

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – I Semester
PAPER –I: GENERAL CHEMISTRY-I (23OCHT11)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) State and explain postulates of quantum mechanics.
(OR)
b) Describe the setting up of operators for linear momentum, angular momentum and energy.
2. a) Derive and solve the Schrodinger wave equation for a particle in one dimensional box.
(OR)
b) Explain wave mechanics of Rigid rotator.
3. a) Derive an expression for the energy of simple harmonic oscillator. Write the selection rules for its transitions.
(OR)
b) Derive Schrodinger wave equation for hydrogen like atom and separate the variables r , θ and ϕ .
4. a) Explain rotational spectra of diatomic molecules and calculation of bond length from rotational spectra.
(OR)
b) Discuss about simultaneous vibrational-rotational spectra of diatomic molecules.
5. a) How do you explain Raman spectra on the basis of classical and quantum mechanical approach.
(OR)
b) Describe the vibrational coarse structure of the electronic spectrum of diatomic molecules.

SECTION-B

(5 x 4 = 20 Marks)

Answer any FIVE questions

6. Write a note on linear, non linear and Commutator Operators.
7. Show that Hermitian operators have real eigen values.
8. Explain factors affecting colour.
9. Describe probability density in 1S atomic orbital.
10. Write brief note on Isotopic effect in rotational spectra.
11. Explain fundamental transition and overtones of anharmonic oscillator.
12. Describe rotational Raman spectra.
13. State and explain Frank-Condon principle.

--*--

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – I Semester
PAPER –II: INORGANIC CHEMISTRY-I (23OCHT12)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) Draw the MO energy level diagram for $[\text{Co}(\text{NH}_3)_6]^{3+}$ and discuss the magnetic properties of it.
(OR)
b) Write about the principles involved in VSEPR Theory. Explain the applications of VSEPR Theory with examples.
2. a) Discuss the preparation, structure and reactions of Boron – Nitrogen cyclic compounds.
(OR)
b) Write about (i) Carboranes (ii) Wades rules
3. a) Explain the Crystal field splitting patterns in Octahedral and Tetrahedral geometries with suitable examples ?
(OR)
b) Discuss about Jahn – Teller effect.
4. a) Derive the Term Symbols for d^2 and d^5 Configurations
(OR)
b) Explain (i) Magnetic Properties of Transition and Inner transition metal complexes.
(ii) Spin and Orbital Momentum
5. a) Write the Selection rules of electronic transitions and explain the breakdown of selection rules.
(OR)
b) Draw the Orgel diagrams for d^2 , d^8 Octahedral metal complexes.

P. T. O

SECTION-B

(5 X 4 = 20 Marks)

Answer any FIVE questions

6. Write about the drawbacks of Valence Bond Theory.
7. Explain the structures of IF_7 , XeF_4 with MOT concepts.
8. Write short notes on Metallocarboranes
9. Write the structure and properties of Borane.
10. Write about the selection rules for Electronic transitions.
11. What is Spin and Orbital Momentum
12. Explain Ligand field theory
13. Write a short note on Charge Transfer Spectra.

---*---

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – I Semester
PAPER –III: ORGANIC CHEMISTRY-I (23OCHT13)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) Explain the role of Inductive effect, Mesomeric effect in Organic Molecules.

(OR)

b) What is Aromaticity ? Explain this phenomenon using Huckle's rule with suitable examples.

2. a) Describe R, S nomenclature with examples

(OR)

b) Define Stereo isomers and explain classification with examples.

3. a) Write about E- Z nomenclature with examples.

(OR)

b) Explain Axial chirality of Allenes and spiranes.

4. a) Write the synthesis and reactivity of Indole and Pyrazole.

(OR)

b) Describe the synthesis and reactivity of Isoquinoline and Pyrimidine.

5. a) Describe the structure elucidation of Camphor?

(OR)

b) Explain the synthesis of Nicotine.

