

**PGIS-O 1010 B-2K13**  
**M.Sc. Ist Semester Degree Examination**  
**Chemistry**  
**(Inorganic Chemistry - I)**  
**Paper - (CHEMT) 1.11**  
**(Old)**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates:-**Answer **all** the questions.All questions carry **equal** marks.

1. Answer the following : (8×2=16)
- a) Electron affinity of fluorine is less than that of Chlorine. Why?
  - b) Predict the solubility of  $BaCl_2$  and  $CaCl_2$  in acetonitrile.
  - c) Give the general electronic configuration and stable oxidation state of transition and inner transition elements.
  - d) Predict the existence of  $He_2^+$  and calculate its bond order and magnetic behaviour.
  - e) Write Born - Lande equation and mention its significance.
  - f) What is post precipitation? How it can be eliminated?
  - g) Write the structure of Ni - DMG complex and mention the conditions involved in its formation.
  - h) "Mohr's method is not suitable for iodides". Substantiate.
2. a) Illustrate the periodic variation of ionization potential and electro negativity. (5)

- b) What is radius ratio? Deduce the limiting ratio for an octahedral ionic solid. (5)
- c) Discuss the factors affecting ionic radii. (6)

**OR**

Explain the causes and consequences of lanthanide contraction.

3. a) Set up the Born - Haber cycle for the formation of CaO and explain the usefulness of the cycle. (5)
- b) Discuss the complexing behaviour of transition and inner transition elements. (5)
- c) Construct the MO diagram for  $O_2$ . Predict the stability, magnetic behaviour of  $O_2$ ,  $O_2^+$  and  $O_2^-$ . (6)

**OR**

With suitable examples Discuss the theory of the Complexometric titrations.

4. a) Discuss the advantages of organic reagents in gravimetric analysis. (5)
- b) Discuss the red - ox titrations. Give suitable examples. (5)
- c) Construct the MO diagram for  $NO_2^-$  ion having delocalized  $\pi$  - electrons. (6)

**OR**

Discuss the role of  $pH$  in various titration reactions.

5. a) Discuss the correlating properties of S and P block elements. (5)

- b) Explain the covalent character in ionic compounds. (5)
- c) Write the MO diagram for CO. Calculate its bond order and magnetic behaviour. (6)

**OR**

What is gravimetric ratio? Discuss the factors influencing the solubility of precipitate in gravimetry.

---

**PGIS-O 1012 B-2K13**  
**M.Sc. Ist Semester Degree Examination**

**Chemistry**

**(Organic Chemistry - I)**

**Paper - CHEMT - 1.22**

**(Old)**

Time : 3 Hours

Maximum Marks : 80

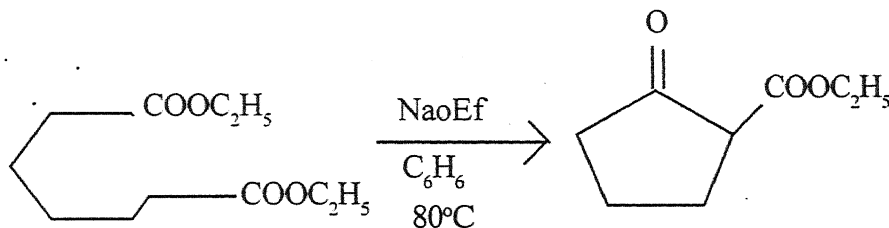
**Instructions to Candidates:-**

- i) All questions are compulsory.
- ii) All questions carry **equal** marks.

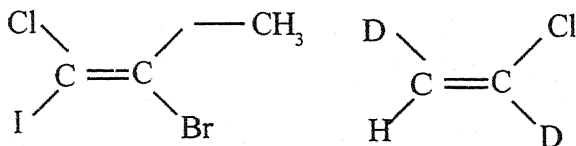
1. Answer the following.

**(8×2=16)**

- a) Why acetylenic protons are more acidic than ethylenic protons.
- b) State Huckel's rule of aromaticity. Give an example
- c) Give any two methods for the generation of free-radicals.
- d) Suggest appropriate mechanism for the following transformation.



- e) Write the stable Newman and saw horse projection formulae for 2-bromo-3-butanol.
- f) Assign E/Z configuration for the following compounds.



- g) Write the Haworth structure of sucrose.

