Second Year B. Pharmacy

PHARMACEUTICAL ORGANIC CHEMISTRY-II (RS 4)

Question Bank

I. STEREOCHEMISTRY

Long Essay (10 Marks):

1. Discuss the stereochemistry of alicyclic compounds and allenes?
2. Define and classify stereoisomerism with examples?
3. Explain the stereochemistry of biphenyls and oximes?
4. What is racemic modification? Discuss the methods of resolution of racemic modification with examples.
5. Define configuration. Give examples and explain R & S configurations with examples?
6. What is geometric isomerism? Give the nomenclature and method of determination of configuration of geometric isomers?
7. Explain enantiomers, diastereoisomers & meso structures with examples. Discuss different types of elements of symmetry with examples?
8. What is optical activity? What are the conditions required for a compound to be optically active. Write a note on reactions of chiral molecules?
9. Write the rules & nomenclature of R S & E Z Configuration?
10. Give various methods of determination of configuration of geometrical isomers?

Short Essay: (05 Marks):

1. Discuss the different type's elements of symmetry with examples.
2. Give the stereochemistry of nitrogen compounds.
3. Explain the various reactions of chiral molecules.
4. Distinguish between configuration and conformation with examples.
5. Discuss the stereochemistry of oximes.
6. Explain R & S configurations with examples.
7. Discuss the stereochemistry of alicyclic compounds.
8. Explain the stereochemistry of biphenyls.
9. Name the methods of resolution of racemic mixtures and explain any two.
10. Define conformational isomers and explain with examples.
11. What are geometric isomers and explain E & Z nomenclature.
12. Explain enantiomers and diastereoisomers with suitable examples.
13. Give the various reactions of chiral molecules.
14. What is optical activity? What are the conditions required for a compound to be optically active.
15. Explain Stereoselective & stereospecific reactions with examples.
16. What are relative and absolute configuration and explain the rules in determining R and S configuration.
17. What are meso compounds? Explain with examples.

SHORT ANSWERS:

1. Define Isomerism. Give examples
2. Define plane polarized light and monochromatic light.
3. Define the term Specific rotation and optical rotation.
4. Define stereoisomerism with examples.

5. Define racemization and racemic modification
6. What are epimers. Give examples.
7. Differentiate between optical rotation and specific rotation.
8. Define centre of symmetry. Give examples.
9. Mention any four methods used for the determination of geometric isomers.
10. What are syn and anti reactions?
11. Define racemization and racemic modification.
12. Define enantiomers. Give examples.
13. What is meant by D&L and R&S system of configuration.
14. Define asymmetric synthesis. Give its classification.
15. Define symmetric and asymmetric molecules. Give examples.
16. Define ordinary light and plane polarized light.
17. Define plane of symmetry. Give examples.
18. Define stereoselective and stereospecific reactions.Give examples.
19. Define geometrical isomers. Give examples.
20. What is meso compound. Give examples
21. Define asymmetric carbon atom and give the formula to calculate isomeric forms.
22. Mention the different techniques used for the resolution of racemic modification.

II. HETEROCYCLIC COMPOUNDS

Long Essays(10 MARKS):

1. Give the synthesis & chemical reactions of benzodiazepines and phenothiazines.
2. Give the methods of preparation & chemical reactions of quinolines.
3. Give the methods of preparation & chemical reactions of benzofuran and benzothiophene.
4. Name the fused heterocyclic compounds with pyrrole, furan & thiophenes. Explain the methods of synthesis and reactions of any one.
5. Distinguish between oxazole, isoxazole and thiazole and give the method of synthesis and reactions of any one.
6. Distinguish between pyrimidine, pyrazine and pyridazine and give the

method of synthesis and reactions of any one.

7. Explain Skraup synthesis & Fischer indole synthesis with its mechanism.
8. Explain the preparation & reactions of pyridine.
9. Discuss and explain aromaticity & chemical reactivity of pyrrole, furan & thiophene.
10. What are heterocyclic compounds? Give their nomenclature and classification.

