

S.S. Jain Subodh P.G. College, Jaipur (Autonomous)
M.Sc I Sem (Chemistry)
Assignment- 2026
Paper – I Inorganic chemistry

M.M 30

Attempt any four questions, selecting at least one question from each unit. All question carries equal marks.

Unit- I

Q.1 Determine the binary formation constants by pH metric and spectrophotometric methods?

Or

Q.2 Discuss the Walsh diagram of triatomic molecule taking suitable example?

Unit – II

Q.3 Discuss molecular orbital diagram of:

a) PtCl_4

b) CoF_6

Or

Q.4 Discuss π Bonding in Transition Metal Complexes and their experimental evidences.

Unit- III

Q.5 What are spectroscopic ground states? Explain with suitable examples.

Or

Q.6 Discuss Orgel diagram for d^1 and d^9 ions in octahedral and tetrahedral complexes.

Unit – IV

Q.7 What do you understand by the charge transfer spectra ? Discuss various types of charge transfer spectra.

Or

Q.8 Write notes on:

a) Spin cross over

b) Optical Circular Dichroism

S. S. Jain Subodh P.G. College
M. Sc. I Sem (Chemistry)
Paper – II Organic Chemistry
Assignment- Oct. 2026

M.M. = 30

Attempt four questions, one question from each unit.

Unit I

Q1. (a) Discuss the role of Chemical Kinetics in investigating the mechanism of chemical Give reaction. suitable examples to support the same.

(b) Write short notes on-

(i) Isotopic Labelling

(ii) Resonance & Field Effects

Or

(a) What are reaction intermediates & discuss various methods adopted for detecting the reaction.

(b) Write short notes on-

(i) Homo aromaticity

(ii) Curtin Hammet principle

Unit II

Q2. (a) Explain the mechanism, stereochemistry, and Kinetics of S_N^2 reactions with the help of suitable examples.

(b) Write notes on:

(i) Factors affecting aliphatic nucleophilic substitution

(ii) S_N^1 mechanism

Or

(b) Write short notes on:

(i) S_N^i and SET mechanism

(ii) Ambident nucleophiles

Unit III

(a) Discuss arenium ion mechanism of aromatic electrophilic substitution reaction with suitable examples.

(b) Write short notes on-

(i) Auto Oxidation

(ii) S_E2 and S_E1 mechanism

Or

(a) Discuss the mechanism of electrophilic aromatic substitution on the basis of arenium ion mechanism as well as π -complex intermediate with the help of suitable examples.

(b) Write notes on:

(i) Coupling of alkynes.

(ii) Energy profile diagram for aromatic electrophilic substitution.

Unit IV

Q4. (a) Give an account of Sharpless asymmetric epoxidation

(b) Discuss the mechanism of the Benzoin reaction and the Mannich reaction

Or

(a) What are Elimination Reactions? Discuss the mechanism of various types of elimination reactions with suitable examples. How does E₁CB mechanism differ from other mechanisms?

(b) Give an account of Pyrolytic elimination reactions.

S.S.Jain Subodh P.G.College ,Jaipur (Autonomous)

Assignment- Oct. 2026

M.Sc.Chemistry (I Semester)

Paper-III

Subject - Physical Chemistry

Note: Attempt any four questions, selecting at least one question from each unit. All question carries equal marks

M.M.30

Unit-I

Q.1 Discuss the postulates of Quantum Mechanics.

Q.2 Derive the Schrodinger wave equation for a particle in a 3 D box.

Unit-II

Q.3 What do you understand by Huckel Molecular Orbital Theory? Apply it to cyclobutadiene molecule to determine bond energy and coefficients of orbitals.

Q.4 Discuss the Linear Variation Theorem.

Unit-III

Q.5 What do you understand by Steady state kinetics ?Discuss Activated complex theory of reaction rates.

Q.6 (a) Discuss Hinshelwood theory of Unimolecular reactions.

(b)Write short note on Flash photolysis.

Unit-IV

Q.7 What is half wave potential? Derive Ilkovic equation and highlight its significance in polarographic analysis.

Q.8 Derive Butler -Volmer Equation and highlight its importance in electrochemistry. Write note on overpotential also.

S.S. Jain Subodh P.G. College, Jaipur

Department of Chemistry

M.Sc. Chemistry I Sem

Assignment - October 2026

Paper IV Spectroscopy -(I)

Note : Attempt four questions one from each unit

M. M. 30

Unit I

Q.1 Explain the nuclear and electron spin interaction and effect of external field with reference to Microwave Spectroscopy.

