PG-CN-1031 **MCHEN-11**

P.G. DEGREE EXAMINATION – DECEMBER, 2023.

Chemistry

First Year

ORGANIC CHEMISTRY – I

Time : 3 hours Maximum marks : 70

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions

1. Explain the reactions of Grignard reagent with esters.

2. Discuss the stereochemistry of S_N1 and S_N2 mechanism.

3. Describe the chirality exhibited by Spirane.

4. Explain the mechanism of Birch reduction.

5. Describe about Huckel's rule of Aromaticity.

6. Explain the difference between benzenoid and non benzenoid compounds.

7. What is NaOCl? Explain its importance in organic synthesis.

8. Explain atropisomerism with an example.

PART B — ($3 \times 15 = 45$ marks)

Answer any THREE questions

9. (a) Illustrate electrophilic, nucleophilic and free radical addition reactions with suitable examples. (10)

(b) Discuss in detail about pyrolytic elimination. (5)

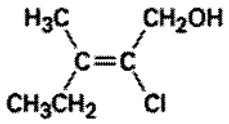
10. (a) Discuss in detail about Hammett and Taft equation. (10)

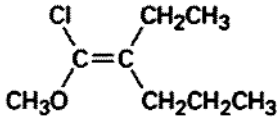
(b) Describe about Wagner-Meerwein rearrangement reaction. (5)

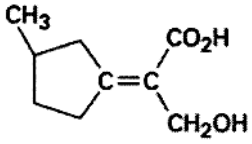
11. (a) Distinguish Enantiomers and Diastereomers. (6)

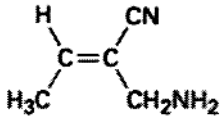
(b) Explain the stereochemistry of simple addition reactions. (5)

(c) Assign E and Z Configuration of the following alkenes. (4)

(i) 

(ii) 

(iii) 

(iv) 

12. (a) Discuss the preparation, mechanism and applications of Wilkinson's catalyst. (10)

    (b) Discuss in detail about functional group interconversions (FGI). (5)

13. Discuss the aromaticity in cyclopropene, cyclobutadiene and annulenes. (15)

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PG-CN-1032 **MCHEN-12**

P.G. DEGREE EXAMINATION – DECEMBER, 2023.

Chemistry

First Year

INORGANIC CHEMISTRY – I

Time : 3 hours Maximum marks : 70

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions out of Eight questions in 300 words

All questions carry equal marks

1. Sketch and discuss the molecular orbital diagram of O_2 molecule.

2. Write a note on Nephelauxetic effect and its applications.

3. (a) Discuss HSAB principle. (3)

   (b) Write a short note on linkage isomerism. (2)

4. Give a brief account on complementary and non-complementary reaction and give examples.

5. Discuss the electronic absorption spectra of lanthanide complexes.

6. Predict the geometries of the following molecules, XeO_2F_2, I_3^- and $N(SiH_3)_3$

7. Explain the asymmetric synthesis catalysed by coordination compounds.

8. Write a note on adiabatic- and non-adiabatic electron transfer reactions.

PART B — ($3 \times 15 = 45$ marks)

Answer any THREE questions out of Five questions in 1000 words

All questions carry equal marks

9. (a) Sketch and explain the Born-Haber cycle of sodium chloride. (8)

   (b) Discuss the LCAO approximation for the formation of covalent bonds. (7)

10. (a) Using molecular orbital theory, explain the formation of sigma and pi bonds in octahedral complexes. (6)

    (b) Discuss the factors affecting crystal field splitting parameter. (9)

11. How would you determine the absolute configuration of metal complexes using ORD and circular dichroism spectral techniques? Give example. (15)

12. (a) Illustrate about racemisation and solvolytic reactions taking place in octahedral complexes. (6)

    (b) Discuss the mechanism of dissociative and associative ligand substitution reactions in octahedral complexes. (9)

13. (a) The observed and expected magnetic moment values of Eu(III) ion are different. Comment on it. (7)

    (b) Write a note on lanthanide-based shift reagents. (8)

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PG–CN–1033 MCHEN–13

P.G. DEGREE EXAMINATION – DECEMBER, 2023.

CY-2020 Onwards

Year

PHYSICAL CHEMISTRY – I

Time : 3 hours Maximum marks : 70

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions out of Eight questions in 300 words.

All questions carry equal marks.

1. Give a brief account on partial molar quantities and their significance.

2. Write a note on de Brogue equation.

3. Discuss the Arrhenius parameters and its importance.

4. Demonstrate the phase behaviour of solid-liquid boundaries.

5. Write a note on Tafel equations.

6. Give a brief account on Raoult's law

7. Illustrate about primary and secondary salt effects.

8. Define the terms, activity and activity coefficient.

PART B — ($3 \times 15 = 45$ marks)

Answer any THREE questions out of Five questions in 1000 words.

All questions carry equal marks.

