

Answer all questions

1 (a) (i) Define a *vital stain*.

_____ [1]

(ii) Name the reagent used to stain chromosomes.

_____ [1]

(b) Fig. 1.1 shows the egg of an invertebrate with a stage micrometer. Each division on the stage micrometer is $10\mu\text{m}$ apart.

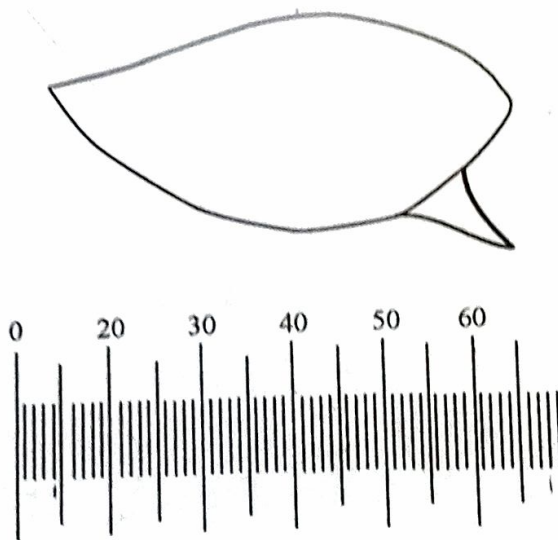


Fig. 1.1

(i) Measure the width of the egg.

_____ [1]

(ii) Calculate the magnification of the image.

_____ [2]

[Total: 5]

2 Fig. 2.1 is a simplified structure of insulin.

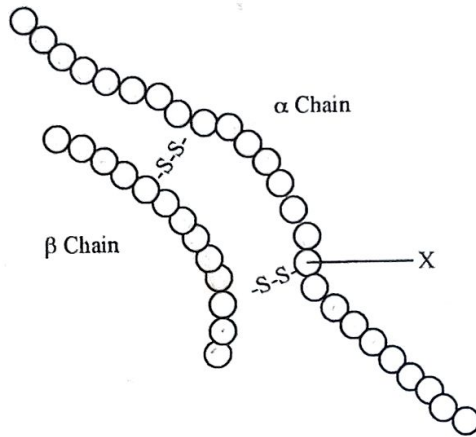


Fig. 2.1

(a) State how the insulin shows the protein primary structure.

[2]

(b) Describe how Fig. 2.1 demonstrates the quaternary structure of a protein.

[3]

(c) Identify amino acid X.

[1]

[Total: 6]

3 Fig. 3.1 shows part of the Meselson-Stahl experiment results.

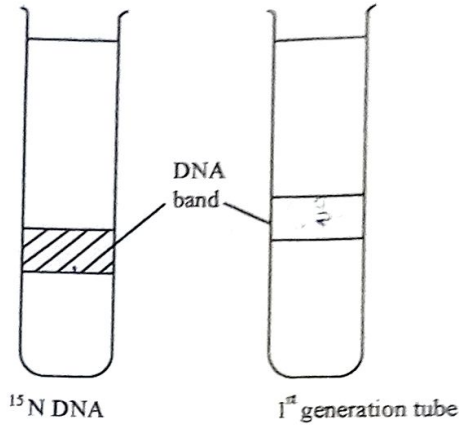


Fig. 3.1

(a) Explain the term *semi-conservative replication*.

_____ [1]

(b) (i) On Fig. 3.1, draw the second generation tube.

[1]

(ii) Explain why *E. coli* bacteria was used in the Meselson-Stahl experiment.

_____ [2]

(c) Describe the results after the third generation of bacteria growth in ^{14}N isotope.

_____ [2]

[Total: 6]

4

(a) Define a gene.

[1]

(b) Fig. 4.1 shows a summary of translation.

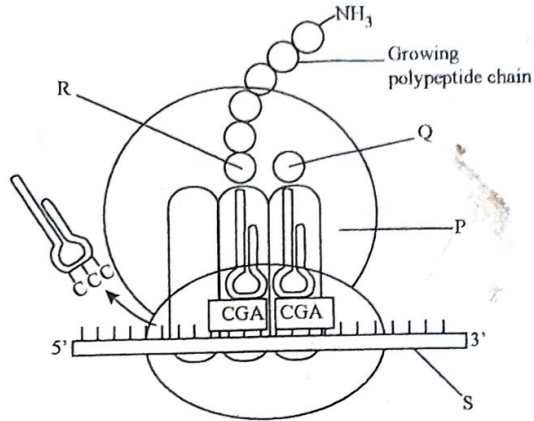


Fig. 4.1

(i) Determine the DNA codon for the amino acids R and Q.

R _____

Q _____

[2]

(ii) Describe the role S in protein synthesis.

[2]

(c) Explain the significance of polysomes in translation.

[2]

[Total:6]

5 (a) Fig. 5.1 shows dissociation curves for fetal haemoglobin, maternal haemoglobin and myoglobin.

For Examiner's Use

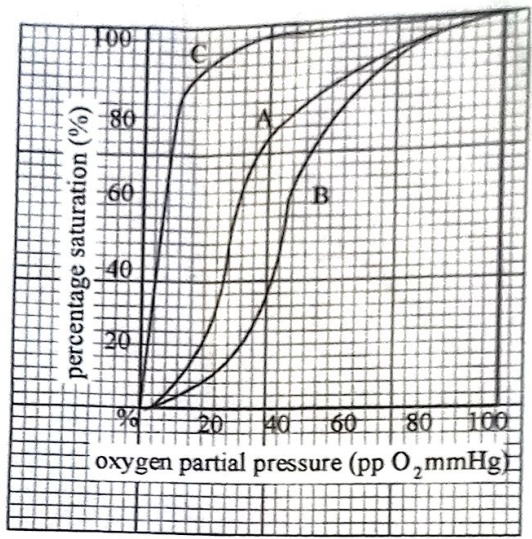


Fig. 5.1

- (i) Identify the dissociation curve
 - A, _____
 - B, _____
 - C, _____ [3]

(ii) Explain the advantages of the displacement of A to the left of B.

