

# B.sc first year

## Chemistry

### First paper

#### (inorganic chemistry)

**NOTE** - Attempt question from all the section.

#### Section-A

#### (Short answer type question)

Explain Heisenberg uncertainty principle.

What is Lattice defect ?

- 1- Define ionic radii and ionization potential.
- 2- Explain Fajan's rule.
- 3- What are vander waals forces and covalent radii?
- 4- Discuss fluorides of Xenon?
- 5- What are fullerenes?
- 6- Differentiate between orbit and orbital.
- 7- Discuss basic properties of halogens.
- 8- Explain Aufbau principle and on this basis, arrange the following orbitals in order to their increasing to multi electron atom.

1s, 3s, 5s, 2p, 4p, 3d, 4d, and 5f,.

11- Why orbitals like 1p, 2d and 3f are not possible? Explain.

12- What do you mean by isoelectronic ions?

Arrange Na,  $Mg^{+2}$ ,  $O^{-2}$  and  $F^{-}$  ions in the decreasing order of their size.

13- Explain polarization, polarizing power and polarisability of ions.

14-  $H_2O$  molecule has V-shaped geometry and bond angle is  $104.5^\circ$ . explain.

15- What is the hybridization state of Cl atom in  $ClF_3$  molecule? Explain geometry of  $ClF_3$  molecule.

16- Draw molecular orbital energy level diagram for CO molecule and calculate its bond order.

17- What is diagonal relationship? Explain with examples.

18- Name the elements, along with their electronic configuration of I and II group of the periodic table.

19- Explain Pauli exclusion principle.

20- Explain Lattice defects

21- Explain the structure of sodium chloride crystal.

22- Define van der Waals radius.

23- Calculate the lattice energy of sodium from the following data-

$\Delta H_f = 104.2 \text{ Kcal/m}$ ,  $S = 21.5 \text{ Kcal/m}$ ,  $\Delta = 57.8 \text{ kcal/}$ ,  $IE = 101.6 \text{ cal/m}$ ,  $E.A = -87.3 \text{ Kcal/m}$

### Section-B

#### ( Long type question)

1- Write short note on the following.

(a)- Types of hybridization.

(b)- Properties and structure of  $\text{XeF}_4$ .

(c)- Structure of Diborane.

2- Explain molecular orbital theory in detail sketch the molecular diagram of  $\text{N}_2$  molecule and calculate its bond order.

3- Explain-

(a)- Hydrogen bonding

(b)- Quantum Numbers

4- Write down the electronic configuration preparation and properties of alkali and alkaline earth metals.

5- Explain the following.

(a)- Electron deficient molecules.

(b)- Electron deficient molecules.

(c)- Hydrides of Boron are called Boranes, why?

(d)- (2C-2e) and (3C-2e) bond in the structure of di borane

6- Define electron affinity, what are the factors that affect the magnitude of electron affinity? Discuss the variation of electron affinity in a group and in a period of periodic table.

7- Write name and valence shell configuration of noble gases and give structure of following compound;

(i)-  $\text{XeF}_4$  (ii)-  $\text{XeF}_6$  (iii)-  $\text{XeOF}_2$

8- What do you mean by quantum numbers? Explain all the four quantum numbers.

9- Write short notes on any three of the following;

(i)- Band theory of metals.

(ii)- Borazine

(iii)- Di borane

(iv)- Inter halogen compounds.

(v)- Effective nuclear charge.

10- What is valence shell electron pair repulsion theory? Discuss structure of  $\text{ClF}_3$ ,  $\text{ICl}_2$ ,  $\text{H}_3\text{O}^+$ .

9- What is hydrogen bonding? Discuss theories types and applications of hydrogen bonding.

10- Derive Schrodinger wave equation and explain significance of  $\Psi$  and  $\Psi^2$ . Explain MO diagram of CO.

