

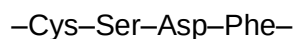
Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

Proteins are polymers made from amino acids.
Part of the structure of a protein is shown.



Each amino acid in the protein is shown using the first three letters of its name.

(a) Identify the type of protein structure shown.

Tick (✓) **one** box.

Primary

☐

Secondary

☐

Tertiary

☐

(1)

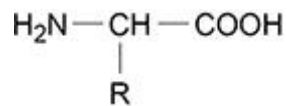
(b) Draw a structure for the –Cys–Ser– section of the protein.
Use the Data Booklet to help you answer this question.

(2)

(c) Name the other substance formed when two amino acids react together to form part of a protein chain.

(1)

The general structure of an amino acid is shown.



R represents a group that varies between different amino acids.
R groups can interact and contribute to protein structure.

- (d) Explain why the strength of the interaction between two cysteine R groups differs from the strength of the interaction between a serine R group and an aspartic acid R group.

Use the Data Booklet to help you answer this question.

[illegible]

(4)

- (e) Deduce the type of interaction that occurs between a lysine R group and an aspartic acid R group.

(1)

(Total 9 marks)

Q2.

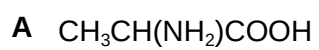
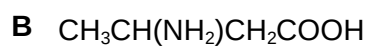
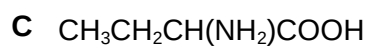
Which type of interaction between polypeptide chains is mainly responsible for maintaining the secondary structure of a protein in the form of an alpha helix?

- A covalent bonds ☐
- B hydrogen bonds ☐
- C ionic interactions ☐
- D van der Waals forces ☐

(Total 1 mark)

Q3.

Which compound is **not** a 2-aminocarboxylic acid?

☐☐☐☐

(Total 1 mark)

Q4.

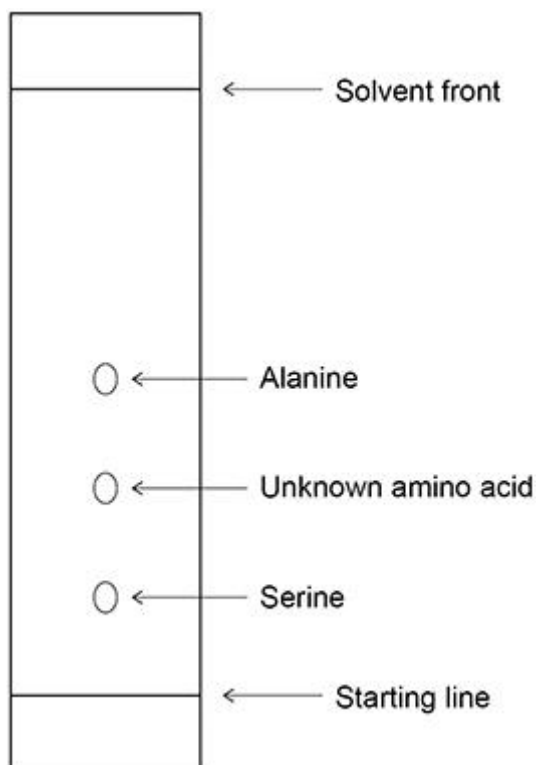
The protein fibroin can be broken down into amino acids using an enzyme.

- (a) A student uses thin-layer chromatography (TLC) to identify these amino acids.

The student identifies two of the amino acids as alanine and serine.

Use the figure below to calculate the R_f value of the unknown amino acid. Show your working.

Use your R_f value and the table below to identify the unknown amino acid.



Amino acid	R_f value
tyrosine	0.25
glycine	0.34
valine	0.64
leucine	0.73

R_f value _____

Identity _____

(2)

- (b) The amino acids cannot be seen as they move during the experiment.

State how the amino acids can be made visible at the end of the experiment.

(1)

- (c) State why each amino acid has a different R_f value.

(1)
(Total 4 marks)

Q5.

Which row shows a pair of bases that can link two strands of DNA with three hydrogen bonds?

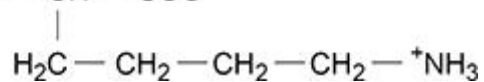
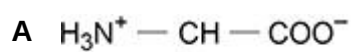
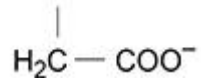
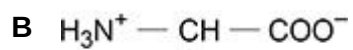
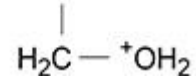
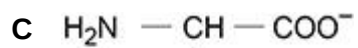
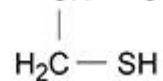
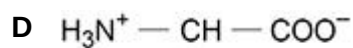
Use the Data Booklet to help you answer this question.

	Base 1	Base 2	
A	adenine	guanine	☐
B	cytosine	thymine	☐
C	cytosine	guanine	☐
D	adenine	thymine	☐

(Total 1 mark)

Q6.

Which is the structure of a zwitterion of an amino acid?

☐☐☐☐

(Total 1 mark)