Exam Code: 210403 **Paper Code: 3219**
(30)

Programme: Master of Science (Chemistry) Semester-III

Course Title: Inorganic Chemistry-II

Course Code: MCHL-3081

Time Allowed: 3 Hours **Max Marks: 40**

Note: Students are required to attempt five questions in all selecting at least one question from each section. The fifth question may be attempted from any section. Each question carries equal marks.

Section A

1. (a) Illustrate the structure and functioning of myoglobin and hemoglobin 4
   (b) Explain the term cooperativity and Bohr effect. What explanation is offered for the cooperativity effect in hemoglobin. 4
2. (a) Discuss the biological significance of trace elements and essential elements. Explain O_2 binding by hemerythrin and hemocyanins. 4
   (b) Is Na^+-K^+ pump a mechanical pump? Explain the mechanism in detail? 4

Section B

3. (a) Discuss the structure and functioning of Vitamin B_{12} coenzyme. Give its two examples in organic synthesis. 4

   (b) Discuss the structures of chlorophyll. Explain photosystem I and photosystem II. Give one synthetic model of chlorophyll. 4

4. (a) Define term Bioenergetics. Explain the concept of phosphate hydrolysis. 4

   (b) Write short notes on :

   i) DNA polymerase

   ii) ATPase 4

Section C

5. (a) Write short notes on:

   i) CN^- and CO poisoning,

   ii) competition for iron,

   iii) iron toxicity 4

   (b) Discuss Biological N_2 fixation, structure and functioning of molybdenum nitrogenase. Give one model complex of nitrogenase. 4

6. (a)Write a short note on

   i) Ferritin

   ii) transferrin and

   iii) siderophores. 4

(b) Discuss the structure and functions of various cytochromes in electron transport. Draw structures of ferredoxin and rubredoxin. 4

Section D

7. (a) Discuss structure and functioning of superoxide Dismutase and carboxypeptidase. 4

   b) What is the role of calcium in biology. Discuss its transport and regulation. 4

8. (a) Discuss the biological role and metal deficiency/disease of sodium, calcium, magnesium and copper ions. 4

   (b) What are the toxic effects of antibiotics and related compounds. Discuss chelate therapy. 4

Exam Code: 210403 **Paper Code**: 3220

Programme: Master of Science (Chemistry)
(Semester III)
COURSE TITLE: Organic Synthesis
COURSE CODE: MCHL-3082

Time: 3hr **Max marks: 40**

Note: -- Attempt **Five** Questions in all, selecting at least one each from each Section. The fifth question may be attempted from any Section. Each question carries 8 marks.

SECTION-A

1. (a) Explain Pinacol-pinacolone reaction along with its mechanism? (4)
   (b) Write down the synthesis of anthracene and phenanthrene in detail. Also explain whether these compounds are aromatic or not, justify your answer? (4)
2. (a) Explain the aromatic character of Linear and non-Linear-ortho-fused polynuclear hydrocarbons? (4)
   (b) Explain the mechanism of Favorskii rearrangement? (4)

SECTION-B

3. (a) Discuss Hantzsch synthesis of pyridine in detail, why it has lower reactivity towards electrophilic substitution reactions? (4)
   (b) Write methods of preparation of aziridines, oxiranes, thiiranes and also discuss their chemical properties? (4)
4. (a) How can you synthesize azepines, oxepines, thiepines and thiazepines? (4)
   (b) Write down three methods of preparation of furan. Compare the aromatic character of furan, thiophene, pyrrole and benzene. Based on the aromatic character also discuss their order of reactivity? (4)

SECTION-C

5. (a) What is Phase transfer catalyst, explain their mechanistic pathway. Also explain their importance in organic chemistry? (4)
   (b) Explain Wilkinson catalyst? Discuss its various applications in detail? (4)
6. (a) What is Merrifield solid phase peptide synthesis? Why protecting groups are used during synthesis? (4)
   (b) Explain the following reagents in detail: (4)
   (i) Gilman's reagent
   (ii) LDA