**B.sc first year**  
**Chemistry**  
**Second paper**  
**( Organic chemistry)**

**NOTE** - Attempt question from all the section.

**Section-A**

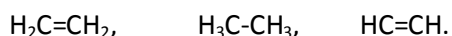
**(Short answer type question)**

- 1-(a) - Discuss the stability of carbonium ion.
- 2-(b)- Explain why chloroacetic acid is more acidic than acetic acid.
- 2-(c)- Explain the following.
  - (i)- Electrophiles reagent.
  - (ii)- Nucleophiles reagent.
- 3- Why cyclopentane is more stable than cyclobutane?
- 4- What are the isolated , conjugated and cumulated dienes ?
- 5- Explain the following?
  - (i)- Homolytic bond fission.
  - (ii)- Heterolytic bond fission.
- 6- Distinguish between  $SN^1$  and  $SN^2$  reaction.
- 7- What is Diels- Alder reaction?
- 8- Discuss Corey- House reaction.
- 9- Write chemical reactions only.
  - (i)- Carbylamine reaction.
  - (ii)- Wurtz reaction.

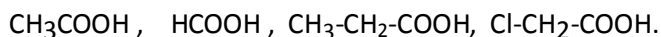
- 10- Explain Huckel's rule of aromaticity with examples.
- 11- Explain why Dimethyl amine is more basic than methyl amine.
- 12- Explain why propane is more stable than ethylene.
- 13- Explain the following.
- (i)- Heterolytic bond fission.
- (ii)- Electrophiles.
- 14- Calculate the formal charge at the carbon of CH<sub>4</sub> and at the Nitrogen of NH<sub>4</sub>(+).
- 15- Represent the configuration of the following compound by E and Z laws.



- 16- Why are the isolated, conjugated and cumulated dienes?
- 17- Arrange the following in increasing order of their acidity and explain it.



- 18- What happens when Toluene reacts with chlorine (write chemical reactions only)
- (i)- At high temperature, in presence of light and in absence of catalyst.
- (ii)- At low temperature, in absence of light and in presence of Lewis acid.
- 19- (a) Explain threo and erythro isomers.
- (b) What do you mean by hyperconjugation?
- (c) Write the following acids in the increasing order of their acidity.



- 20- (a)- What is Racemization.
- (b)- Give the preparation of cycloalkane by Dieckmann's method.
- (c)- Give the structural formulas of D.D.T and B.H.C.
- (d)- Explain why CCl<sub>4</sub> is non polar, whereas CHCl<sub>3</sub> is polar.
- 21- (a)- B.P of which is higher in n-pentane and isopentane and why?
- (b)- What is Ziegler-Natta polymerization?

## Section-B

### ( Long answer type questions )

- 1- What is meant by Hybridization? Discuss the hybridization in ethylene and acetylene.
- 2- Describe the Baeyer's strain theory. What are its limitations and what modifications have been done in it to develop the theory of strain less rings.
- 3- Write short note on any four of the following.
  - (i)- Field effect.
  - (ii)- Inclusion compounds.
  - (iv)- Banana bond
  - (v)- plane of symmetry.
  - (vi)- Erythro and threo Diastereomers.
  - (vii)- Ozonolysis.
- 4- Explain the following mechanism of benzene.
  - (i)- Sulphonation
  - (ii)- Nitration
- 5- Write short note on any four of the following.
  - (i)- Difference between inductive and field effect.
  - (ii)- Stability of singlet and triplet carbenes.
  - (iii)- H- Bond.
  - (iv)- Resonance.
  - (v)- Structure of Benzyne.
  - (vi)- Charge transfer complexes
- 6- Explain the following.
  - (i)- Ozonolysis
  - (ii)- Diels- Alder reaction.
- 7- Explain the following mechanism of benzene.
  - (i)- Halogenation

(ii)- Friedel- crafts alkylation.

8- Explain the following.

(i)- Huckel's rule and aromaticity.

(ii)- Elimination-addition mechanism ( Benzyne mechanism) of aryl halides.

9- Explain the following.

(i)- Birch reduction.

(ii)- Friedal craft acylation

(iii)- Side chain reaction.

