

M. SC. CHEMISTRY EXAMINATION, 2022

(4th Semester)

ORGANIC CHEMISTRY SPECIAL**PAPER – XV- O**

Time : Two hours

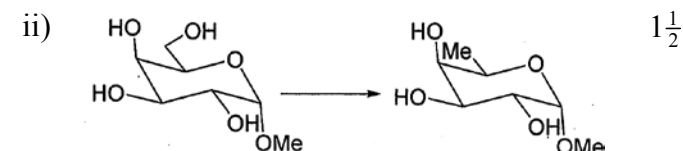
Full Marks : 50

(25 marks for each unit)**Use a separate answer script for each Unit.****UNIT: O-4151**Answer **any five** of the following questions:

5×5

- ii) Parallel β -sheets are less stable than the antiparallel β -sheets.
5. a) Write down the steps for the determination of N-terminal end of a polypeptide by Edman's method. Mention the advantage of this method over other procedures. 2+1
- b) What is β -bend structure in protein? How is β -bend structure formed? 2
6. a) What is circular dichroism (CD)? Mention the application of far-UV CD in the determination of secondary structure of protein. 1+2
- b) CD and NMR measurements have shown that poly-L-lysine is a random coil at pH=7 but becomes a helix as the pH is raised above 10. i) Account for this pH-dependent conformational transition. ii) Predict the pH-dependence of the helix-coil transition of poly-L-glutamate. 2
7. a) What are the different protein folding accessories? Mention the role of any one of them in the folding pathway of protein. 1+2
- b) Give a brief account of **any one** of the followings:
- i) 'Molten globule' state of a protein.
- ii) Cyanogen bromide in peptide chemistry. 2

1. a) Outline a synthetic pathway for getting α -(1 \rightarrow 6)-linked-D-Manp based **trisaccharide** as its **aminopentyl glycoside utilizing Merrifield resin**. 5
- b) Starting with the corresponding native sugars synthesize the disaccharide : β -D-GlcpNAc-(1 \rightarrow 4)- α -D-Galp-1-OMe **using orthogonal anomeric leaving groups in the glycosyl donor and glycosyl acceptor in the first glycosylation step**. 5
- c) Carry out the following transformation :



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[2]

- d) Synthesize **GABOB** starting with a nature's chiral pool. 5
- e) i) Depict the probable mechanistic pathway for formation of glycosyl chloride from glycosyl acetate. 2
- ii) After showing the primary mass fragmentation justify the formation of mass fragments appearing at m/e 101 and 127 from 4, 6-di-O-acetyl-1,2,3,5-tetra-O-methyl-D-glucitol. 3
- f) A disaccharide (DS) is composed of two epimeric hexoses. The methyl glycoside of DS on HIO₄ oxidation liberates HCO₂H. Periodate oxidation followed by Smith degradation of methyl glycoside of DS produces glycol aldehyde, glycerol and a hexose. DS is hydrolysed by β-D-galactosidase. Deduce probable structure/(s) of the DS and its methyl glycoside drawing the structures in chair forms, and justify your answer.
- Write the name of the partially methylated alditol acetates obtained after methylation analysis of the above mentioned DS-methyl glycoside. 4+1

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Answer **any five** of the following questions: 5×5

2. a) Write the steps for the biosynthesis of a polypeptide chain.
- b) How can you determine the total number of -S-S- (disulfide) bonds in a protein.
- c) Write the name and structure of rare amino acid in protein? 2+2+1
3. a) 'Collagen triple helix is very stable and has large tensile strength though it contains repeating -Gly-Pro-Hyp- triplets' – explain the formation and stability of this triple helix. Why does ascorbic acid deficiency lead to denatured collagen fibre formation? 2+1
- b) What is Ramachandran Plot? What are the limitations of this plot? 2
4. a) Discuss the major differences between an α-helix and Π-helix. Why does an α-helix contain dipole moment? 2+1
- b) Explain the following observations (**any one**): 2
- i) Amide-I and Amide-II bands of protein in FTIR spectroscopy are important in prediction of different secondary structures.

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