SECTION-D

7. (a) Discuss different types of intermolecular forces present in the supramolecular compounds? (4)
   (b) Explain the concept of Preorganisation and complementarity in supramolecular chemistry? (4)
8. (a) Write synthesis and structure Crown ethers and Cryptands. Also explain the effect of structure on the selectivity of the host? (4)
   (b) Define cyclotriveratrylene, its synthesis and application in detail? (4)

Exam Code: 210403 **Paper Code: 3221**
(30)

Programme: Master of Science (Chemistry)
Semester-III

Course Title: Surface and Polymer Chemistry

Course Code: MCHL-3083

Time Allowed: 3 Hours **Max Marks: 40**

Note: The candidates are required to attempt five questions in all. Selecting one question from each section A,B,C, D and fifth question may be attempted from any section. Use of nonprogrammable calculator is allowed.

Section A

1. How will you estimate the surface area of an adsorbent by using BET adsorption isotherm? (8)
2. Derive Laplace equation and mention its consequences. (8)

Section B

3. What are surface active agents? Classify them. (8)
4. Discuss the phase separation models in respect of solutions of surfactants. (8)

Section C

5. Explain briefly
   (i) Fire resistant polymers and
   (ii) Conducting polymers. (8)
6. Describe the osmometry method for determining the molecular weight of polymers. (8)

Section D

7. What is glass transition temperature? Discuss the various factors affecting the glass transition temperature of polymers. (8)
8. Write short notes on
   (i) Chain Topology and
   (ii) polymer structure and properties. (8)

Exam Code: 210403 **Paper Code: 3222**
(30)

Programme: Master of Science (Chemistry) Semester-III

Course Title: Photochemistry and Pericyclic Reactions

Course Code: MCHL-3084

Time Allowed: 3 Hours **Max Marks: 40**

Note: Attempt five questions selecting one question from each section. The fifth question may be attempted from any section. Each question carries 8 marks.

Section -A

1. a) What are electrocyclisation reactions. Draw the correlation diagram to explain the conrotatory and disrotatory interconversion of 1,3 cyclohexadiene and 1,3,5 hexatriene along with the selection rules. (5)
   b) Explain Cope rearrangement with suitable example. (3)
2. a) Discuss the Frontier Orbital Molecular Orbital (FMO) Method for analysing the (2+2) cycloaddition reaction with suitable example. (5)
   b) Write note on 1,3 dipolar cycloaddition reaction. (3)

Section B

3. a) What are sigmatropic reactions. Explain the orbital picture diagram of suprafacial and antarafacial carbon shifts with retension and inversion of configuration. Also discuss its selection rules. (5)
   b) Discuss cheletropic reaction with example. (3)
4. a) What are correlation diagrams? Draw correlation diagram for ∏4s + ∏2s with suitable explanation. (5)
   b) Explain Ene reaction with suitable example. (3)

Section C

5. (a) Discuss following in brief
   (i) Laws of photochemistry
   (ii) Quantum Efficiency (4)
   (b) Explain different classification or pathways of photochemical reaction. (4)
6. (a) Determine rate constant and their relation with life-time of reactive excited states for bimolecular reactions. (6)
   (b) Explain fate of excited molecule in photochemical reactions. (2)

Section-D

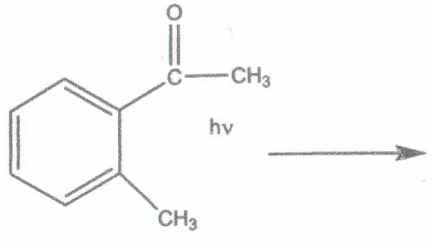
7. (a) Discuss fragmentation reaction of photoexcited carbonyl group (cyclic and acyclic). (5)

(b) Explain Photochemical formation of smog. (3)

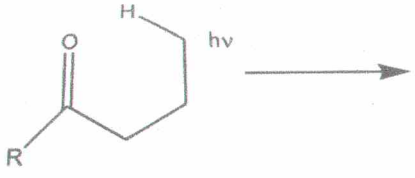
8. (a) Discuss briefly photoisomerisation of benzene (4)

(b) Give final products of following reactions:

(i)



(ii)



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