Dr.B.R.AMBEDKAR OPEN UNVERSITY
FACULTY OF SCIENCE
M.Sc – I year -CHEMISTRY (2021-22)
Course – 1: Inorganic Chemistry
FIRST ASSIGNMENT

Maximum Marks – 15
Minimum Marks – 06

Section – A

(Essay Type) - **[1X10=10]**

Answer any ***one*** question from the following ***two*** questions

1. Write a note on the following. a) Symmetry elements.
   b) Point groups in molecules (MLS, MHS and MSS).
2. a. State the crystal field theory ,
   b. Give salient features of CFT.
   c. Explain the Crystal Field Splitting in tetragonal, square planar, trigonal bipyramidal, octahedral geometry
   d. Calculate CFSE for Octahedral and tetrahedral complex.

Section –B
(Short Type) - **[1X5=5]**

Answer any ***one*** question from the following ***two*** questions

1. Define the Sub group and Group multiplication tables. With suitable examples.
2. Explain L-S coupling and Orgel diagrams.

SECOND ASSIGNMENT

Maximum Marks – 15
Minimum Marks – 06

Section – A
(Essay Type) **–[1X10=10]**

Answer any ***one*** question from the following ***two*** questions.

1. Write a short note on the following.
   a. S_N1CB Mechanism of octahedral complexes
   b. Trans effect and its applications.
   c. Inner-sphere mechanism
   d. Marcuss-Hush theory.
2. Write a short note on the following
   a. Types of stability, Stability constants and give their equation.
   b. Explain Pearson HSAB rule and discuss its applications.
   c. Bonding modes of nitric oxide to metal
   d. Metal carbonyl clusters.

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Section –B
(Short Type) **– [1X5=5]**

Answer any ***one*** question from the following ***two*** questions

1. Explain the following, a) Oxidative and reductive elimination reactions.
   b) Hydrogenation reaction and Hydro Formylation reaction.
2. a) Write a detailed account of carboxylate clusters of Re, Mo, Cr and Cu.
   b) Describe the biochemistry of Cu and Zn.

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M. Sc I Year - CHEMISTRY (2021-22)
COURSE – 2: ORGANIC CHEMISTRY

FIRST ASSIGNMENT

Maximum Marks – 15
Minimum Marks – 06

SECTION --A
(Essay Type) **– [1x10=10]**

*Answer any **one** question from the following **two** questions.*

1) Explain the following terms.
   a. Define the terms with suitable example Conformation, Configuration, Chirality, Diastereomerism, Enantiomerism, Racemisation, Racemic modification and Resolution.
   b. Discuss about Optically active Molecules without chiral center(Axial, Planar and Helical)
2) Write a short note on the following.
   a. Applications of Inductive, Mesomeric and Hyperconjugation effects.
   b. Determination of reaction mechanism by Isotopic labeling and Kinetic isotopic effect.
   c. Discuss mechanism and factors effecting on S_N^2, S_N^i and S_E^1 reactions.
   d. Addition reactions on carbon-carbon double bond.

SECTION – B
(Short Type) **[1x5=5]**

Answer any ***one*** question from the following ***two*** questions.

1. Discuss about the determination of obsolute configuration by Nuclear Magnetic techniques.
2. Write a note on Aromatic nucleophilic substitution reactions.

SECOND ASSIGNMENT

Maximum Marks – 15
Minimum Marks – 06

SECTION --A
(Essay Type) **– [1x10=10]**

*Answer any **one** question from the following **two** questions.*

1. Explain the following
   a. Criteria for Aromaticity.
   b. Huckel rule and its postulates, limitations and applications
   c. Any three Synthesis methods and any three chemical reaction of cyclopentadienyl anion, tropilium ion, Indole, benzofuron, quinoline, isoquinoline, Acridne.
2. Discuss the determination of structure and synthesis of Camphor an α-terpinol.
   How the structure of quinine and pepavarine established from degradation experiments.

SECTION – B
(Short Type) - **[1x5=5]**

*Answer any **one** question from the following **two** questions*

1. Write a note on Benzenoids and Nonbenzenoids.
2. Draw the conformational structures of sucrose, maltose, cellobiose and gentobiose.

