PG–AN–1031 **MCHEN–11**

P.G. DEGREE EXAMINATION — JULY 2024

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 E_1 and E_2 elimination reactions with mechanism.

2. What is Chichibabin reaction? Write its mechanism.

3. Explain in detail about stereospecific synthesis with suitable example.

4. Enumerate the applications of Organozinc reagent.

5. Explain the aromatic character of six membered rings.

6. List the applications of Lithium aluminium hydride ($LiAlH_4$).

7. Explain the following:
   (a) Synthon
   (b) Synthetic equivalent

8. Explain the essential condition for chirality in biphenyls.

PART B — (3 × 15 = 45 marks)

Answer any THREE questions.

9. Draw a mechanism of the following reactions:
   (a) Cope elimination   (5)
   (b) Chugaev elimination   (5)
   (c) Benzoin condensation   (5)

10. Explain in detail about Aliphatic electrophilic substitution reaction.   (15)

11. Discuss the chirality exhibited by allenes, spiranes and biphenyls with suitable examples.   (15)

12. (a) Discuss the applications of Jones Reagent and PDC.   (10)
    (b) Explain in detail about heterogenious catalysts.   (5)

13. Discuss the aromaticity in azulenes, sydnones and fullerenes.   (15)

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P.G. DEGREE EXAMINATION — JULY 2024.

Chemistry

First Year

INORGANIC CHEMISTRY – I

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.   What is bond length, bond order and bond energy?

2.   Explain Tanabe-Sugano diagrams for coordination complexes.

3.   Write note on circular dichroism.

4.   Explain Marcus-Hush theory in detail.

5.   Explain lanthanide contraction with examples.

6. Explain the structure of atomic orbitals.

7. Write the linkage isomerism with examples.

8. Write the difference between the 4f and 5f orbitals of actinide compounds.

PART B — $(3 \times 15 = 45 \text{ marks})$

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

All questions carry equal marks.

9. Determine properties of ionic compound using Born-Haber cycle.

10. Explain ligand field theory and MO theory of octahedral complexes.

11. Explain the stereoisomerism in octahedral and square planar complexes.

12. Explain in detail about the substitution reactions in square planar and octahedral complexes.

13. Explain in detail about the properties and term symbols of lanthanide complexes.

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P.G. DEGREE EXAMINATION — JULY 2024.

Chemistry

First Year

PHYSICAL CHEMISTRY – I

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. Write the principles of Carnot engine with diagram.

2. Explain in detail about photoelectric effect.

3. Explain temperature dependence of rate equations.

4. Explain degrees of freedom with examples.

5. Explain activity, activity coefficient and mean ionic activity.

6. What are eigen function and eigen values with examples.

7. Derive Bronsted-Bjerrum equation.

8. Explain Phase transfer between solid-liquid and liquid-solid.

PART B — (3 × 15 = 45 marks)

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

All questions carry equal marks.

9. Derive Gibbs-Duhem equation and explain its applications to real gases.

10. Derive de Broglie's equation and Derive Schrodinger wave equation.

11. Explain about Collision theory and derive Lindmann's equation for unimolecular reactions.

12. Explain three component system and stokes plot.

13. Explain Gouy-Chapmann and Stern model for double layers.

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P.G. DEGREE EXAMINATION — JULY 2024

Chemistry

First Year

ANALYTICAL AND ENVIRONMENTAL CHEMISTRY

Time : 3 hours   Maximum marks : 70

SECTION A — (5 × 5 = 25 marks)

Answer any FIVE questions.

1. What are Lanthanide shift reagents? How do they aid in the shift of the NMR peak.

2. Distinguish between IR active and inactive vibrations.

3. Describe briefly about Chromophore.

4. Elaborate on the different types of electrode used in Cyclic Voltammetry.

5. Write a note on the formation theory of Acid rain.

6. Explain about deuterium substitution in NMR spectroscopy.

7. Write the factors influencing intensity of absorption in IR spectroscopy.

8. Write a short note on Base peak and Metastable ion peak.

SECTION B — (3 × 15 = 45 marks)

Answer any THREE questions.

9. (a) How many ^{1}H NMR signals would be obtained for the given molecules

    (i) $(CH_3)_3C-C(CH_3)_3$,

    (ii) CH_3OCH_3,

    (iii) $CH_3CH_2CH_2Br$,

    (iv) $CH_3CH_2OCH_3$,

    (v) $CH_3CHBrCH_3$,

    (vi) C_6H_6,

    (vii) $ClCH_2CHCl_2$ (7)

(b) Explain why NMR spectrum of Benzene is observed at a lower field whereas acetylene is observed at a higher field strength. (8)

10. (a) Elaborate on the inter/intermolecular hydrogen bonding and IR spectrum. (8)

(b) What are the factors influencing Vibrational frequencies in IR spectrum. (7)

11. (a) Write a note on McLafferty rearrangement and Retro Diel's Alder reaction. (7)

(b) Describe the Ionization methods in Mass Spectroscopy. (8)

12. (a) Explain the principle, instrumentation and working of HPLC. (8)

(b) How TGA thermogram is recorded? (7)

13. (a) Discuss about Green House effect. (8)

(b) What are the various types of water pollutants? State their consequences. (7)

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P.G. DEGREE EXAMINATION — JULY 2024.

Chemistry

First Year

CHEMISTRY OF BIOMOLECULES AND GREEN CHEMISTRY

Time : 3 hours   Maximum marks : 70

PART A — (5 × 5 = 25 marks)

Answer all FIVE questions in 50 words.