Q.2 Differentiate between rigid and non-rigid rotators spectroscopy. Write the selection rule for rigid rotator

Unit II

Q.3 Differentiate between harmonic and anharmonic oscillator: diatomic molecule.

Q.4 (i) Explain Raman Effect and give its applications.

(ii) Give a brief accounts of CARS.

Unit III

Q.5 Explain vector representation of momenta and vector coupling and spectra of alkali metal atoms.

Q.6 Write short note on

(A) Koopman's Theorem

(B) Internal Conversion

Unit IV

Q.7 Determine Sn^{+2} and Sn^{+4} compounds nature of M-L bond, co-ordination number and structure. Focus on spectral parameters and display of their Mossbauer Spectrum.

Q.8 (i) What is Hyperfine Coupling?

(ii) Explain spin polarization for atoms

S. S. Jain Subodh P.G. College, Jaipur (Autonomous)

Assignment -October 2026
Programme- M.Sc. I Sem
Paper- V, Bioinorganic Chemistry

Attempt any 4 questions, selecting at least one question from each unit. All question carries equal marks

MM: 15

UNIT-I

Q1. Write short notes on:

- a) Criteria for essentiality of elements
- b) Deficiency and toxicity of trace elements.

Or

Q1. Discuss structure of Adenosine Triphosphate (ATP) molecule.

UNIT-II

Q2. Explain photosystem I and II with their function and characteristics.

Or

Q2 Write short notes on

- 1. Structure and functions of electron transfer proteins
- 2. Calvin cycle

UNIT-III

Q3. Discuss structure and function of haemoglobin.

Or

Q3. Explain:

- A) Co-operative effect
- B) Haemocyanin

UNIT-IV

Q4. Compare biological and chemical nitrogen fixation.

Or

Q4. Write short notes on:

- A) Nitrogen fixation in soils
- B) Nitrogen in atmosphere.

Assignment 2026

M.Sc. Chemistry I Sem

Paper VI : Introduction to Analytical Techniques and Nanochemistry

Attempt any four questions, one from each unit

M.M = 15

Unit I

Q1. What is anodic stripping voltammetry?

Q2. Explain amperometry?

Unit II

Q2. Write about Gel-permeation chromatography.

Q3. Explain High-Performance Liquid Chromatography.

Unit III

Q3. Discuss Brillouin zones.

Q4. Explain (a) Super paramagnetism-

(b) Photoluminescence

Unit IV

Q7. Discuss characterization of nanomaterials.

Q8. Explain –

- a. Electrochemical synthesis
- b. Sonochemical routes

S.S. Jain Subodh P.G. College, Jaipur (Autonomous)
M.Sc III Sem (Chemistry) Organic and Physical
Assignment-October 2026
Paper – I Photochemistry

M.M. 30

Attempt four questions, one from each unit.

Unit –I

Q.1 Write short notes on:

- (a) Gas Phase Photolysis
- (b) Jablonskii Diagram

Or

Q.2 (a) Explain the effect of light intensity on the rate of photochemical reaction.

- (b) Write short note on Electromagnetic radiation.

UNIT- II

Q.3 Discuss the photochemistry of cross conjugated and conjugated cyclohexadienone?

Or

Q.4 Write a note on Paterno- buchi reaction and β - γ unsaturated ketones?

Unit- III

Q.5 Discuss the cis-trans isomerization of stilbene?

Or

Q.6 (a) Write a note on Di- π methane rearrangement?

- (b) Discuss the mechanism of interconversion of 1,3,5- trimethyl benzene to 1,2,4- trimethyl benzene?

Unit-IV

Q.7 Write a short note on

- (a) Photo-fries reaction of anilide
- (b) Singlet molecular oxygen reaction

Or

Q.8 (a) Explain Barton reaction with suitable examples.

- (b) Write explanatory note on photochemical formation of smog?

S. S. Jain Subodh PG (Autonomous) College, Jaipur

M Sc Sem III Assignment 2026

Paper II : Bioorganic Chemistry

M. M. 15 marks

Attempt four questions one from each unit

Unit – I

- Q.1 What do you understand by Enzyme kinetics? Explain the Michaelis – Menton equation and its significance in understanding the Enzyme kinetics.
- Q.2 What is affinity labelling? Describe Enzyme modification by site directed mutagenesis.

Unit – II

- Q 3. Discuss the following :-
- a) Acid based catalysis.
 - b) Transition state theory.
- Q 4 Write short notes on :-
- a) Coupling of ATP cleavage to endergonic processes.
 - b) Nucleophilic displacement on a phosphorous atom.