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M.Sc I Year – CHEMISTRY (2021-22)
COURSE – 3: PHYSICAL CHEMISTRY

FIRST ASSIGNMENT

Maximum Marks – 15
Minimum Marks – 06

SECTION --A

(Essay Type) **– [1x10=10]**

*Answer any **one** question from the following **two** questions*

1) Discuss the following
   a. Schrodinger wave equation and its determination..
   b. Rigid rotator
   c. Wave equation for hydrogen like atom.
   d. Variation Method.
2) Explain the following
   a. Joule Thomson effect.
   b. Gibbs Duhem equation.
   c. Clausius inequality and spontaneity.
   d. Maxwell's relations

SECTION – B

(Short Type) **– [1x5=5]**

*Answer any **one** question from the following **two** questions.*

1) State and explain Molecular Orbital Theory of the Hydrogen ion.
2) Define term state function and path functions with suitable examples. State and explain Lechatlier Principle.

SECOND ASSIGNMENT

Maximum Marks – 15
Minimum Marks – 06

SECTION --A

(Essay Type) **– [1x10=10]**

*Answer any **one** question from the following **two** questions.*

1. Explain
   a. Debye-Huckel-onsagar equation Derivation.
   b. Forms of Corrosion
   c. Half wave potential
   d. Applications of Polarography.
2. Write a short note on the following.
   a. Collision Theory, Transition state theory and comparison.
   b. Study state treatment for chain reactions.
   c. Acid-base catalysis.
   d. Beer's and Lambert's law

SECTION – B

(Short Type) - **[1x5=5]**

*Answer any **one** question from the following **two** questions.*

1. Explain a) Theories of Over Voltage. b) Discuss about theories of corrosion.
2. a. Explain Flah photolysis and Gas Photolysis.
   b. Define quantum yield and explain for its determination.

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M.Sc I Year – CHEMISTRY (2021-22)
COURSE – 4 : Mathematics, Biology, Spectroscopy & Computers (General)

FIRST ASSIGNMENT

SECTION --A Maximum Marks – 15
(Essay Type) **- [1x10=10]** Minimum Marks – 06

*Answer any **one** question from the following **two** questions.*

For mathematics**: **(to the students B.Sc with biology or life science)

1. a. Find the derivative of $f(\chi) = x^{sin^{-1}x}$
   b. Find the inverse matrix $\begin{bmatrix} 2 & 10 & 9 \\ -4 & 3 & 6 \\ 11 & -12 & 10 \end{bmatrix}$
   c. Solve $\frac{dy}{dx} = \frac{y^2-2xy}{x^2-xy}$

For biology**: **(to the students B.Sc with Mathematics stream)

1. a. Give an account of the structure and functions of Prokaryotic and Eukaryotic cell.
   b. Explain Glycogen metabolism.

For Both:

2. a. Explain the terms fundamental bands, over tones and hot bands.
   b. Explain the following terms: Chromophore, Auxochrome, Bathocromic Shift, Hypochromic Shift, Hypsochromic Shift and Hyperchromic Shift.

SECTION – B [1x5=5]
(Short Type)

*Answer any **one** question from the following **two** questions.*

For mathematics: (to the students B.Sc with biology or life science)

1. Evaluate $\int_0^{\pi/2} xsinx\, dx$.

For biology**: **(to the students B.Sc with Mathematics stream)

1. a) Discuss about the Lipo - Proteins composition and function.
   b) Structure of Nucleic acid bases, RNA and DNA

For Both:

2. What is Raman effect? Explain the appearance, selection rules and applications of pure rotational Raman and vibrational Raman spectral lines.

SECOND ASSIGNMENT (*for both*)

SECTION --A Maximum Marks – 15
(Essay Type) – **[1x10=10]** Minimum Marks – 06

*Answer any **one** question from the following **two** questions.*

1. Discuss about the following.
   a. Chemical shift and factors effecting on it
   b. Spin-spin coupling and coupling constants. Study of dynamic process through PNMR.
   c. Nitrogen rule, Isotopic peaks and Meta stable peaks
   d. Molecular ion production in MASS Spectrometry.
2. Discuss input and output functions in 'c' conditional and control statements in 'C' programming.

SECTION – B [1x5=5]
(Short Type)

*Answer any **one** question from the following **two** questions*

1. a. Explain the terms chemical shift, shielding constant, coupling constant in H^1NMR and ion production technique in mass spectroscopy.
   b. write a note on NMR of Fluxional molecules
2. What is an algorithm and flow chart? Draw a flow chart to find the maximum among three numbers.