

MODEL PAPER
FIRST YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-I
CHEMISTRY Course-I: INORGANIC & PHYSICAL CHEMISTRY

Time: 3 hours

Maximum Marks: 75

PART- A 5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Explain the preparation & structures of Phosphonitrilic compounds.
2. Explain in brief, catalytic properties & stability of various oxidation states of d-block elements.
3. Write short note on Bravais lattices and crystal systems.
4. What are Smectic & Nematic liquid Crystals? Explain.
5. Write account on Common ion effect & Solubility product.
6. Describe Andrews' isotherms of carbon dioxide.
7. Explain Actinide Contraction.
8. Explain the structure of Borazine.

PART- B (Inorganic Chemistry) 2 X 10 = 20 Marks

Answer **any two** of the following questions. Each carries **TEN** marks

9. Explain Classification, Preparations & uses of Silicones
10. (i) What are Pseudohalogens.
(ii) Explain the Structures of any one AX_3 & AX_5 interhalogen compounds.
11. What is Lanthanide Contraction? Explain the Consequences of Lanthanide Contraction.
12. (i) Explain the magnetic properties of d-block elements.
(ii) Explain about Conductors, Semi-Conductors & Insulators using Band Theory.

PART- C (Physical Chemistry) 3 X 10 = 30 Marks

Answer **any three** of the following questions. Each carries **TEN** marks

13. Write an essay on Crystal defects.
14. What is Bragg's Law. Explain the determination of structure of a crystal by powder method.
15. Derive the relationship between Critical constants & Vanderwaal constants
16. (i) Write any 5 differences between liquid crystals & liquids, solids
(ii) Write the applications of Liquid crystals.
17. Explain Nernst distribution Law. Explain its applications
18. What are colligative properties. Write experimental methods for determination of molar mass of a non-volatile solute by using Elevation in boiling point & depression in freezing point.

MODEL PAPER
FIRST YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-II
CHEMISTRY COURSE -II: ORGANIC & GENERAL CHEMISTRY

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Write different conformations of n-butane. Explain their relative stability..
2. Explain 1,2- & 1,4- addition reactions of conjugated dienes.
3. Explain the orientation effect of halogens on mono substituted benzene.
4. Explain the mechanism of $E1^{CB}$ elimination reaction.
5. Explain the structure of ClF_3 by Valency Bond theory.
6. What are Hard & soft acids & bases? Explain with examples.
7. Draw the Wedge, Fischer, Newmann & saw-Horse representations for Tartaric acid.
8. Define Enantiomers and Diastereomers and give two examples for each.

PART- B (Organic Chemistry) 3 X 10 = 30 Marks

Answer **any three** of the following questions. Each carries **TEN** marks

9. (i) Write the preparation of alkanes by Wurtz and Corey-House reaction.
(ii) Explain Halogenation of alkanes. Explain the reactivity and selectivity in free radical substitutions.
10. (i) Explain Baeyer Strain Theory
(ii) Draw the conformations of Cyclohexane and explain their stability by drawing energy profile diagram.
11. (i) Write any two methods of preparation of alkenes.
(ii) Explain the mechanism of Markownikoff and Anti-Markownikoff addition of HBr to alkene.
12. (i) Explain the acidity of 1-alkynes
(ii) How will you prepare acetaldehyde and acetone from alkynes?
(iii) Write alkylation reaction of terminal alkene.
13. Define Huckel rule of aromatic compounds. What are benzenoid and nonbenzenoid aromatic compounds? Give examples.
14. Explain the mechanisms of Nitration and Friedel-Craft's alkylation of Benzene.

PART- C (General Chemistry) 2 X 10 = 20 Marks

Answer **any two** of the following questions. Each carries **TEN** marks

15. (i) Define Hardy-Schulze rule & Gold number.

- (ii) Differentiate Physisorption & Chemisorption. Explain Langmuir adsorption isotherm.
16. Construct the Molecular Orbital diagram for O_2 and NO and explain their bond order and magnetic property.
17. Define racemic mixture. Explain any two techniques for resolution of racemic mixture.
18. (i) Define Optical activity and Specific rotation.
(ii) Draw the R- & S- isomers of Alanine, Glyceraldehyde.
(iii) Write the E- & Z- isomers of 2-butene.

MODEL PAPER
SECOND YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-III
CHEMISTRY COURSE-III: ORGANIC CHEMISTRY &
SPECTROSCOPY

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Discuss two methods for preparation of aryl halides.
2. Explain the mechanism for Pinacol-Pinacolone rearrangement.
3. Discuss the mechanism for Bayer-villiger oxidation reaction.
4. Explain the effect of substituents on acidic strength of mono-carboxylic acids.
5. Write the mechanism for Claisen Condensation reaction.
6. Write the selection rules in rotational spectroscopy.
7. Explain Spin – Spin coupling and Coupling Constant.
8. Explain types of electronic transitions in UV spectroscopy.