10- (i)- Give the mechanism of murcuration of Benzene.

(ii)- Resolution.

(iii)- Bayer's strain theory.

(iv)- Benzyne and carbene.

(v)- peroxide effect

(vi)- Methods of determination of reaction mechanism.

# B.sc first year

## Chemistry

### Third paper

#### (Physical chemistry)

**NOTE** - Attempt question from all the section.

#### Section-A

#### (Short answer type question)

- 1- Find the value of  $25.2 \times 0.15$  with the help of log table.
- 2- Evaluate  $d/dx (5e^x - 5\log x)$ .
- 3- Define the following.
  - (i)- Hard ware
  - (ii)- Soft ware

Find the R.M.S. velocity of  $O_2$  molecules at  $27^\circ C$ .

- 4- Explain the protective action of colloids.
- 5- Extend the following:
  - (i)- VDU
  - (ii)- RAM
  - (iii)- PU
  - (iv)- ROM
- 6- Write two applications of liquid crystals.
- 7- Define the term molecularity of a reaction.
- 8- Explain Induced catalysis with examples.
- 9- Calculate the difference of coefficient of function  
 $Y = e^x \log x + a^x$
- 10-What are hardware and software.
- 11-Write the RMS velocity of  $O_2$  at  $27^\circ C$ .
- 12- Write the applications of seven segment display.
- 13- Define the peptization.



14- Explain the powder method for structure determination of crystals.

15- Define the temperature coefficient.

16- Explain the pseudo order mono molecular reaction.

17- Differentiate between reaction rate and specific rate of reaction.

18- Define the kinetic theory of gases.

19- Explain the average, root mean square and most probable velocities.

20- Define the Miller Indices.

### **Section-B**

#### **(Long answer type question)**

1- (a)- Derive an expression for the velocity constant of second order reaction.

(b)- A first order reaction completes 50% in 10 minutes. Find out the velocity constant of the reaction.

2- Derive Vander Waal's equation; write down the units of Vander Waal constants. Explain the behavior of real gases at high and low pressures on the basis of Vander Waal's equation.

3-Write short notes on any four of the following;

(i)- Emulsions and Gels

(ii)- Gold numbers

(iii)- Applications of colloids

(iv)- Bredig's method of preparation of colloidal sol.

(v)- Order and Molecularity of reaction.

4-(a)- Find the Wave length of X- ray which have the diffraction angle  $Q = 8.40^\circ$  for a crystal. The inter planer distance of the crystal is 0.22nm and diffraction is first order ( $n=1$ ).

(b)- Explain the terms.

(i)- Miller indices.

(ii)- Space lattice

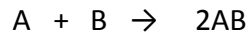
(iii)- Unit cell

5- Derive an equation to show the relation between critical constant and Vander Walls constants.

6- (a)- Write the classification of liquid crystals .

(b)- Explain the Eyring's theory to explain the structure of liquids.

7- Derive an equation for rate constant of second order reaction.



Conc. Of A = X mole/litre.

Conc. Of B = Y mole/ litre.

8- Write comments on any three.

(a)- Operating system

(b)- Liquification of Gases

(c)- Cohesive force.

(d)- Protective colloids.

9- Write comments on any three.

(a)- Brownian movement

(b)- Tyndal effect

(c)- Electrophoresis

(d)- Gels.