Short Essays(05 MARKS):

1. Give the one method of synthesis & chemical reactions of pyridazine.
2. Write the synthesis & reactions of thiophenes.
3. Discuss aromaticity & chemical reactivity of pyrrole, furan & thiophene.
4. Write the synthesis & uses of acridine.
5. What are heterocyclic compounds? Write its classification with examples.
6. Write the resonance structures of pyrrole, furan & thiophene.
7. Explain Fischer indole synthesis and give its mechanism.
8. Justify why pyridine undergoes nucleophilic & electrophilic substitution reactions.
9. Outline the mechanism of Bischler Nephralski synthesis of quinoline.
10. Give the preparation and pharmaceutical application of benzodiazepines.
11. Give the preparation and uses of phenothiazine.
12. Write any two methods of synthesis and reactions of benzothiophenes.
13. Give the synthesis and reactions of imidazole.
14. Write the synthesis and uses of acridine.
15. Compare the aromaticity & chemical reactivity of pyrrole, furan & thiophene.
16. Distingush between pyrazole and imidazole and give the methods of synthesis & reactions of any one.
17. Give the synthesis and reactions of imidazole.
18. Give the synthesis and reactions of isoquinoline.
19. Distinguish between oxazole and isoxazole and give the methods of synthesis & reactions of any one.
20. Write any two methods of synthesis and reactions of benzothiophene.

Short Answers(02 MARKS):

1. Give any one synthesis of pyrrole.
2. What are acridines? give examples.
3. Give the structure of pyrimidine, pyridazine and pyrazine
4. Write any two structures of five membered heterocyclic compounds with two nitrogen atoms.
5. Write the structure of reduced forms of imidazole.
6. Write the structure of reduced form of isoxazole.
7. Why pyridine is more basic than pyrrole.
8. Write the structure of reduced form of pyrazole.
9. Write the resonance structure of thiophene.
10. What are heterocyclic compounds? Give examples.

II. Chemistry of biomolecules of pharmaceutical importance.

1. Carbohydrates

Long Essay:

1. Give the chemistry of starch and cellulose. Explain the pharmaceutical applications of cellulose derivatives.
2. What are disaccharides & give the chemical nature of maltose, sucrose and lactose.
3. Explain ascending and descending of sugars with suitable examples.
4. Explain the steps involved in the structural elucidation of fructose.
5. How do you determine the ring structure of glucose?
6. What are aldohexoses? Give examples and explain how to determine ring size of glucose.
7. What are carbohydrates? Give the classification with suitable structural examples.
8. Explain the steps involved in the structural elucidation of glucose.
9. What are aldoses and ketoses & write the structural determination of any one.

10. How do you convert glucose into fructose and vice versa?

SHORT ESSAYS (5)

1. Write one method to determine ring size of glucose.
2. Explain the chemical reactions of glucose.
3. Give the chemistry of maltose.
4. Explain the stereochemistry of monosaccharides.
5. Classify carbohydrates with suitable structural examples.
6. Explain Fischer Killiani synthesis.
7. Explain polysaccharides with examples.
8. Define & explain mutarotation with suitable examples.
9. Explain one method to determine ring size of glucose.

SHORT ANSWERS (2)

1. Name the reagents used in Fischer Killani synthesis.
2. Define configuration and conformation isomers.
3. What are polysaccharides. Give examples.
4. Write the structure of pyranose and furanose forms of glucose.
5. Define and classify carbohydrates.
6. What are epimers? Give examples.
7. Write the structure and uses of maltose.
8. Define aldose and ketose sugars. Give examples.
9. Define carbohydrates with examples.
10. Define muta rotation. Give examples.

a. Fats, oils and waxes

SHORT ESSAYS (5 marks)

1. Explain the chemistry of fats, oils and waxes.
2. Define the analytical constants of fats & oils. Give its significance.
3. Write a note on hardening of oils.
4. Write a note on drying, semidrying & nondrying of oils.
5. What is unsaponifiable matter and give its methods of determination
6. Define and give methods of determination & significance of acid value.
7. Define saponification value. Give a method of determination and its significance.
8. Explain hardening of oils & hydrogenation of oils.
9. Define iodine value. Give a method of determination and its significance.
10. How fats and oils acts as source of pure alcohols and carboxylic acids.

