

Name of the Student: _____

Max. Marks : 29 Marks

Time : 29 Minutes

Q1.

- (a) The genetic code is described as being degenerate. What does this mean?

(1)

- (b) What is a codon?

(2)

- (c) (i) What is the role of RNA polymerase during transcription?

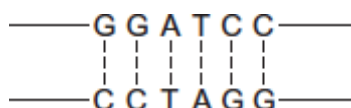
(1)

- (ii) mRNA can be converted to cDNA.

Name the enzyme used in this process.

(1)

- (d) The diagram shows the base sequence on DNA where a restriction endonuclease cuts DNA.



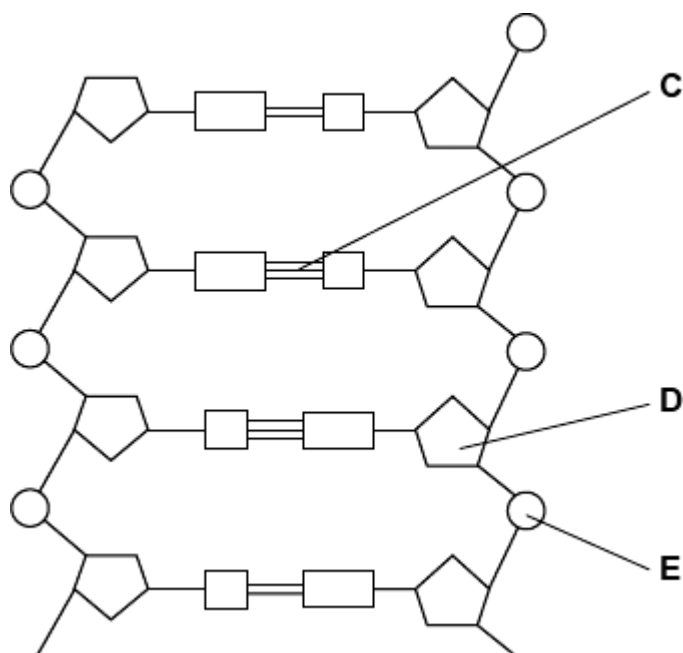
Use evidence from the diagram to explain what is meant by a palindromic recognition sequence on DNA.

(1)

(Total 6 marks)

Q2.

The diagram shows part of a DNA molecule.



- (a) (i) DNA is a polymer. What is the evidence from the diagram that DNA is a polymer?

(1)

- (ii) Name the parts of the diagram labelled **C**, **D** and **E**.

Part **C** _____

Part **D** _____

Part **E** _____

(3)

- (iii) In a piece of DNA, 34% of the bases were thymine.

Complete the table to show the names and percentages of the other bases.

Name of base	Percentage
Thymine	34
	34

(2)

- (b) A polypeptide has 51 amino acids in its primary structure.

- (i) What is the minimum number of DNA bases required to code for the amino acids in this polypeptide?

(1)

- (ii) The gene for this polypeptide contains more than this number of bases.

Explain why

(1)

(Total 8 marks)

Q3.

A student investigated the rate of respiration of yeast cells. He set up a conical flask with a suspension of yeast in some apple juice. He took samples of the mixture at different times and found the number of yeast cells.

His results are recorded in the table below.

Time from start of investigation/days	Mean number of yeast cells ($\times 10^6$) per cm^3
3	7.413
4	8.912
8	16.595
9	19.952
10	23.442
11	23.703

- (a) The student set up a suspension of yeast in apple juice. Apple juice contains all the nutrients that yeast requires for growth. Name **two** types of nutrients present in the apple juice that are essential for the growth and reproduction of yeast cells.

1. _____

2. _____

(2)

- (b) The student counted the yeast cells in a sample of the suspension. Give **one** precaution the student should have taken to make sure he obtained a representative sample. Explain how this precaution would result in a representative sample.

(2)

- (c) Calculate the percentage increase of yeast cells between day 3 and day 4. *Show your working.*

Answer _____

(2)

- (d) The increase in the number of yeast cells was less between days 10 and 11 than it was between days 3 and 4.
Give **two** reasons why.

1. _____

2. _____

(2)

(Total 8 marks)

Q4.

Phenylketonuria is a disease caused by mutations of the gene coding for the enzyme PAH. The table shows part of the DNA base sequence coding for PAH. It also shows a mutation of this sequence which leads to the production of non-functioning PAH.

DNA base sequence coding for PAH	C	A	G	T	T	C	G	C	T	A	C	G
DNA base sequence coding for non-functioning PAH	C	A	G	T	T	C	C	C	T	A	C	G

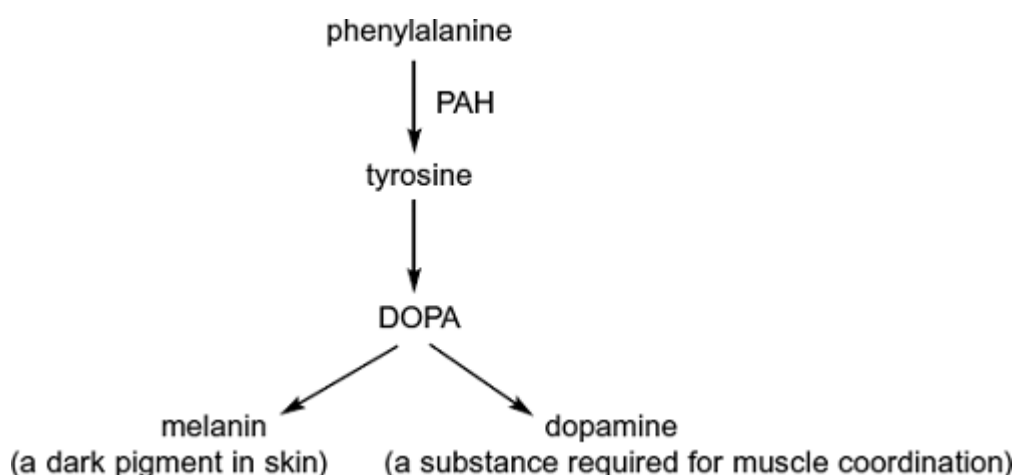
- (a) (i) What is the maximum number of amino acids for which this base sequence could code?

(1)

- (ii) Explain how this mutation leads to the formation of non-functioning PAH.

(3)

PAH catalyses a reaction at the start of two enzyme-controlled pathways. The diagram shows these pathways.



- (b) Use the information in the diagram to give **two** symptoms you might expect to be visible in a person who produces non-functioning PAH.

1. _____

2. _____

(2)

- (c) One mutation causing phenylketonuria was originally only found in one population in central Asia. It is now found in many different populations across Asia. Suggest how the spread of this mutation may have occurred.

(1)

(Total 7 marks)