Unit – III

- Q5. What are Crown Ethers? Give synthesis and applications of Crown Ethers.
- Q6. Discuss the structures of the following:
- a) NADP^+
 - b) FMN
 - c) FAD

Unit – IV

Q7. Discuss the applications of Enzymes in food and drink industry.

Q8. Explain the techniques and methods of immobilization of Enzymes.

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M Sc Sem III Assignment October 2026

Paper III: Environment Chemistry

Attempt four questions, one from each unit

M. M. 15 marks

Unit – I

Q.1 What is chemical speciation? Discuss chemical speciation of Arsenic. 4 marks

Q.2 Discuss chemical toxicology of Hg in detail. 4 marks

Unit – II

Q.3 Discuss the methods of re-mediation of soil. 3.5 marks

Q.4 Write short notes on 3.5 marks

i. Bhopal gas tragedy

ii. Minimata disease.

Unit – III

Q.5 Give detailed account of classification of waste and solid waste disposal. 3.5 marks

Q.6 Write short notes on – 3.5 marks

i. Paper waste

ii. Dioxin

iii. Sources of water pollution

Unit – IV

Q.7 Give detailed classification of energy resources. 4 marks

Q.8 Elucidate “ wood is a major renewable source”. 4 marks

S. S. Jain Subodh P.G. College
M. Sc. III Sem (Chemistry)
Paper – IV Organic Synthesis I
Assignment- Oct. 2026

M.M. = 30

Attempt four questions, one question from each unit.

Unit- I

Q1. Write notes on

- a. Inter- and intramolecular Aldol condensation**
- b. Dieckmann Condensation**
- c. Nozaki- Hiyama Kishi coupling**

Or

Explain the Following reactions with examples:

- a. Thermodynamic & kinetic control of Enolates**
- b. Michael reaction and Baylis-Hillman reaction.**

Unit- II

Q 2. (a) Discuss various modes of cleavage of C=C double bond using suitable oxidising agents.

(b) Discuss the oxidation of nitrogen-containing compounds with suitable examples.

Or

Write notes on

- a. Hydrohalogenation**
- b. Preparation of amines by hydroboration**
- c. Protonolysis in hydroboration**

Unit- III

Q3. (a) What is Reduction? Highlight various reduction processes used to reduce different functional groups.

(b) Discuss the reduction of alkynes and aromatic rings.

Or

Give the mechanistic details of the reduction of the following:

- (a) Reduction of epoxides**
- (b) Reduction of Nitro and oxime groups**
- (c) Photoreduction**

Unit- IV

Q.4 (a) What are non-benzenoid aromatic compounds? Discuss Synthesis, properties and reactions of Azulene.

(b) Discuss Bardhan Sen Gupta method of Phenanthrene Synthesis. Also discuss the aromatic behaviour of Phenanthrene.

Or

What are metallocenes? Discuss Synthesis, aromaticity and Bonding & Structure of Ferrocene

S. S. Jain Subodh P.G.College, Jaipur (Autonomous)

Assignment- 2026-27

M.Sc. Semester III (Organic Chemistry)

Paper-V (Natural Product-I)

NOTE: Attempt any four questions.

UNIT-I

1. Discuss the classification, nomenclature, occurrence and general methods of isolation of terpenoids. Explain the Isoprene Rule with suitable examples.
2. Describe the stereochemistry and synthesis of Geraniol and Menthol in detail.

UNIT-II

3. Discuss the structure, stereochemistry and synthesis of Farnesol and Zingiberene in detail.
4. Describe the structure determination, stereochemistry and synthesis of Santonin.

UNIT-III

5. Define alkaloids and discuss their classification, nomenclature, occurrence, physiological action, isolation and general methods of structure elucidation.
6. Describe the structure, stereochemistry and synthesis of Morphine in detail.

UNIT-IV

7. Discuss the occurrence, nomenclature, isolation and general methods of structure determination of natural pigments. Describe the structure determination and synthesis of Luteolin and Quercetin.
8. Discuss the structure and synthesis of Cyanidin chloride, Cyanidin-7-arabinoside and Alizarin.