All questions carry equal marks.

1.   Compare DNA and RNA.

2.   Write the occurrence and deficiency caused by the vitamin A and vitamin C.

3.   Summarize the role of various elements in plants growth.

4. Describe the general methods of structure determination of carotenes.

5. Explain the microwave and ultrasound mediated synthesis.

6. Write short notes on organic pesticides DDT and Gammexane.

7. Outline the green chemical synthesis of Paracetamol.

8. List out the application of green chemistry.

PART B — (3 × 15 = 45 marks)

Answer any THREE questions out of Five questions in 400 words.

All questions carry equal marks

9. Explain the C- and N- terminal analysis of peptides.

10. Describe the classifications of carbohydrates.

2 **PG-AN–1035**

11. (a) Write the origin of petroleum. (4)

(b) Write the composition of Natural gas, Naphtha and Kerosine. (6)

12. Elaborate the synthesis of Morphine.

13. Present the definitions of analgesics, anaesthetics, antipyretics, anti-inflammatory.

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P.G. DEGREE EXAMINATION — JULY 2024.

Chemistry

First Year

POLYMER 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. Write in detail about emulsion and bulk polymerization.

2. Discuss the structure and mechanism of Ziegler Natta Catalyst.

3. Discuss about the factors affecting Tg.

4. How will you determine the molecular weight of polymers using viscosity by Oswalt method.

5. Write in detail about silicone polymers.

6. What is tacticity and its types?

7. Explain group transfer polymerization.

8. How to calculate polydispersity index.

PART B — (3 × 15 = 45 marks)

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

All questions carry equal marks.

9. Discuss elastomers and fibers with suitable example.

10. Explain Stereoregular polymers with examples.

11. Discuss in detail about the crystal structures of polymers.

12. Explain the following terms.

    (a) Number average molecular weight

    (b) Weight average molecular weight

    (c) Viscosity average molecular weight

13. Describe the polymer composites.

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P.G. DEGREE EXAMINATION - JULY, 2024

Chemistry

Second Year

ORGANIC CHEMISTRY — II

Time : 3 hours   Maximum marks : 70

SECTION A — (5 × 5 = 25 marks)

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

All questions carry equal marks.

1. Name each one example forinter-and intra- molecular rearrangement reactions.

2. Write any one synthetic method forindole.

3. Draw the structure of epibatidine.

4. Write the complete equation of Paterno-Buchi reaction.

5. What is mean by Chemical Shift in NMR spectroscopy?

6. Describe the Baeyer-Villiger rearrangement reaction.

7. Present the electrophilic substitution reactions of the thiazoles.

8. Write the synthesis of androsterone from cholesterol.

SECTION B — (3 × 15 = 45 marks)

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

All questions carry equal marks.

9. Explain the Pinacol-Pinacolone rearrangement reaction and evaluate the migratory aptitude of substitutions in the rearrangement reactions.

10. List the methods of synthesis and reactions of the quinoline.

11. Explain the Corey's synthesis of longifolene.

12. Describe the Norrish Type-I and Type-II reaction with suitable example.

13. Explain the absorption spectra of the diene and unsaturated compounds.

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P.G. DEGREE EXAMINATION –
JULY, 2024.

Chemistry

Second Year

INORGANIC CHEMISTRY – II

Time : 3 hours   Maximum marks : 70

PART A — (5 × 5 = 25 marks)

Answer all FIVE questions in 50 words

1. What is cyclic donor in organometallic chemistry? Given an example.

2. What are shift reagents in NMR spectroscopy?

3. What is Steller energy in nuclear chemistry?

4. Define the aquation reactions of inorganic complexes.

5. Give any four examples for non-aqueous solvents.

6. Explain the hydroformylation of olefine with rhodium complex.

7. Explain the Koopman's theorem.

8. List the conditions for the controlled nuclear fission chain reactions.

PART B — (3 × 15 = 45 marks)

Answer any THREE questions.

9. Explain in detail about the hydrogenation of olefine by Wilkinson's catalyst.

10. Discuss the applications of Mossbauer spectra in analyzing their on complexes.

11. Elaborate the nuclear liquid drop and shell model of nucleus.

12. Explain the stereochemistry of substitution reactions in octahedral coordination complexes.

13. Write short notes on stoichiometric and non-stoichiometric defects.

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P.G. DEGREE EXAMINATION — JULY 2024.

Chemistry

Second Year

PHYSICAL CHEMISTRY – II

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. What are canonical and grand canonical ensembles?

2. Write in detail about Shockwave technique with diagram.

3. What is adsorption coefficient and how it will affect catalysis?

4. Explain center of symmetry and improper axis of symmetry with example.

5. Explain Frank-Condon principle with energy diagram.

6. Derive Michaelis-Menten kinetics of enzyme catalysis.

7. Write postulates of Group theory.

8. Explain about Green house effect.

PART B — (3 × 15 = 45 marks)

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

All questions carry equal marks.

9. Derive the following distributions
   (a) Bose Eistein distribution
   (b) Fermi-Dirac distribution

10. Derive the rate equations of stepwise and chain polymerization kinetics.

11. Write about Freundlich adsorption isotherm and Langmuir adsorption isotherm.

12. Discuss about the Great Orthogonality theorem with examples.

13. Discuss about the photooxidation, photodimerization, photochemical substitution reaction.

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