PART- B (Organic Chemistry)

3 X 10 = 30 Marks

Answer **any three** of the following questions. Each carries **TEN** marks

9. Give the mechanism & stereochemistry of SN^1 & SN^2 reactions of alkyl halides with suitable example.
10. Explain the following reactions with mechanism.
(i) Reimer-Tiemann reaction (ii) Fries rearrangement.
11. Discuss the mechanism for following reactions.
(i) Perkin reaction. (ii) Cannizzaro reaction
12. Write the preparation and any three synthetic applications of diethyl malonate.
13. Explain acid and base hydrolysis reaction of esters with mechanism.
14. Explain the mechanisms of Curtius rearrangement & Arndt –Eistert reaction.

PART- C (Spectroscopy)

2 X 10 = 20 Marks

Answer **any two** of the following questions. Each carries **TEN** marks

15. (i) Write a note on vibrational degrees of freedom for polyatomic molecules.
(ii) Explain different modes of vibrations & selection rules in IR spectroscopy.
16. (i) Define Bathochromic shift. Explain the effect of conjugation in U.V. spectroscopy.
(ii) Discuss the principle of NMR spectroscopy.
17. Write Woodward-Fieser rules for calculating λ_{max} for conjugated dienes and α, β – unsaturated carbonyl compounds, and apply them for one example each.
18. What is Fingerprint region. Explain its significance with an example. (ii) Write IR spectral data for any one alcohol, aldehyde and ketone

MODEL PAPER
SECOND YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-IV
CHEMISTRY COURSE -IV: INORGANIC, ORGANIC &
PHYSICAL CHEMISTRY

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.
2. What are epimers and anomers. Give examples.
3. Discuss about iso electric point and zwitter ion.
4. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.
5. Explain Tautomerism shown by nitro alkanes
6. Discuss the basic nature of amines.
7. Write the differences between thermal and photochemical reactions.
8. Derive heat capacities and derive $C_p - C_v = R$

PART- B (Inorganic Chemistry)

1 X 10 = 10 Marks

Answer **any one** of the following questions. Each carries **TEN** marks

9. What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.
10. Discuss the general methods of preparations of mono & bi-nuclear carbonyls of 3d series.

PART- C (Organic Chemistry)

3 X 10 = 30 Marks

Answer **any three** of the following questions. Each carries **TEN** marks

11. Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational structure of glucose.
12. (i) Explain Ruff's degradation.
(ii) Explain Kiliani- Fischer synthesis.
13. What are amino acids? Write any three general methods of preparation of amino acids.
14. Discuss the aromatic character of Furan, Thiophene and Pyrrole.
15. Write the mechanism for the following.
(i) Nef reaction (ii) Mannich reaction
16. (i) Explain Hinsberg separation of amines.
(ii) Discuss any three synthetic applications of diazonium salts.

PART- D (Physical Chemistry)

1 X 10 = 10 Marks

Answer **any one** of the following questions. Each carries **TEN** marks

17. What is quantum yield? Explain the photochemical combination of Hydrogen Chlorine and Hydrogen - Bromine.
18. Define entropy. Describe entropy changes in the reversible and irreversible process.

MODEL PAPER
SECOND YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-IV
CHEMISTRY COURSE V: INORGANIC & PHYSICAL
CHEMISTRY

Time: 3 hours

Maximum Marks: 75

PART- A

5 X 5 = 25 Marks

Answer any **FIVE** of the following questions. Each carries **FIVE** marks

1. Write note on Jahn-Teller distortion.
2. Explain Labile & inert complexes.
3. Explain Job's method for determination of composition of complex.
4. Explain Thermodynamic derivation of Gibb's phase rule.
5. Explain any two conductometric titrations.
6. Write note on Fuel Cells with examples and applications.
7. What is enzyme catalysis? Write any three factors effecting enzyme catalysis.
8. Derive Michaels- Menten equation.

PART- B (Inorganic Chemistry)

2 X 10 = 20 Marks

Answer **any two** of the following questions. Each carries **TEN** marks

- 9 Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.
10. Define CFSE. Explain the factors effecting the magnitude of crystal field splitting energy.
11. Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.
12. (i) Write the biological functions of Haemoglobin and Myoglobin.
(ii) Write note on use of chelating agents in medicines.

PART- C (Physical Chemistry)

3 X 10 = 30 Marks

Answer **any three** of the following questions. Each carries **TEN** marks

13. Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.
14. (i) Explain phase diagram for NaCl-water system.
(ii) Explain briefly about Freezing mixtures.
15. Define Transport number. Write experimental method for the determination of transport number by Hittorf method.

16. (i) Define single electrode potential.
(ii) Explain four types of electrodes with examples.
17. Explain general methods for determination of order of a reaction.
18. Explain Collision theory and Activated complex theory of bimolecular reactions.