S.S. Jain Subodh P.G. College, Jaipur

Department of Chemistry

M.Sc. III Sem Chemistry (Organic Special)

Assignment -October 2026

Paper VI Heterocyclic chemistry-I

Attempt four questions one from each unit

M.M:30

Unit- I

Q. 1. Write a brief note on π excessive and π deficient heterocycle

Q. 2. Draw the structures of the following heterocycles:

(i) Pyrazino [2,3-c] pyrimidine

(ii) Imidazo [2,1,-b] oxazole

(iii) 1-oxa-6-thiaspiro[4.4] nonane

(iv) 7-oxabicyclo[2.2.1] heptane

Unit- II

Q.3. Write short notes on

(i) Pyramidal Inversion

(ii) Anomeric effect

Q.4. Discuss Consequences of bond angle strain in a small ring heterocycles

Unit- III

Q. 5. How will you synthesize:

- (a) Azetidines from Aziridines
- (b) Thietanes from Cyclic carbonate
- (c) Oxetane from benzophenone.

Q.6. (I) Write the synthesis of Aziridines by Cycloaddition Reaction methods.

(II) Explain synthesis methods of oxaziridines.

Unit - IV

Q.7. a. Give one method for the synthesis of imidazole.

- b. Compare the electrophilic aromatic substitution reaction of imidazole, oxazole and thiazole.

Q.8. Write down the mechanism of the following reactions.

- (a) Fischer indole synthesis
 - (b) Benzofurans from coumarins
- .

S.S.Jain Subodh P.G.College ,Jaipur (Autonomous)

Assignment- Oct. 2026

M.Sc.Chemistry (III Semester)

Physical Specialization

Paper-IV

Subject - Advance Electrochemistry-I

Note: Attempt any 4 questions, selecting at least one question from each unit. All question carries equal marks

M.M.30

Unit-I

Q.1 Explain the terms Galvanostat and Potentiostat in detail.

Q.2 What is fuel cell? Describe the structure and functioning of Hydrogen-Oxygen fuel cell.

Unit-II

Q.3 Provide the structure, working and cell reactions of lead acid batteries.

Q.4 How do you see the future of electricity storage in terms of Hydrogen and nonaqueous solutions.

Unit-III

Q.5 Explain the surface mechanism of Corrosion. What are the advantages and disadvantages of Corrosion?

Q.6 What do you understand by cathodic and anodic protection of corrosion? Discuss in detail.

Unit-IV

Q.7(a) Explain electrical conductance in biological organism.

(b) Write a short note on Nernst Plank equation.

Q.8 Explain the term cardiography and the significance of different components of Electrocardiogram.

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M Sc Sem III Assignment Oct, 2026

Paper V: Phase Rule and Surface Phenomenon

Attempt four questions one from each unit

Max Marks 30

UNIT I

Q.1 Explain in detail 3+3+1.5

- (i) Critical Solution Temperature
- (ii) Nicotine-Water system
- (iii) Immiscible liquids

OR

Q.2 What are azeotropic mixtures? Explain fractional distillation of Zeotropic and Azeotropic mixtures.

UNIT II

Q.3. Write short note on 3.5+4

- (i) Electrical Properties of colloidal solution
- (ii) Stern's theory of double layer

OR

Q.4 Write short on 3.5+4

- (i) Coagulation or flocculation
- (ii) Micelle formation

UNIT III

Q.5 Explain surface catalyzed unimolecular reactions. 7.5

OR

Q.6 Write Short note on: 3.5+4

- (i) Difference in between physical and chemical adsorption
- (ii) Freundlich adsorption isotherm

UNIT IV

Q.7 (i) What is Trouton's rule? Explain Bernal Scott theory of liquids. 3.5+4

(ii) Explain intermolecular force in liquids.

OR

Q.8 (i) Explain specific heat of liquids. 2+3.5+2

(ii) Explain the property of surface tension of liquids. How is it measured?

(iii) How is viscosity of liquids determined?

S.S.Jain Subodh P.G.College ,Jaipur

Assignment- Oct. 2026

M.Sc.Chemistry (III Semester)

Physical Specialization

Paper-VI

Subject - Advanced Chemical Kinetics

Note: attempt any four questions. Each question carry equal marks.

M.M.30

Unit-I

Q.1 Explain opposing reactions and side reactions in detail.

Q.2 What is induced reaction? Discuss kinetics and explain induction factor .

Unit-II

Q.3 Discuss the mechanism of two reactions where first step is a rate determining step.

Q.4 .Discuss the mechanism of reactions involving more than two elementary processes with at least one slow step.

Unit-III

Q.5 What do you understand by oscillatory reactions? Discuss Lotka Volterra mechanism.

Q.6. Discuss Ligand Substitution reactions in detail.

Unit-IV

Q.7(a) What do you understand by collisions in solution?

(b). Discuss Fick's laws of diffusion.

Q.8. Discuss the theory of absolute reaction rates as applicable to reactions in solution.