- h) Give any two reagents for blocking -COOH group of amino acids in peptide synthesis.
2. a) Explain hydrogen bonding with at least two examples.  
 b) Discuss the geometry, bond angle and bond lengths in ethane, ethene and ethyne.  
 c) What are crown ethers? Explain their applications with suitable examples

OR

Discuss the aromaticity of the following compounds on the basis of Huckel's rule.

- i) [18]. Annulene.  
 ii) Tropylium cation.  
 iii) Cyclopentadienyl anion. (5+5+6=16)

3. a) Write an account of the formation, structure and stability of carbocations.  
 b) what is Reimer - Tiemann reaction? Explain its mechanism by taking suitable example.  
 c) Explain with the help of an appropriate example, how the cross-over experimental technique is useful in determining the mechanism of a reaction.

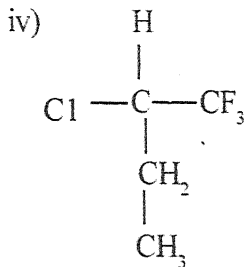
OR

Write note on:

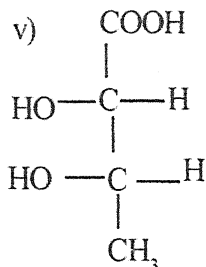
- i) Wittig reaction.  
 ii) Generation of aryne and its reactions. (5+5+6=16)

4. a) Match the following.

I		II
i) $\begin{array}{c} \text{CHO} \\   \\ \text{HO}-\text{C}-\text{H} \\   \\ \text{CH}_2\text{OH} \end{array}$	a)	R
ii) $\begin{array}{c} \text{COOH} \\   \\ \text{H}_3\text{C}-\text{C}-\text{OH} \\   \\ \text{C}_6\text{H}_5 \end{array}$	b)	S
iii) $\begin{array}{c} \text{H} \\   \\ \text{HO}-\text{C}-\text{CH}_3 \\   \\ \text{H}_3\text{C}-\text{C}-\text{Br} \\   \\ \text{H} \end{array}$	c)	R



d) 2S, 3R



e) 2S, 3S

- b) Discuss the stereochemistry of biphenyls with suitable examples.  
 c) Describe any two methods for determining configuration of geometric isomers.

**OR**

Give an account of the conformational analysis of cyclohexane with energy profile diagram. **(5+5+6=16)**

5. a) Discuss the use of  $\text{HIO}_4$  in the determination of ring size in D-glucose and D-Fructose.  
 b) Describe the Sangers method of end group analysis.  
 c) Write notes on  
 i) Double helical structure of DNA  
 ii) Isoelectric point of amino acids.

**OR**

Write an account of RNA and its biological functions. **(5+5+6=16)**

**PGIS-O 1017 B-2K13****M.Sc. Ist Semester (Non-CBCS) Degree Examination****Chemistry****(Analytical Chemistry and Mathematics for Chemist . )****Paper - CHEMT 1.44(A) and 1.44(B)****(Old)**

Time : 3 Hours

Maximum Marks : 80

**Instructions to Candidates:**

- 1) All questions are compulsory
- 2) Answer the questions Section A and B in separate answer books

**Section - A**

1. Answer the following : (6×2=12)
  - a) What is meant by eddy diffusion? Explain.
  - b) What is dialysis and gas diffusion in flow injection analysis?
  - c) Give the equation for dispersion 'D' used in flow injection analysis and mention the terms there in.
  - d) Define the terms accuracy and precision
  - e) Enumerate the variables that effect, the column efficiency
  - f) Write the effects of sampling uncertainties.
2.
  - a) Describe the working of peristaltic proportionate pump. (5)
  - b) Explain the factors affecting dispersion. Give the applications of medium dispersion. (5)
  - c) Draw a block diagram of automatic C, H and N analyser, label the components and explain its working. (6)

**OR**

- c) Draw the inter relation between capacity factor, selectivity factor and column resolution.