_____ [2]

(b) Explain the physiological advantage of the Bohr effect.

_____ [2]

[Total: 7]

6 (a) Fig. 6.1 shows an action potential.

For
Examiner's
Use

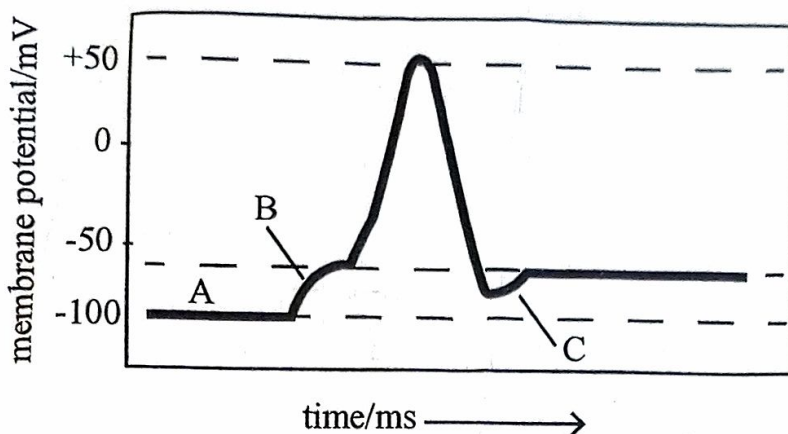


Fig. 6.1

Identify stage A, _____

B, _____

C. _____ [3]

(b) Explain the role of the myelin sheath in neurons.

_____ [2]

(c) Outline the role of sodium ions in impulse transmission along a neuron.

_____ [2]

[Total: 7]

7 Fig. 7.1 shows stages in anaerobic respiration in plants.

For
Examiner's
Use

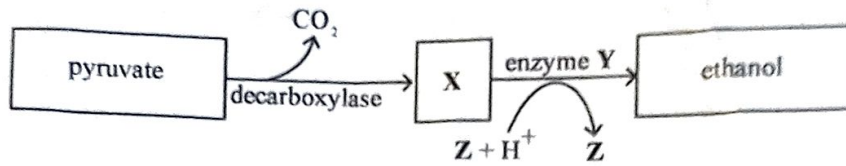


Fig. 7.1

(a) Identify

(i) X, _____ [1]

(ii) enzyme Y, _____ [1]

(iii) Z, _____ [1]

(b) Describe how the proton gradient across the inner mitochondrial membrane is established.

[2]

(c) Calculate the RQ value for the equation
 $C_{15}H_{31}COOH + 23O_2 \rightarrow 16CO_2 + 16H_2O$

_____ [2]

[Total: 7]

8 Fig. 8.1 shows stages in DNA fingerprinting.

For
Examiner's
Use

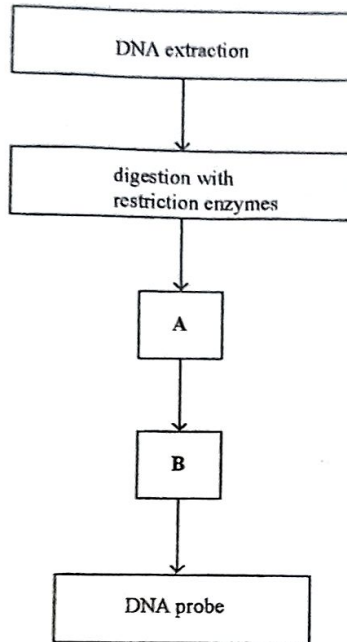


Fig. 8.1

(a) (i) Identify the stage:

A _____

B _____ [2]

(ii) Describe a DNA probe.

_____ [2]

- (b) Fig. 8.2 shows DNA profiles in a paternity dispute involving the mother, M, the child, Ch and three possible fathers, 1, 2, and 3.

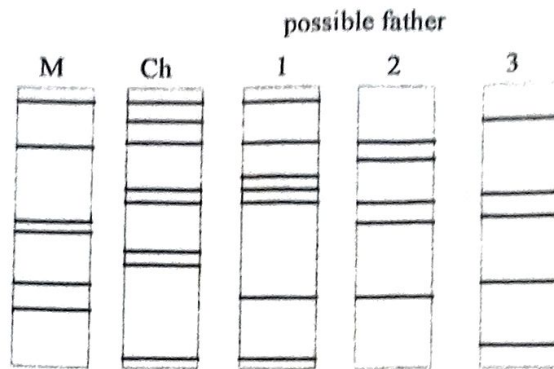


Fig. 8.2

- (i) State, with a reason, the father of the child.

[2]

- (ii) State any **other** application of genetic fingerprinting.

[1]

[Total: 7]

- 9 In fruit flies, the male is heterogametic. The gene for eye colour is sex linked. The allele for white eyes is recessive to that for red eyes.

- (a) State the genotype for a

1 male with red eyes,

2 heterozygous red eyed female.

[2]

For
Examiner's
Use

(b) Determine, using a genetic diagram, the proportion of the progeny with white eyes if a red eyed male is crossed with a red eyed heterozygous female.

[4]
[Total:6]

10 (a) Define the term *habitat*.

[1]

(b) Describe any **three** human activities that have led to the loss of habitat for the white rhino.

[3]

(d) State any **two** benefits of conserving the African elephant *Loxodonta africana*.

[2]

[Total:6]

13
BLANK PAGE