**B.sc Second year**  
**Chemistry**  
**First paper**  
**(inorganic chemistry)**

**NOTE** - Attempt question from all the section.

**Section-A**

**(Short answer type question)**

- 1- Compare the ionic radius of Zn, Cd and Hg of second transition series.
- 2- Why transition elements show variable valency?
- 3- Why Zn, Cd and Hg complexes are generally colourless?
- 4- Explain frost diagram with examples.
- 5- Explain oxidation reduction with examples.
- 6- Explain the oxidation states of second and third transition series elements.
- 7- Explain co-ordination isomerism and hydrate isomerism with examples.
- 8- Explain Bronsted- Lowry principle with examples.
- 9- How many type of chemical reactions is possible in non –aqueous solvents.
- 10- How will you show the [ Co (NH<sub>3</sub>)<sub>5</sub>SO<sub>4</sub>] Cl are Ionization isomers.
- 11- Why second and third transition series. Elements like Zr, Hf, Nb and Ta show similar ionic radii?
- 12- What do you mean by inner d-orbital and outer orbital complexes? Give one example of each.
- 13- Draw a frost diagram for mercury in acid solution from the following Latimer diagram.  
$$\begin{array}{ccccccc} \text{Hg}^{+2} & 0.9'' & \text{Hg}_2^{+2} & 0.796 & \text{Hg} & & \\ & \rightarrow & & \rightarrow & & & \end{array}$$
- 14- What is d-d electronic transition? Explain the color of [ Ti (H<sub>2</sub>O)<sub>6</sub>]<sup>+3</sup> ion.
- 15- Classify bidentate ligands and give one example of each.
- 16- Give a brief account of Lux-flood concept of acid and base.
- 17- What are transuranic elements?
- 18- What is the oxidation number of Cr in CrO<sub>2</sub>Cl<sub>2</sub> and K<sub>2</sub>CrO<sub>4</sub>.
- 19- What are ionizing and non-ionising solvents?
- 20- Differentiate between a ligand and a chelate.
- 21- What is Co-ordination number?
- 22- Cu<sup>+2</sup> is more stable than Cu<sup>+</sup> explain.

**Section –B**

**(Long type question)**

- 1- (a)- Write the IUPAC name of the following compound;  
(i)- [ Co (en)<sub>3</sub>]<sub>2</sub> (SO<sub>4</sub>)<sub>3</sub>

- (ii)-  $K_4[ Ni (CN)_4]$   
(ii)-  $[Cr (NH_3)_6] [ CoF_6]$   
(b)- Write the formula of the following compounds.  
(i)- Iron hexacyano ferrate (III)  
(ii)- Triammine trinitro cobalt (III)  
(iii)- Hexa aquo nickel (II) Perchlorate  
(iv)- Dichloro bis ( ethylene diammine) Copper (II)
- 2- What is optical isomerism? Explain in octahedral complexes.  
3- What are actinides? Why they called actinides? Write in detail.  
4- Write general characteristics of d- block elements.  
5- Write the IUPAC name of the following .  
(i)-  $NH_4[ Cr (SCN)_4 (NH_3)_2]$   
(ii)-  $[ Cr (NH_3)_4 (CN)_2 [Cr (NH_3)_2 (CN)_4]$   
(iii)-  $[Pd (H_2O)_2 (ONO)_2 I_2]$ .
- (b)- Explain the following on the basis of redox potential data.  
(i)- Displacement of metals.  
(ii)- Displacement of the hydrogen by elements.
- 6- (a)- Draw all the geometrical and optical isomers of the following.  
(i)-  $[ CoCl_2 (en)_2]^+$   
(ii)-  $[ Co(NH_3)_2Cl_2 (en)]^{+2}$   
(iii)-  $[ Co (NH_3)_2Cl_2 (en)]^+$   
(b)- Discuss the formation and structure of the following complexes on the basis of V.B theory.  
(i)-  $[ Fe (CN)_6]^{-3}$   
(ii)-  $[ Ni (CN)_4]^{-2}$
- 7- (a)- Give an account of Werner's theory of co-ordination compound. How is it verified experimentally? What further improvements did Sidgwick make in it?  
(b)- Give an example of hexadentate ligand and show its bonding with central metallic atom.
- 8- Write short notes on any four of the following;  
(i)- Interstitial compounds of transition elements.  
(ii)- Lanthanide contraction and its consequences.  
(iii)- Separation of Lanthanides by ion exchange method.  
(iv)- Colour of  $Ti^{+4}$ ,  $Cr^{+2}$ ,  $Fe^{+2}$ ,  $Cu^{+2}$  and  $Ag^+$  ions.  
(v)- Linkage and co-ordination isomerism.
- 9- (a)- Explain Lanthanide contraction and effect of contraction.  
(b)- Explain complex formation by lanthanides.
- 10- (a)- Explain redox potential data applications in detail.