9. (a) Write a short note on fugacity. (8)

   (b) Elaborate on the Gibbs Duhem equation. (7)

10. (a) Illustrate briefly the time dependent Schrodinger equations. (9)

    (b) Discuss, in detail, the Hermitian operator. (6)

11. (a) Give a detailed account on the transition state theory. (8)

    (b) Write a note on temperature dependence of rate constant. (7)

12. (a) Write a short note on Gibbs phase rule. (7)

(b) Explain the phase behaviour of three component system one pair of liquid components exhibiting partial miscibility. (8)

13. (a) Discuss, in detail, Helmholtz-Perrin double layer model. (8)

(b) Derive the Butler – Volmer equation. (7)

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PG–CN-1034 MCHEN–14

P.G. DEGREE EXAMINATION — DECEMBER, 2023.

Chemistry

First Year

ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

Time : 3 hours Maximum marks : 70

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

1. Explain about equivalent and non-equivalent protons with suitable examples.

2. Write a note on the factors affecting the molecular vibrations.

3. Explain the selection rule for electronic transition in UV-Visible Spectroscopy.

4. Describe about the working of Glass electrode.

5. What are the sources of air pollution?

6. How would you differentiate between sp^3, sp^2 and sp hybrid carbon atoms in a ^{13}C NMR spectrum?

7. Explain different sampling techniques in IR spectroscopy.

8. Explain briefly about Cotton effect.

PART B — ($3 \times 15 = 45$ marks)

Answer any THREE questions.

9. (a) Differentiate between first order and second order spectra. (7)

(b) Discuss in details about the coupling constants and its types. (8)

10. (a) Discuss about the types of molecular vibrations and factors affecting the molecular vibrations. (8)

(b) Define Hook's law and explain how it influences in the molecular vibration in IR spectroscopy. (7)

11. What are the factors that affect the absorption in UV-Visible Spectroscopy? (15)

12. Discuss in details about the biosensors and its applications. (15)

13. (a) Discuss in detail about the pretreatment of polluted water. (8)

(b) What are the preventive methods for radiations. (7)

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PG–CN–1035 MCHEN–15

P.G. DEGREE EXAMINATION – DECEMBER, 2023.

Chemistry

First Year

CHEMISTRY OF BIOMOLECULES AND GREEN CHEMISTRY

Time : 3 hours Maximum marks : 70

PART A — (5 × 5 = 25 marks)

Answer any FIVE questions out of Eight questions in 300 words.

All questions carry equal marks.

1. Classify proteins.

2. Draw the structures any three carbohydrates.

3. Define the following terms:

   (a) Anaesthetics

   (b) Paris green as inorganic pesticide

   (c) Urea as chemical fertilizer (1 + 2 +2)

4. Write a short note on isoprene rule with examples.

5. Mention the green chemical synthesis of ibuprofen.

6. Differentiate vitamins and hormones.

7. List out the importance of

   (a) Natural gas

   (b) Light naphtha

   (c) Petroleum. (1 + 2 + 2)

8. Define solvent free reactions and reactions in ionic liquids with examples.

PART B — ($3 \times 15 = 45$ marks)

Answer any THREE questions out of Five questions in 1000 words.

All questions carry equal marks.

9. (a) Differentiate DNA and RNA. (10)

   (b) Explain the mechanism of enzyme action. (5)

10. Classify vitamins and explain the structure, occurrence and deficiency diseases caused by vitamins.

11. Describe the applications of penicillin and streptomycin. (7 + 8)

12. Explain the synthesis of coniine and α-terpineol. (7 + 8)

13. (a) List out the 12 principles of green chemistry. (12)

(b) Give any three applications of green chemistry. (3)

PG–CN–1036 MCHEN–16

P.G. DEGREE EXAMINATION – DECEMBER, 2023.

Chemistry

First Year

POLYMER CHEMISTRY

Time : 3 hours Maximum marks : 70

PART A — ($5 \times 5 = 25$ marks)

Answer any FIVE questions out of Eight questions in 300 words.

All questions carry equal marks.

1. Differentiate thermoplastic and thermosetting polymers.

2. Mention the role of Ziegler Natta catalyst in Coordination polymerization.

3. Relate the term, T_m with T_g.

4. Determine viscosity average molecular weight for polymers.

5. Write a note on the commercial polymers:

   (a) PVC

   (b) Silicone polymers.

6. Define the following terms:

   (a) Metathetical polymerization

   (b) Group transfer polymerization.

7. Measure the molecular weight of polymers using ultracentrifugation method.

8. Explain about electroluminescent polymers.

PART B — ($3 \times 15 = 45$ marks)

Answer any THREE questions out of Five questions in 1000 words.

All questions carry equal marks.

9. (a) Classify polymers. (6)

   (b) Explain the techniques of polymerization involved in suspension. (9)

10. Illustrate the types of stereoisomerism involved in 1,2-disubstituted ethylene and 1,3-butadiene. (6 + 9)

11. Describe the crystal structures of polymers and the morphology in crystalline polymers.

12. Explain the analysis of polymers using thermal methods, XRD and SEM. (5 + 5 + 5)

13. (a) List out the application of starch. (7)

(b) Write a note on electrically conducting polymers and biodegradable polymers. (4 + 4)

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