P. T. O

SECTION-B

(5 x 4 = 20 Marks)

Answer any FIVE questions

6. Explain Hyper Conjugation with suitable examples.
7. Explain the Aromaticity in [10] and [12] Annulenes.
8. Write any three differences between conformation and configuration.
9. Define Enantiomer and Diastereomers.
10. Write about the conformation of Cyclohexane.
11. Write a short note on Atrope Isomerism of Biphenyles
12. Write a short note on synthesis of Quinoline.
13. Draw the structures of Atropine and Quinine.

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – I Semester
PAPER –IV: PHYSICAL CHEMISTRY-I (23OCHT14)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) Describe any two methods to determine partial molar volumes of binary solutions.

(OR)

- b) Derive an expression for the effect of temperature on equilibrium constant

2. a) What is Critical Micellar Concentration? Explain the factors effecting the CMC of surfactants

(OR)

- b) Explain viscometry method for the determination of molecular weight of a polymer.

3. a) Derive an expression for collision theory and discuss its limitations.

(OR)

- b) Discuss kinetics of consecutive reactions and parallel reactions.

4. a) Describe Michaelis -Menten mechanism for Enzyme catalysis.

(OR)

- b) Explain flow methods for studying kinetics of fast reactions.

5. a) What is quenching effect? Derive Stern-Volmer equation.

(OR)

- b) Discuss photo-addition reactions with examples.

SECTION-B

(5 x 4 = 20 Marks)

Answer any FIVE questions

6. Derive Gibbs-Duhem equation.
7. Write a note on free energy of mixing.
8. Explain micellar solubilization.
9. Write a note on electrically conducting polymers.

10. Give an account on primary salt effect.
11. Explain Skrabal diagrams.
12. State and explain Frank-Condon principle.
13. Write a note on photochemical equilibrium.

--*--

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – II Semester
PAPER –I: GENERAL CHEMISTRY-II (23OCHT21)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) Explain the time independent first order perturbation theory.
(OR)
b) Describe Hartree's self-consistent field method to get ground state energy of many electron atom.
2. a) Discuss the application Valence-Bond method to H_2 molecule
(OR)
b) Describe MO theory of bonding in H_2^+ ion using LCAO approximation.
3. a) (i) Derive matrices for rotation operation and reflection operation.
(ii) Draw flow chart for identification of point groups of molecules.
(OR)
b) Find out the point groups of following molecules.
(i) H_2O (ii) BCl_3 (iii) Allene (iv) H_2O_2 (v) SF_6
4. a) (i) What are reducible and irreducible representations?
(ii) Explain great orthogonality theorem and its consequences.
(OR)
b) Explain Character table and its anatomy.
5. a) (i) Define precision and accuracy. Give an example for each.
(ii) Give the classification of errors.
(OR)
b) (i) Write notes on significant figures and computation rules.
(ii) Explain Absolute and relative errors.

SECTION-B

(5 x 4 = 20 Marks)

Answer any FIVE questions

6. Write a note on variation principle.
7. Sketch the MO diagram for O_2 molecule and calculate the bond order.
8. Discuss quantum mechanical concepts of hybridization.
9. Explain symmetry operations.
10. Discuss axioms of group theory with suitable example.
11. Write a note on similarity transformations and classes.
12. Write a note on minimization of errors.
13. Write a short note on T- test.

--*--

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – II Semester
PAPER –II: INORGANIC CHEMISTRY- II (23OCHT22)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) Define M-M bonding and Discuss the preparation, structure and bonding in $\text{Re}_2\text{Cl}_8^{2-}$
(OR)
b) Write about the preparation, structure and bonding of Tri nuclear metal clusters.
2. a) Explain structural features and bonding aspects of Ferrocene.
(OR)
b) Discuss the Isolobal relationship between H , Cl , CH_3 , $\text{Mn}(\text{CO})_5$.and S , CH_2 , $\text{Fe}(\text{CO})_4$
3. a) Explain the determination of Stability constant of a metal complex by Job's method.
(OR)
b) Define Stepwise and Overall formation constants. Explain the factors affecting the stability of metal complexes.
4. a) Discuss the mechanism of D and A in Substitution reactions of metal complexes with suitable examples.
(OR)
b) Explain the concept of Trans effect theories
- . 5. a) Explain Metalloporphyrins with special reference to Hemoglobin and Myoglobin
(OR)
b) Write about the Inner and Outer sphere mechanisms with examples.