(b)- Explain redox cycle with its analysis .

11- (a)- What are chelates and effective atomic numbers? Explain with examples.

(b)- Explain geometrical isomerism with examples.

12- (a)- Explain Lewis concept and classification.

(b)- Explain physical properties and general characteristics.

## B. Sc. Second year (II)

### Chemistry

### Second paper

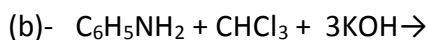
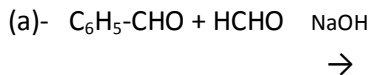
### ( organic chemistry II)

**Note-** Attempt question from all the section.

#### Section-A

#### (Short type questions)

1- Complete the following reactions.



2- How will you obtain any two of the of the following from urea?

(a)- Barbituric acid

(b)- Semicarbazide.

(c)- 4- Methyl Uracil

3- Explain Libermann's nitroso reaction.

4- Write down the substitution reaction of benzene nucleus in aromatic aldehydes and ketones.

5- How will you convert.

(a)- Benzene into T.N.T.

(b)- Benzene into Toluene.

6- How will you obtain primary, secondary, and Tertiary alcohol from Grignard reagents.

7- What happens when.

(a)- on heating Lactic acid with HI.

(b)- Allyl alcohol react with Bromine.

(c)- On heating ethylene cyanohydrin with  $\text{H}_2\text{SO}_4$ .

(d) – On heating Dicarboxylic acid with  $\text{H}_2\text{SO}_4$ .

8- Write IUPAC name.

(a)-  $\text{CH}_3\text{-NH-C}_2\text{H}_5$

(b)-  $\text{CH}_3\text{-N-CH}_3$

!

$\text{CH}_3$

(c)-  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{.NH}_2$

(d)-  $\text{C}_6\text{H}_5\text{-CH}_2\text{-NH}_2$

9- Write the following name reaction.

(a)- Gattermann reaction.

(b)- Sandmyer's reaction

(c)- Perkin reaction.

10- (a)- Finger print region.

(b)- Chromophore.

(c)- Auxochrome.

11- How is lactic acid prepared in laboratory? What is the action of the following on lactic acid  
Acetyl chloride, dil.  $\text{H}_2\text{SO}_4$  oxidising agents; HI, Heat and  $\text{PCl}_5$ .

12- How is salicylic acid prepared? How would you convert it in to phenol. Benzene, Benzoic acid, Aspirin and oil of winter green. what are its medicinal uses?

13- What are amine? How are they classified? Discuss the general the methods of their preparation and properties.

14- Write balanced equations for the following reaction.

(i)-  $\text{C}_2\text{H}_5\text{NH}_2 + \text{CHCl}_3 + \text{KOH} \rightarrow$

(ii)-  $\text{R-CH} + \text{Sn/Hcl}$ .

(ii)- Propionamide + Br<sub>2</sub> + 4KOH

(iv)- Methyl amine + sodium.

15- Give three method of preparing primary aliphatic amines. How may the different isomers of C<sub>3</sub>H<sub>9</sub>N be separated from one another by Hofmann method. Why secondary amines are more basic than primary amines.

16- What is the action of heat on.

(i)- Oxalic acid

(ii)- Succinic acid

(ii)- Malonic acid

17-What happens when the following are heated?

(i)- Ammonium acetate

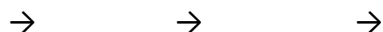
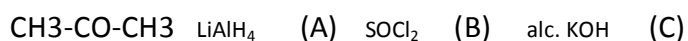
(ii)- Calcium acetate

(iii)- Calcium formate

(iv)- Sodium formate

18- what is the order of reactivity of benzaldehyde, benzophenone and acetophenone towards nucleophilic reagent.

