**  
**PAPER: CHA 104 BMA: BASIC INSTRUMENTAL METHODS OF**  
**ANALYSIS**

Time: 3 hours

Total Marks: 70

Instructions:

1. Attempt any 3 questions from each section, of which question No. 4 and 8 are compulsory.
2. Answer each section in separate answer book.

**SECTION – I**

- |     |   |   |   |
|-----|---|---|---|
| Q.1 | A | Draw the instrumentation of HPLC & explain each part.   | 7 |
|     | B | Give the classification of HPLC and explain each type briefly.  | 7 |
| Q.2 | A | Explain advantages and limitations of basic instrumental analytical methods.                              | 7 |
|     | B | Give classification of electrodes & explain the role of "salt bridge" in Potentiometric titration.        | 7 |
| Q.3 | A | Explain thin layer chromatography.  | 7 |
|     | B | Explain the selectivity of extraction.  | 7 |
| Q.4 | A | Give the full form of S.C.E.  | 1 |
|     | B | The cell which is having reference electrode & measuring electrode combined, is called _____ electrode.   | 1 |
|     | C | What is called as sensitive part of glass electrode?  | 1 |
|     | D | What is the full name of TLC?   | 1 |
|     | E | What is the name of the method used in tea making?  | 1 |
|     | F | Boiling of plant materials in water, and collecting the minerals & nutrients is which type of extraction? | 1 |
|     | G | Which material is used inside the column?   | 1 |

## SECTION – II

- Q.5 A Draw the instrumentation of polarimeter, explain each part & give qualitative and quantitative application. 7
- B Explain dropping mercury electrode. 7
- Q.6 A What is conductance? What are the factors affecting conductance? 7
- B Discuss Kohlrausch law. 7
- Q.7 A Explain stripping voltammetry. 7
- B Short note: Biamperometric titrations. 7
- Q.8 A Which lamp is used in polarimeter? 1
- B Which type of light is used in polarimeter? 1
- C The current used for conductometric instrument is AC/DC? 1
- D Conductance of ultra-pure distilled water is \_\_\_\_\_ S/m? 1
- E Give the full name of ORD and CD with respect to polarimeter. 1
- F What is the meaning of DME with respect to polarography? 1
- G Give the meaning of “id” and “il” with respect to polarography. 1

END OF PAPER