

M. Sc. CHEMISTRY EXAMINATION, 2018

(4th Semester)

ORGANIC CHEMISTRY SPECIAL

PAPER - XV-O

Time : Two hours

Full Marks : 50

(25 marks for each unit)

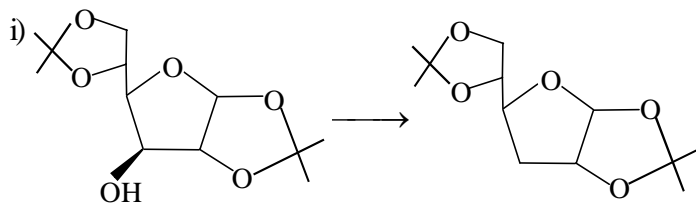
Use a separate answerscript for each unit.

UNIT - O - 4151

1. a) Account for the peaks at m/e 101 and 129 obtained on EI-Mass spectrum of 3, 5, 6 - tri-O-methylglucitol triacetate. 1 $\frac{1}{2}$
- b) Draw the structure of 3-deoxy-*L*-*lyxo* hexose. 1 $\frac{1}{2}$
- c) Discuss on the $^1\text{H NMR}$ of the anomeric protons of α - and β -D-glucopyranose. 2
- d) An oligosaccharide (Os) on NaBH_4 reduction followed by acidic hydrolysis produces D-hexose and D-hexitol in the mole ratio of 2 : 1. The reducing end and the non-reducing end sugars are epimeric. The Os is hydrolysed by β -D-mannopyranosidase. The methyl glycoside of the Os on periodate oxidation followed by Smith degradation produces glycerol, glycol aldehyde and two epimeric hexoses. Write the probable structure of the Os. 4

[2]

2. Answer **any two** questions : 5×2
- a) Give an outline of the synthesis of β -D-Galp-(1 → 6)- β -D-Galp-(1 → 6)- β -D-Galp-(1-OMe) using a common building block and solid phase synthesis.
- b) Synthesise the following disaccharide using any one β -mannosylation technique in the relevant step.
 β -D-Manp-(1 → 3)- α -D-Galp-(1-OMe)
- c) Outline the synthesis of L-daunosamine starting with L-rhamnose.
3. a) Write appropriate reagents and conditions for the following transformations : 1×2



[5]

- I. Trypsin hydrolysis :
1. Gln-Met-Lys
 2. Gly-Met-Asp-Ile-Lys
 3. Phe-Ala-Met-Lys
 4. Tyr-Arg
- II. Cyanogen bromide (CNBr) treatment :
1. Asp-Ile-Lys-Gln-Met
 2. Lys
 3. Lys-Phe-Ala-Met
 4. Tyr-Arg-Gly-Met
- III. Edman reagent (PITC) treatment :
- PTH - Tyr
- b) Give a brief account of **any two** of the following : $1\frac{1}{2}\times 2$
- i) Oxytocin
 - ii) Amide-I bands of protein in FTIR
 - iii) 'Molten globule state' of a protein

[4]

6. a) Explain the following observations (*any two*): $1\frac{1}{2}\times 2$

i) Lysine residues stabilize the α -helical conformation more when they occupy the carboxyl terminus rather than at the amino terminus.

ii) Antiparallel β -sheet structures are more stable than parallel β -sheet structures.

iii) Poly-L-arginine has random-coil structure at pH 7.0 but it adopts α -helical structure as pH is raised to 11.0.

b) Write the steps involved in the biosynthesis of protein. 2

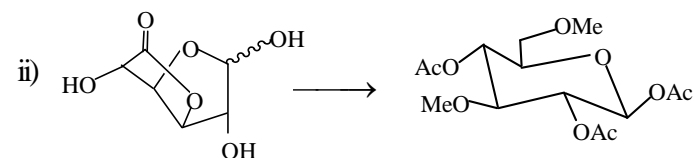
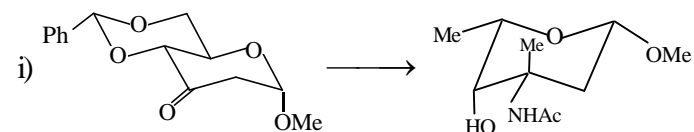
7. a) What is circular dichroism (CD)? Why is far UV-CD used as an important tool for the investigation of refolding mechanism of an unfolded protein? $1+2$

b) What is Quaternary structure of a protein? Give an example of a storage and a transport protein. 2

8. a) A polypeptide is subjected to the following degradative techniques resulting in polypeptide fragments with indicated amino acid sequences. What is the amino acid sequence of the entire polypeptide chain? 2

[3]

b) Carry out the following transformations: $2\frac{1}{2}\times 2$



UNIT - O - 4152

4. a) Comment on the structural features of the α -helix mentioning its pitch, number of residues and stability. $2\frac{1}{2}$

b) What is a 'motif'? How is ' β -barrel' structure formed in the protein triose phosphate isomerase? $2\frac{1}{2}$

5. a) Describe a method for the estimation of free thiol ($-\text{SH}$) groups in a protein sample. 2

b) Write the reactions involving the identification of N-terminus of a polypeptide chain by Edman degradation method. Why is this method preferred over other procedures? $2+1$

[Turn over