19- Discuss the general mechanism of nucleophilic addition of aldehydes. Identify the product (A), (B) and (C) in the following set of reaction.



20-Why phenacetin is manufactured by recycling process utilizing phenol.

### Section-B

#### (Long answer type question)

- 1- Give the principal and applications of U.V spectroscopy.
- 2- Give mechanism of the reactions.

(i)- Aldol condensation



(II)- Houben- Hoesh reaction

(III)\_ Claisen-rearrangement.

(iv)- Reimer-Tiemann reaction

3- What is Glycol? Write preparation, properties and uses of ethylene glycol and explain.

4- How will you distinguish the following from one another

(I)- Ethyl carbinol from dimethylcarbinol

(II)- Propanol-1 from propanol-2

(iii)- 2-Methylpropanol-2 from 2-methylpropanol-1

(iv)- Methyl alcohol from ethyl alcohol.

5-(a)- How salicylic acid is prepared from

(i)- Anthranilic acid,

(ii)- phenol &  $\text{CCl}_4$ .

(b)- How salicylic acid is converted to.

(i)- Salol,

(ii)- Pimelic acid.

(iii)- Aspirin

5- What is the action of phenol on the following reagents;

(i)- Caustic soda

(ii)- Bromine

(iii)-  $\text{PCl}_5$

(iv)- Acetyl chloride

(v)- Nitric acid

6- Give two methods for the preparation of an aldehyde which is found in the oil of bitter almond.

7-Write down the two geometrical isomers of the product formed in Perkin reaction of salicylaldehyde.

8- How is salicylic acid prepared? How would you convert it in to phenol, Benzoic acid, Aspirin and oil of winter green. What are its medicinal uses?

9- How will you convert the following;

(i)- Nitrobenzene to o-dinitrobenzene

(ii)- Toluene to trinitrotoluene

(iii)- O-Dinitrobenzene to o-nitrophenol

(iv)- p-Nitrotoluene to m-Nitrotoluene

(v)- m- Dinitrobenzene to m-Nitroaniline.

10- Write short notes on

(i)- Carbylamine reaction

(ii)- Mustard oil reaction

(iii)- Gabriel's phthalimide reaction.

# **B.sc Second year**

## **Chemistry**

### **Third paper**

#### **(Physical chemistry)**

**NOTE** - Attempt question from all the section.

#### **Section-A**

##### **(Short answer type question)**

- 1- Describe the Kirchhoff's equation.
- 2- Derive Vant Hoff reaction isochore from thermodynamic consideration.
- 3- What is Le-Chatelier's Principle ?
- 4- Define Ostwald's dilution law, its uses and limitations.
- 5- What is meant by specific and equivalent conductivity of an electrolyte ?
- 6- What is Handerson Hazel equation?
- 7- Calculate the increase in entropy when one gram molecular weight of ice at  $0^{\circ}$  melt to form water. Latent heat of fusion of ice= 80 calories.
- 8- What is Kohlraush's law? Explain.
- 9- Explain hydrolysis and degree of hydrolysis.
- 10-Derive Nerst's equation for using it determine E.M.F of a cell.

#### **Section-B**

##### **(Long Answer type Questions)**

- 1- (a)- Clausius- Clapeyron equation and its application.  
(b)- Define Nerst distribution law and its application.
- 2- Define and explain the terms phase component and the degree of freedom. Draw the phase diagram of sulphur system & describe it.
- 3- What is Metal corrosion? Mention the factors influencing metal corrosion. Discuss the various theories of metal corrosion.
- 4- Explain the third law of thermodynamics. What are the exceptions to this law? Discuss the applications of this law.

5- What do you understand by concentration cell with and without transport? Derive an equation for EMF of a concentration cell without transport.