SHORT ANSWERS (2 marks)

1. Define acid value. Give its significance.
2. Define saponification value. Give its significance.
3. Define iodine value. Give its significance.
4. Define drying, semidrying and non drying of oils.
5. What is hydrogenation of oils. Give examples.
6. Distingush between fats and fatty acids. Give examples
7. Define saturated and unsaturated fatty acids. Give examples.
8. What is unsaponifiable matter and give its significance.

9. Give the chemical composition of fats, oils & waxs.
10. Mention the analytical constants of fats and oils.

Proteins

SHORT ESSAYS (5 marks)

1. Define the terms Zwitter ion, isoelectric point & explain the geometry of peptide linkages.
2. Explain Gabriel's phthalimide synthesis, Strecker's synthesis of amino acid.
3. Write any two methods of synthesis of amino acids
4. Explain Erlenmeyer's azalactone synthesis of amino acid.
5. What are peptide linkages? Give the method of synthesis of peptides.
6. Explain essential and nonessential amino acids with suitable examples
7. What are essential amino acids and give the structure any four.
8. Define & classify amino acids with suitable examples.
9. Define & classify proteins with suitable examples.
10. Explain the methods involved in the determination of C-terminal analysis of amino acids.
11. Explain the methods involved in the determination of N-terminal analysis of amino acids.

SHORT ANSWERS (2 marks)

1. Define and classify proteins.
2. Mention the different methods used for the preparation of amino acids
3. Give any two chemical reactions of acidic amino acids
4. Mention the different structural organisation of proteins.
5. Write any two chemical reactions of amino acids.

6. Mention the methods used for the determination of C-terminal amino acid residue of peptide.
7. What is peptide linkage and give the structure of dipeptide.
8. Give any two structures of acidic amino acids.
9. Write the structure of any basic amino acids.
10. Write the reaction involved in the Strecker's synthesis of amino acids.
11. Write any two structures of neutral amino acids.
12. Mention the methods used for the determination of molecular weight of proteins
13. Define Zwitter ions and peptide bond.
14. What are non essential amino acids. Give examples.
15. What is isoelectric point of amino acids? Give its significance.
16. Mention the techniques used for the determination of N-terminal amino acid of peptide.
17. Define denaturation and renaturation of proteins.
18. What are essential amino acids? Give examples.

SHORT ESSAYS:

IV.PROTECTION AND DEPROTECTION OF GROUPS

Short Answers(02 MARKS):

1. Define protection and deprotection of functional groups with examples.
2. Write the significance of amino protective agents. Give two examples.
3. Write the significance of hydroxyl protective agents. Give two examples.
4. Write the significance of carbonyl protective agents. Give two examples.

V. A STUDY AND SPECIFIC USES OF THE REAGENTS IN ORGANIC SYNTHESIS INCLUDING THEIR MECHANISM

Short Essays(05 MARKS):

1. Explain the specific use of aluminum isopropoxide in synthesis of Oppenauer oxidation. Give its mechanism.

2. Explain the specific use of aluminum tertiary butoxide in allylic bromination.

Give its mechanism.

3. Explain the specific use of lithium aluminum hydride in reduction of carboxylic acid. Give its mechanism.

4. Explain the specific use of periodic acid in oxidation of 1,2–diol to carbonyl compound. Give its mechanism.

5. Explain the specific use of sodamide in chichibabin reaction. Give its mechanism.

6. Explain the specific use of sodium borohydride in reduction of aldehyde carbonyl group.

Give its mechanism.

7. Explain the specific use of metachloro peroxybenzoic acid in Beyer–Villeger oxidation (oxidation of ketone to esters).Give its mechanism.

8. Explain the specific use of diazo methane in Buchaner – Curtius – Schlotterbeck reaction (aldehyde s to methyl ketones). Give its mechanism.

Short Answers(02 MARKS):

1. Give the structure and application of metachloroperoxybenzoic acid

2.Give the structure and application of aluminum tertiary butoxide.

3.Give the structure and application of aluminium isopropoxide

4.Give the structure and application of sodamide.

5.Give the structure and application of diazo methane.

6.Give the structure and application of periodic acid.

1. Give the structure and application of lithium aluminium hydride.
2. Give the structure and application of sodium borohydride.