SECTION-B

(5x 4 = 20 Marks)

Answer any FIVE questions

6. What are the favorable conditions for formation of M – M bond?
7. State and explain 18 electron rule.

8. What is meant by Chelate effect?
9. Write a brief note on Acid Hydrolysis.
10. Explain Nitrogen Fixation?
11. Write a short note on HSAB?
12. Write about Base hydrolysis reactions
13. Define complementary and non-complementary reactions.

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – II Semester
PAPER –III: ORGANIC CHEMISTRY- II (23OCHT23)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) What is neighbouring group participation. How the neighbouring group participation occurred in oxygen nucleophiles.

(OR)

- b) What is saytzeff rule and explain with examples?

2. a) Write the mechanism of E₂ elimination reaction with suitable example.

(OR)

- b) Write about dehydration, dehydrogenation and dehalogenation.

3. a) Write about the mechanisms of Claisen and Reformatsky reactions.

(OR)

- b) Explain the hydrogenation of aromatic rings and hydroboration.

4. a) Describe the mechanism of the following reactions.

- (i) Wagner – Meerwin rearrangement. (ii) Arndt- Eistert rearrangement.

(OR)

- b) Explain the mechanism of the following reactions.

- (i) Neber rearrangement (ii) Bayer- Villiger rearrangement.

5. a) Write a note on (i) Chromophore, Auxochrome, (ii) Beer's Law

(OR)

- b) Discuss about the Shielding, Deshielding and Chemical Shift

[PTO]

SECTION-B

(5 x 4 = 20 Marks)

Answer any FIVE questions

6. Explain the smiles rearrangement
7. Write a short note on Aromatic Nucleophilic substitution.
8. Explain the types of Elimination reactions with examples.
9. Define Hydroboration and write its mechanism.
10. Write about Pinacol and Pinacolone rearrangement.
11. Explain Dakin rearrangement.
12. Write about Finger print region.
13. Write a note on basic principles of Mass Spectroscopy

--*--

S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (A)

M.Sc. Organic Chemistry – II Semester
PAPER –IV: PHYSICAL CHEMISTRY-II (23OCHT24)
(W.e.f. 2023-24 Admitted Batch)

Time: 3 hrs.

MODEL QUESTION PAPER

Max. Marks: 70

SECTION-A

(5 x 10 = 50 marks)

Answer ALL questions

1. a) Describe Gouy balance method for measuring magnetic susceptibility of a substance.
(OR)
b) (i) Write a note on Chemical shift and its origin.
(ii) Discuss NMR spectrum of ethanol.
2. a) Explain the principle and theory of ESR spectroscopy.
(OR)
b) Discuss applications of ESR studies to the structure of metal complexes.
3. a) State third law of thermodynamics. Discuss the application of third law of thermodynamics in determination of absolute entropy of solids.
(OR)
b) i) Based on thermodynamic probability, derive the Maxwell Boltzmann distribution law.
ii) Derive an expression for translational partition function.
4. a) Explain in detail about the concentration cell with and without transference.
(OR)
b) Explain the anomalous behavior of strong electrolytes. Give the Debye Huckel-Onsager equation. Discuss how it is verified.
5. a) Explain Helmholtz-Perrin parallel plate model for the electric double layer.
(OR)
b) Derive Butler-Volmer equation and discuss high field and low field conditions.

SECTION-B

(5 x 4 = 20 Marks)

Answer any FIVE questions

6. Write a note on spin-spin interaction.
7. Write a note on line shapes and line widths.
8. Explain hyperfine interactions.
9. Write a short note on ensembles.
10. Derive an expression for relation between E and the partition function.
11. Discuss the effect of complexation on redox potentials.
12. Discuss how activity coefficients are determined from EMF data..
13. Derive Nernst equation.

--*--