Dr.B.R.AMBEDKAR OPEN UNVERSITY
FACULTY OF SCIENCE
M.Sc. – I year -CHEMISTRY (2019-2020)
Course – I: Inorganic Chemistry
First Assignment

Maximum Marks – 15
Minimum Marks - 06

Section – A [1X10=10]
(Essay Type)
Answer any _one_ question from the following _two_ questions

1. Write a note on the following. a) Symmetry elements with suitable examples.
b) Molecules with Low, high and special symmetry.
2. a) State the crystal field theory and give salient features of CFT. And explain the crystal field splitting in tetragonal, square planar, trigonal bipyramidal geometry.
b) Explain the effect of π-bonding on the Δ of the Octahedral complexes

Section –B [1X5=5]
(Short Type)
(Answer any _one_ question from the following _two_ questions)

1. Define the point group. And classify the molecules into point group.
2. a) Explain L-S coupling. b) Write a note on Orgel diagrams.

Second Assignment

Maximum Marks – 15
Minimum Marks – 06

Section – A–[1X10=10]
(Essay Type)
(Answer any _one_ question from the following _two_ questions)

1. Write a short note on the following.
   a. Acid hydrolysis and factors effecting on it
   b. The Trans effect and its applications.
   c. Inner-sphere mechanism
   d. Marcuss-Hush theory.
2. Write a short note on the following
   a. Explain Pearson HSAB rule and discuss its applications.
   b. Determination of stability constant by Polarographic method.
   c. Bonding modes of **DINITROGEN** and **DIOXYGEN** to metals.

Section –B – [1X5=5]
(Short Type)
(Answer any _one_ question from the following _two_ questions)

1. Explain the following, a) Oxidative and reductive elimination reactions. b) Insertion reaction and hydro formylation reaction.
2. a) Write a detailed account of carboxylate clusters of Re, Mo, Cr and Cu.
   b) Describe the active sites of Heamocyanin, Hemerythrin and Hemoglobin

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M. Sc I Year - CHEMISTRY (2019-2020)
COURSE – II: ORGANIC CHEMISTRY

FIRST ASSIGNMENT

Maximum Marks -- 15
Minimum Marks – 06

SECTION --A – [1x10=10]
(Essay Type)
(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. Explain the physical, chemical and biological properties of Geometrical isomerism.
2) Write a short note on the following.
   a. Electronic effects.
   b. Discuss mechanism and factors effecting on S_N^1, S_N^i and S_E^2 reactions.
   c. Addition reactions on carbon-carbon double bond.

SECTION – B [1x5=5]
(Short Type)
(Answer any *one* question from the following *two* questions)

1. Explain the determination of absolute configuration by chemical correlation and spectral methods.
2. Explain how the trapping of intermediates, cross over experiments and kinetic isotopic effect to give proof for the reaction pathway? Illustrate with two examples.

SECOND ASSIGNMENT

Maximum Marks -- 15
Minimum Marks – 06

SECTION --A – [1x10=10]
(Essay Type)
(Answer any *one* question from the following *two* questions)

1. Formulates any two syntheses and three chemical properties of the following compounds.
   a. Cyclopentadiene anion
   b. Anthracene
   c. Indole
   d. Quinoline
   e. Acridine
2. How are alkoloids classified? Give one example for each class. Discuss the determination of structure and synthesis of quinine.

SECTION – B [1x5=5]
(Short Type)
(Answer any *one* question from the following *two* questions)

1. How the structure of camphor established from degradation experiments.
2. Draw the conformational structures of sucrose, maltose, cellobiose and gentobiose.

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M.Sc I Year – CHEMISTRY (2019-2020)
COURSE – III : PHYSICAL CHEMISTRY

FIRST ASSIGNMENT

Maximum Marks -- 15
Minimum Marks – 06

SECTION --A – [1x10=10]
(Essay Type)
(Answer any _one_ question from the following _two_ questions)

1) Discuss the following
   a. Schrodinger wave equation its derivation.
   b. Particle in one dimensional box and Rigid rotator
   c. Wave equation for hydrogen like atom.

2) Explain the following
   a. Hess's law
   b. State second law of thermodynamics in its various forms.
   c. Clausius inequality and spontaneity.
   d. Nernst Heat theorem.

SECTION – B – [1x5=5]
(Short Type)
(Answer any _one_ question from the following _two_ questions)

1) Give the proof of variation theorem and Explain Born Oppenheimer approximation.
1) Discuss the relationship between Cp and Cv and Joule-Thomson effect.

SECOND ASSIGNMENT

Maximum Marks -- 15
Minimum Marks – 06

SECTION --A – [1x10=10]
(Essay Type)
(Answer any _one_ question from the following _two_ questions)

1. Explain
   a. Theories of Over Voltage.
   b. Fick's law
   c. Half wave potential and applications of Polarography.
2. Write a short note on the following.
   a. Collision and transition state theory
   b. Taft equation.
   c. Beer's and Lambert's law

SECTION – B [1x5=5]
(Short Type)
(Answer any _one_ question from the following _two_ questions)

1. Explain a) Liquid Junction Potential. b) Forms of corrosion.
2. Derive the rate equation for the photochemical reaction between hydrogen and chlorine.

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M.Sc I Year – CHEMISTRY (2019-2020)
COURSE – IV : Mathematics, Biology, Spectroscopy & Computers (General)
FIRST ASSIGNMENT

Maximum Marks -- 15
Minimum Marks – 06

SECTION --A - [1x10=10]
(Essay Type)
(Answer any **one** question from the following **two** questions)

For mathematics:

1. a) Find the derivative of $f(\chi) = \frac{X \cos X}{\sqrt{1+X^2}}$.

    b) Evaluate $\int \frac{X^5}{1+X^6} dx$.

    c) Solve $\frac{dy}{dx} = \frac{y^2 - 2xy}{x^2 - xy}$

2. a) What is Raman Effect? Describe the selection rules and applications of vibration-Raman spectroscopy.

    b) Explain why cis-trans isomers differ in their IR spectral absorption.

For biology:

1. Explain the following
    a. Intracellular organelles and their functions.
    b. Glycolysis and TCA.

2. a) What is Raman Effect? Describe the selection rules and applications of vibration-Raman spectroscopy.

    b) Explain why cis-trans isomers differ in their IR spectral absorption.

SECTION – B [1x5=5]
(Short Type)
(Answer any **one** question from the following **two** questions)

For mathematics:

1. Find the adjoint of the matrix $\begin{bmatrix} 3 & 6 & 9 \\ -2 & -4 & -6 \\ 5 & 10 & 15 \end{bmatrix}$.

2. Explain the terms overtones, hot band and zero point energy.

For biology:

1. a) Discuss the classification of lipids with suitable examples.
    b) Structure of Nucleic acids bases, RNA and DNA

2. Explain the terms overtones, hot band and zero point energy.

SECOND ASSIGNMENT (*for both*)

Maximum Marks -- 15
Minimum Marks – 06

SECTION --A – [1x10=10]
(Essay Type)
(Answer any **one** question from the following **two** questions)

1. Explain the terms chemical shift, shielding constant, coupling constant in H^1NMR and ion production technique in mass spectroscopy.

2. Discuss input and output functions in 'c' and control statements in 'C' programming.

SECTION – B [1x5=5]
(Short Type)
(Answer any **one** question from the following **two** questions)

1. Describe fluxional molecules and explain the applicability of NMR in detecting fluxionality.

2. What is an algorithm and flow chart? Draw a flow chart to find the maximum among three numbers.