Exam Code: 210404 **Paper Code: 4214**

Programme: Master of Science (Chemistry) Semester: IV

Course Title: Advanced Inorganic Chemistry

Course Code: MCHL-4081

Time Allowed: 3 Hours **Maximum Marks: 60**

Note: Attempt the five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 12 marks.

Section A

1. (a) Explain Franck Condon Principle? (6)
   (b) Explain photo substitution reactions with example? (6)
2. (a) Explain the following
   (i) Kasha's Rule (ii) Adamson's Rule (iii) Thexi State (6)
   (b) Explain in detail the photosynthesis in plants? (6)

Section B

3. (a) Explain oxidative addition and reductive elimination reactions with examples? (6)
   (b) Explain cyclometallation reactions? (6)
4. (a) How the insertion of CO will take place in M-H bonds? (6)
   (b) What are migratory insertion reactions? Explain the insertion of alkenes. (6)

Section C

5. (a) Explain the following in detail
   (i) Mononuclear polyhydrides (ii) Homolepticpolyhydride anions. (6)
   (b) Write down the characteristics and chemical behaviour of hydride compounds? (6)
6. (a) Explain the metal hydrogen interaction with C-H bonds? (6)
   (b) Explain molecular hydrogen compounds and M-H interactions? (6)

Section D

7. (a) Explain carbonylation of methyl acetate with mechanism? (6)
   (b) Discuss the following:
   (i) Oxygen Transfer from peroxo species
   (ii) Decarbonylation Reactions (6)
8. (a) Explain carbonylation of adipic ester with mechanism. (6)
   (b) Explain the hydroformylation process for unsaturated compounds. (6)

Exam Code: 210404 **Paper Code: 4215**

Programme: Master of Science (Chemistry) Semester: IV

Course Title: Chemistry of Natural Products

Course Code: MCHL-4082

Time Allowed: 3 Hours **Maximum Marks: 60**

Note: Attempt five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 12 marks.

Section A

1a Discuss the bio-synthetic pathway for the synthesis of thujene. 6

1b Explain acetate hypothesis. 6

2a Sketch the mechanism of formation of mevalonic acid from acetyl coenzyme. 8

2b Write aldol type cyclisation in poly-ketoacids. 4

Section B

3 Discuss the degradation and synthetic methods for structure elucidation in Abietic acid. 12

4 Discuss the synthesis of Progesterone using cholesterol as precursor. 12

Section C

5 Explain the structure and synthesis of chlorophyll molecule. 12

6a Write the mechanistic of action of pencillins. 6

6b Write short note on structure of porphyrin molecule. 6

Section D

7a How can methylated sugars are used to determine the ring size of monosaccharides? 8

7b How is α helix formed? 4

8 What is insulin? Discuss the amino acid sequence determination in insulin. 12

Exam Code: 210404 **Paper Code: 4216**

Programme: Master of Science (Chemistry) Semester: IV

Course Title: Electrochemistry and Chemical Dynamics

Course Code: MCHL-4083

Time Allowed: 3 Hours **Maximum Marks: 60**

Note: Attempt five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 12 marks.

Section A

1. (a) Derive Butler-Volmer equation? (6)
   (b) Explain structure of electrified interfaces? (6)
2. (a) Explain different types of corrosion? (6)
   (b) What is exchange current density? (6)

Section B

3. (a) Explain kinetic salt effect? How can you determine the value of rate constant using secondary salt effect? (6)
   (b) What are unimolecular reactions? Explain Lindemann-Hinshelwood theory and its limitations in detail? (6)
4. (a) Write down the mechanism of pyrolysis of acetaldehyde? (6)
   (b) Explain the process of decomposition of ethane and calculate the rate of reaction for this reaction? (6)

Section C

5. (a) Define fast reaction. How we can determine the rate of reaction using relaxation method and flash photolysis? (6)
   (b) What are enzymes? Why they are known as biological catalysts and also explain their kinetics in detail? (6)
6. (a) Define Photochemical reaction? Write the mechanism for the reaction between hydrogen and chlorine to determine the value of rate constant? (6)
   (b) Define oscillatory reaction. Explain the mechanism and expression of Belousov-Zhabotinsky reaction? (6)

Section D

7. (a) How can polarography help in detecting different metal ions and other contaminants from the solution? (6)
   (b) Explain the working of polarograph? Write applications of polarography? (6)
8. (a) Explain how polarography helps in determination of organic and inorganic mixtures. (6)
   (b) Discuss: (i) Diffusion current (ii) Half wave potential (6)