**B.sc Third year**  
**Chemistry**  
**First paper**  
**(inorganic chemistry)**

**NOTE** - Attempt question from all the section.

**Section-A**

**(Short answer type question)**

- 1- What Drago-Wayland theory of hardness and softness? Explain it.
- 2- Explain d<sup>2</sup> complexes with Orgel energy level diagram.
- 3- What are the differences between Curie's and Curie-Weiss laws?
- 4- Write uses of silicone resins.
- 5- What do you mean by L-S coupling?
- 6- Write important uses of magnetic moment data.
- 7- How is J<sub>0</sub>J coupling different from L-S coupling?
- 8- Explain the basic strength of ligands and thermodynamic stability of complexes.
- 9- Explain the thermodynamic aspects of metal complexes.
- 10- Explain the thermodynamic aspects of metal complexes.
- 11- What is crystal field splitting energy?
- 12- What are soft acids? Explain with examples.
- 13- What do you understand by inorganic polymers.
- 14- Explain chelate effect.
- 15- What do you understand by magnetic susceptibility?
- 16- Write a note on Nitrogen fixation.
- 17- Write a note on 18 electron rule.

- 18- Give the preparation methods of ethylenic metal complex compound.
- 19- Explain the ground state term symbol of  $3F_2$  .
- 20- What do you understand by inorganic polymers.
- 21- Give the structure of  $(N\text{PCl}_2)_3$  molecule.
- 22- Explain HF is a weak acid while HI is a strong acid.

### Section –B

#### ( Long type question)

- 1- Give the preparation and properties of silicons .
- 2- What is stability constant ? Give the factors affecting it.
- 3- What do you understand by electronic transitions? Give its types.
- 4- What are organo-metalic compound? Give its classification.
- 5- Write an essay on crystal field theory.
- 6- Derive relation between stepwise and overall stability constant's . Explain stability and unstability constant with examples.
- 7- Explain VBT in detail.
- 8- Discuss the mechanism of substitution in square planer complexes.
- 9- Write short note on any three of the following
  - (i)- Phosphazenes.
  - (ii)- Silicon resins
  - (iii)- Chemical processes to fix nitrogen
  - (iv)- Alkyl lithium
- 10- (a)- In  $[\text{Fe}(\text{CN})_6]^{-4}$  and  $\text{Fe}[(\text{CN})_6]^{-3}$  Complex ions which have more  $\Delta_0$  value, and why?
  - (b)- The aqueous solution of  $[\text{Co}(\text{H}_2\text{O})_6]^{+2}$  is pink. Explain with help of absorption spectra.

## Bsc Third year(III)

### Chemistry

#### Second paper

#### ( organic chemistry )

**Note-** Attempt question from all section

#### Section – A

#### ( short answer type question)

- 1- Write short note on saponification value.
- 2- Write short notes on sulphonates.
- 3- Explain the PMR spectra of 1,1,2 Tribromethane.
- 4- Write the short notes on vulcanization of rubber.
- 5- How many NMR signals would be give by  $(\text{CH}_3)_2\text{CH}_2\text{CHCH}_3$  ?
- 6- Complete the given reaction.  
$$\text{CH}_3\text{-CO-CH}_2\text{-CH}_2\text{-CO-CH}_3 \xrightarrow{\Delta} \text{A} + \text{B}$$
- 7- Write short notes on peptide linkage.
- 8- Explain isoelectric point of amine acid.
- 9- Explain the malachite green.
- 10- Write one preparation of furan.
- 11- With the help of methyl lithium how can you prepare the ethanol?
- 12- Write short notes on enolates.
- 13- Write short notes on hydrogenation of oil.
- 14- Write short notes on detergents.
- 15- How many NMR signals would be give by  $(\text{CH}_3)_2\text{CH}_2\text{CHCH}_3$ .
- 16- Write short notes on peptide linkage.
- 17- Complete the given reaction.  
$$\text{R-Mg-X} + \text{H-C(OC}_2\text{H}_5)_3 \xrightarrow{\text{H}_2\text{O}} \text{A} \rightarrow \text{B}.$$
- 18- With the help of methyl lithium how can you prepare the ethanol?
- 19- Write short notes on enolates.
- 20- Explain isoelectric point of amino acid.
- 21- Write notes on sping-sping coupling.
- 22- Write the one prepration of furon.
- 23- Write notes on poly saccarides.
- 24- Identify different protons in following compound.  
$$\text{CH}_3\text{CBr=CH}_2$$

## Section-B

### (Long answer type question)

1-Discuss the constitution and synthesis of indigo. Which isomer of indigo is more stable and why?

