

[4]

9. Give two examples of unnatural α -amino acids and depict a synthetic scheme of one of those two of your choice. 2+3
10. What is Type-I peptidomimetics? What do you understand by the term Depsipeptide? Give synthetic scheme of conversion of a chiral α -amino acid to a chiral α -hydroxy acid keeping the configuration unaltered at the α -carbon. 1+2+2
11. Write down the structures of four nucleobases present in DNA: A, T, G and C. What is the difference between a 'nucleoside' and a 'nucleotide'? Show the H-bonding interaction (Watson-Crick type) present among the nucleobases. 2+1+2
12. Write short notes on (*any two*) : $2 \times 2\frac{1}{2}$
- i) α -PNA
 - ii) Peptoid
 - iii) Packing parameter
 - iv) Bolaform lipid
 - v) Ala-scan

Ex/SC/CHEM/PG/CORE/TH/XVI-O/2023(S)

M. Sc. CHEMISTRY (SPECIAL SUPPLEMENTARY)

EXAMINATION, 2023

(4th Semester)

PAPER: XVI-O

[ORGANIC CHEMISTRY SPECIAL]

Time : Two Hours

Full Marks : 40

(20 marks for each Unit)

Use a separate answer script for each Unit.

UNIT – O-4161

Answer *any four* of the following questions:

1. a) How can you determine the total number of free thiol (-SH) groups in a protein?
- b) Br-CH₂-CH₂-NH₂ reacts with cysteine side chain in a protein to form S-aminoethyl derivatives. The peptide bond on carboxyl site of the modified cysteine residues becomes susceptible to hydrolysis by trypsin. Explain with proper reason.
- c) Write the steps for the biosynthesis of a polypeptide chain. $1\frac{1}{2} + 1\frac{1}{2} + 2$
2. a) How different helices are formed? Discuss the major differences between an α -helix and a π -helix. What are the constraints for the formation of an α -helix?
- b) Write the name of a carrier protein and a storage protein. $(1 + 1\frac{1}{2} + 1\frac{1}{2}) + 1$

[Turn over

[2]

3. a) Describe the structural features of collagen. Explain the role of vitamin-C in the stabilization of collagen fiber.
- b) What is Ramachandran diagram? Show the regions of allowed conformations of poly-L-alanine in this diagram. $(1\frac{1}{2}+1) + (1+1\frac{1}{2})$
4. a) Explain the following observations (**any two**):
- Carboxypeptidases are not used for the determination of C-terminal amino acid sequence.
 - Glutathione has unusual peptide bond.
 - Amide-I band in FTIR spectra of protein is important for the determination of different secondary structures.
- b) The toxin polypeptide 'apamine' is present in the venom of the honeybee. It has the amino acid sequence: CNCKAPETALCARRCQQH.
- It is known that 'apamine' does not react with iodacetate ($\text{ICH}_2\text{COO}^\ominus$). How many disulfied (S-S) bonds are present?
 - Trypsin cleavage gave two peptide fragments. Where are the S-S bonds located? Give your answer with reason. $1\frac{1}{2} \times 2 + 2$

[3]

5. a) What is 'mean residue ellipticity' (MRE)? Why the near UV-CD spectrum can be employed to detect the correctly folded structure of a protein?
- b) Explain the formation of 'Molten globule' state of a protein. $1+2+2$
6. a) What are the folding accessory proteins? Mention the role of any one of the folding accessory protein.
- b) Mention the application of **any one** of the following reagents in protein chemistry with plausible mechanism.
- Ellman's reagent (DTNB)
 - Cyanogen bromide (CNBr)
 - Formation of β -bend structure $(1+2)+2$

UNIT – O-4162

Answer **any four** of the following questions:

7. Depict the salient functional features of architecture of the most common membrane lipid DPPC (1, 2-dipalmitoyl-sn-glycero-3-phosphocholine) and give a plausible organic synthetic scheme of the racemic analogue of DPPC. $2+3$
8. What are cationic lipids? Explain with a suitable example and give the plausible scheme of bench organic synthesis of the chosen example. $1+1+3$

[Turn over