3. a) What are determinate and indeterminate errors? How these errors get propagated in addition, subtraction, division and multiplications? (5)
- b) What is F-test and t-test? For what purpose these tests are applied? Write the steps involved in applying these tests. (5)
- c) Draw the block diagram of motor for centrifugal fast scan analyser, label the components, describe their working in brief (6)

OR

- c) The amount of Mohr salt present in a given solution was determined volumetrically by titration against a standard solution of potassium permanganate. The results obtained in seven observations are as follows :
- 19.8, 20.2, 19.4, 19.6, 21.0 and 23.4 gram per litre. Determine if the suspect result 23.4 can be rejected or not.  $Q_{\text{critical}}$  for 6 observations at 90% confidence level is reported to be 0.52. (6)
4. a) Explain the different stages in sampling procedures. Write briefly about the sampling techniques for solids; gases and liquids. (5)
- b) Discuss the importance of eluents and absorbents in column chromatography. (5)
- c) Discuss the plate theory of chromatography.

OR

- c) Write a note on least square method of deriving calibrations plots. (6)

### Section - B

5. a) Find the derivative of  $\frac{2x^2 + 5x}{\sqrt{x}}$  (2)
- b) Evaluate the integral  $\int \frac{x}{(x^2 + 3)^2} dx$  (2)
6. a) Solve the system of equations

$$x + 2y + 3z = 14$$

$$3x + y + 2z = 11$$

$$2x + 3y + z = 11$$

(5)



b) Solve  $\frac{dy}{dx} = (4x + y + 1)^2$  (5)

c) Find the Fourier series for the function  $f(x)$  defined by

$$f(x) = \begin{cases} 0; & \text{for } 0 < x < \pi \\ 1; & \text{for } \pi < x < 2\pi \end{cases}$$

OR

Fit the straight line of the form  $y = a_0 + a_1x$  to the data points

x	1	2	3	4	6	8
y	2.4	3.1	3.5	4.2	5.0	6.0

(6)

---

**PGIS-O 1015 B-2K13****M.Sc. Ist Semester (CBCS) Degree Examination****Chemistry****(Analytical Chemistry)****Paper - CHEMT-1.4****(Old)**

Time : 3 Hours

Maximum Marks : 80

***Instructions to candidates:****Answer all the questions.*

1. Answer any **eight** of the following: **(8×2=16)**
- a) Define the term detection limit.
  - b) Calculate the absolute error and relative error in parts per thousand in the following:

Measured value	Accepted value
i. 22.62	22.57
ii. 45.02	45.31
  - c) Write the principle of estimating atmospheric sulphur dioxide using acid-base titration.
  - d) How does the pH affect the shape of the titration curve in complexometric titration?
  - e) Write the principle of Vohhard's method of precipitation titration.
  - f) Write Van-Deemter's equation and mention the terms there in.
  - g) What do you understand by precipitation from homogeneous solution?
  - h) What is chromatography?
  - i) Enumerate the variables that affect column efficiency.
  - j) List out the factors of an ideal precipitating agent in gravimetric analysis.
2.
  - a) Explain sampling hazards in chemical analysis. **(6)**
  - b) Classify the errors. Write the distribution of random errors in Guassian Curve. **(5)**
  - c) Write a note on correlation coefficient. **(6)**

OR

The normality of a solution is determined by four separate titrations, the results being 0.2041, 0.2049, 0.2039 and 0.2043. Calculate the mean, median, range, average deviation, relative average deviation and coefficient of variation.

3. a) Write a note on the determination of aluminium as oxinate by gravimetric method. (5)
- b) Discuss the role of non-aqueous solvents in non acid-base titrations. (5)
- c) Discuss the principle involved in the determination carbonic acid, esters amines and hydroxyl groups using acid-base titrations. (6)

OR

Explain the procedures that are routinely used to minimise.

4. a) Explain the use of chromate ions as indicator in Mohr's method of precipitation titration. (5)
- b) Discuss different methods of EDTA titrations. (5)
- c) Describe the factors influencing the stability of complexes. (6)

OR

Write a note on cyanide with  $\text{Ag}^+$  ion.

5. a) How is  $R_f$  value in TLC determined? Discuss variables that affect  $R_f$  value and indicate the significance of  $R_f$  value. (5)
- b) Write the characteristics of stationary phase and mobile phase in chromatography. (5)
- c) Discuss rate theory of chromatography. (6)

OR

Substances A and B have retention times 16.40 and 17.63 min. An unretained species passes through the column in 1.30 min. The peak widths (at baseline) for A and B are 1.11 and 1.21 min respectively. Calculate.

- i. Column resolution
  - ii. Average number of plates
  - iii. peak height
  - iv. Length of the column to achieve resolution 1.5
-