2- (a)- What are Ziegler-Natta catalysis? Discuss their importance in the formation of addition polymer.

(b)- Describe the method for the synthesis of dipeptide of  $\alpha$ -amino acid.

(c)- Explain the Ribonucleoside.

3-(a)- Describe electronic theory of colour and constitution.

(b)- Write the synthesis of following.

(i)- Alizarin

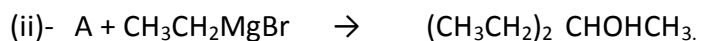
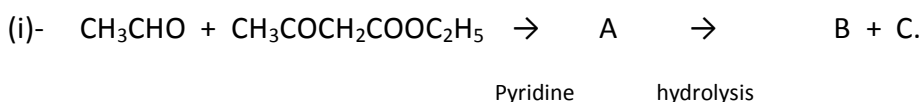
(ii)- Congo red

(iii)- Phenolphthalein

4- (a)- Explain the Bischler-Napieralski synthesis.

(b)- Discuss the electronic substitution reaction of pyridine.

(a)- Complete the following reaction.



5- (a)- Explain the Skraup synthesis of quinoline.

(b)- Discuss the electrophilic substitution reaction of pyridine.

6- (a)- Explain the preparation and reaction of amino acid.

(b)- Explain the ribonucleoside.



7- (a)- What are Zeigler-Natta catalyst? Discuss their importance in the formation of addition polymer.

(b)- Explain about Bakelite.

(c)- What are synthetic natural rubber?

8-(a)- Discuss about Fluoroscein.

(b)- Write short notes on congo red.

9- What is meant by the term chemical shift of a particular proton in NMR spectroscopy? Draw the splitting patterns of protons in NMR spectrum of ethyl alcohol.

10- Give a method of preparation of ethyl acetoacetate. Discuss the mechanism of the reaction . Write some synthetic applications of ethyl acetoacetate.

## **B.sc Third year**

### **Chemistry**

### **Third paper**

### **(Physical chemistry)**

**NOTE** - Attempt question from all the section.

#### **Section-A**

#### **(Short answer type question)**

- 1- Write a short note on photoelectric effect.
- 2- Write a short notes on angular part of wave function.
- 3- Write a short notes on heat capacity of solids.
- 4- Discuss the visible and ultraviolet region of spectrum.
- 5- Discuss Born oppenheimer approximation.
- 6- What are selection rule for the transition between the rotational level?
- 7- Write a short notes on Isotopic effect in rotational spectra.
- 8- Write a short notes on pure vibrational spectrum.
- 9- Discuss about stokes's and Anti stokes line in Raman spectra.
- 10- Write a short notes on K-band R-band.
- 11- Write a short notes on photo chemical reaction with example.
- 12- Discuss photosensitized reaction.

#### **Section-B**

#### **( Long answer type question)**

- 1- Prove the Schrodinger wave equation and write physical interpretation of wave function.
- 2- (a) Discuss about the quantum yield and write experimental determination of quantum yield.

(b)- For a photochemical reaction  $A \rightarrow B$ ,  $1.0 \times 10^{-5}$  mole of B were formed on absorption of  $6.0 \times 10^7$  ergs at  $3600 \text{ \AA}$ . Calculate the quantum yield. ( $N = 6.02 \times 10^{23}$ ,  $h = 6.6 \times 10^{-27}$  erg sec,  $c = 3 \times 10^{10}$  cm/sec)

3- What do you understand by elevation of boiling point? Derive a relationship between elevation of boiling point and molecular weight of solute on the basis of thermodynamics.

4-What is rotational spectrum? Discuss energy level of a rigid rotator.





































