Q1.

(a) Describe and explain how you would use cell fractionation **and** ultracentrifugation to obtain a sample of nuclei from muscle tissue.

(6)

(b) Describe the role of organelles in the production and release of enzymes by animal cells.

Do **not** include details of transcription in your answer.

(5)

(c) Describe the structure of ATP.

Outline how named enzymes break down and resynthesise ATP.

(4)

(Total 15 marks)

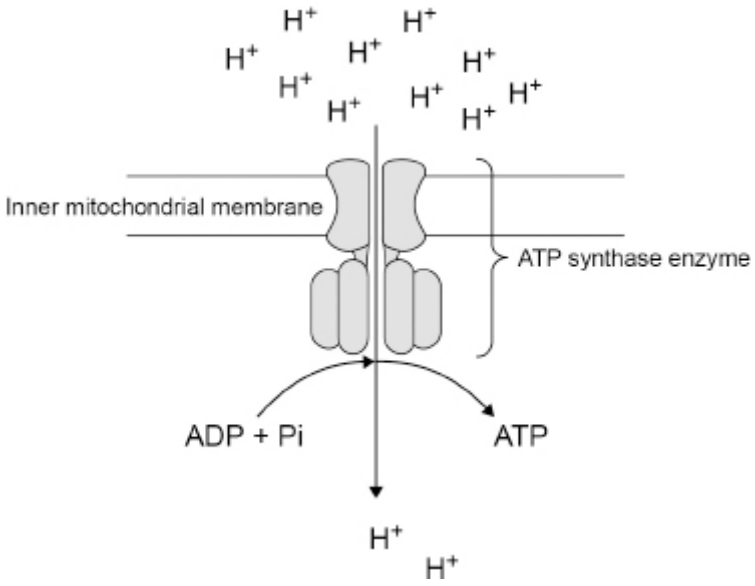
Q2.

Write an essay on phosphorus-containing substances and their importance in biological systems.

(Total 25 marks)

Q3.

(a) The figure below shows an ATP synthase enzyme in the inner mitochondrial membrane.



Complete the passage with the appropriate terms.

ATP synthase comprises several polypeptides, so is said to have

a _____ structure.

It catalyses the synthesis of an ATP molecule by a _____

reaction; this involves the _____ of a water molecule.

The ATP synthase in the figure above is in a mitochondrion so would catalyse reactions during _____.

(2)

(b) As shown in the figure above, ATP synthase has two functions.

- It catalyses the synthesis of ATP.
- It allows the movement of H^+ ions.

Suggest how the shape of the ATP synthase allows it to have these two functions.

Explain your answers.

Catalyses the synthesis of ATP _____

_____

_____

_____

_____

_____

Allows the movement of H^+ ions _____

_____

_____

_____

_____

_____

(4)

(Total 6 marks)

Q4.

Write an essay on **one** of the topics below.

The uses and importance of ATP in organisms.

(Total 25 marks)