Membranes

Question Paper 2

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Cell Membranes and Transport
Sub Topic	Membranes
Booklet	Theory
Paper Type	Question Paper 2

Time Allowed : **54 minutes**

Score : **/ 45**

Percentage : **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 **(a)** Cell surface membranes are involved with the movement of substances into and out of cells.

Calcium pumps in cell surface membranes maintain a concentration of calcium ions inside the cytoplasm that is a thousand times lower than outside the cell.

Fig. 1.1 shows the movement of calcium ions across a cell surface membrane.

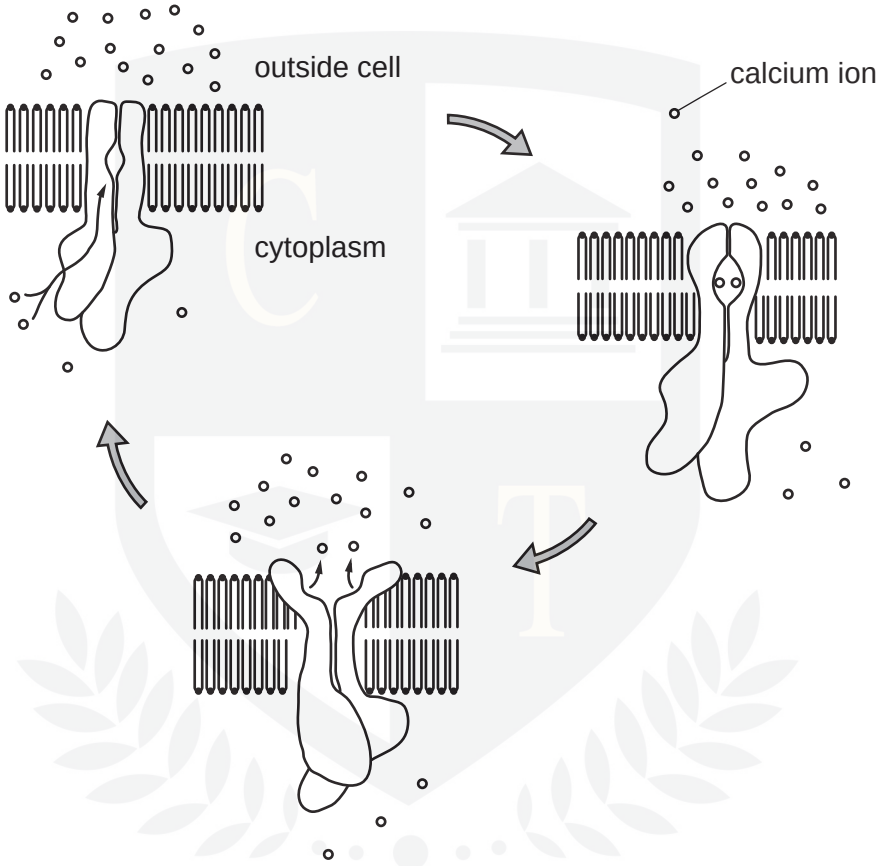

Fig. 1.1

With reference to Fig. 1.1,

(i) explain why calcium ions do not pass through the phospholipid bilayer;

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..... [2]

(ii) name and describe the process by which calcium ions are moved across the membrane.

name .....

description .....

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.....[3]

(b) Phagocytosis is the process by which bacteria are ingested by cells.

Describe the role of the cell surface membrane during phagocytosis.

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(c) Phagocytic cells contain many lysosomes.

Describe the function of lysosomes in destroying ingested bacterial cells.

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.....[4]

[Total: 12]

2 Receptor proteins are part of the fluid mosaic structure of cell surface (plasma) membranes of T-lymphocytes. Each type of receptor protein is specific to a particular antigen.

Fig. 1.1 shows a receptor protein and the surrounding phospholipids of a cell surface membrane of a T-lymphocyte.

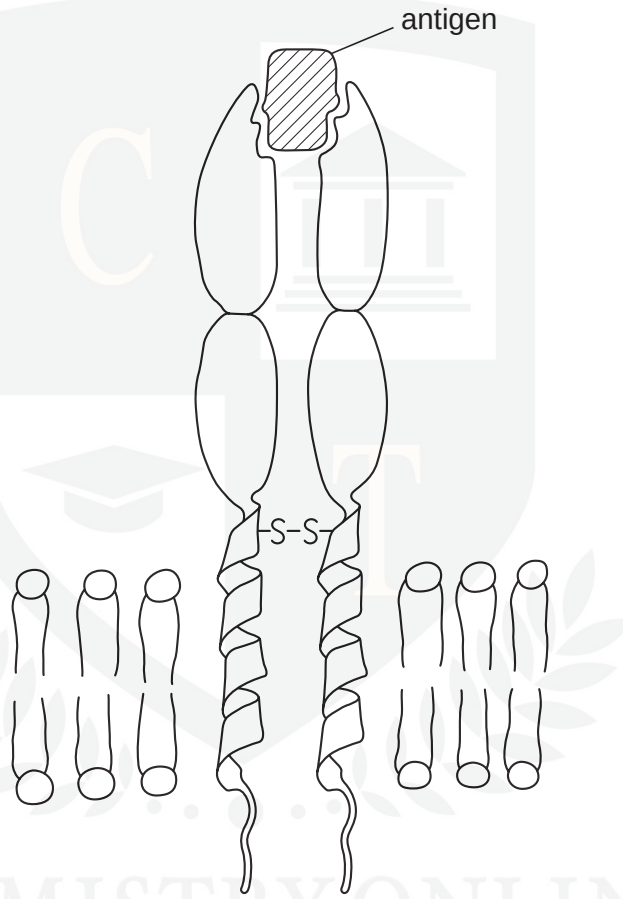

Fig. 1.1

(a) (i) Draw a bracket (}) on Fig. 1.1 to indicate the width of the phospholipid bilayer. [1]

(ii) Explain the term *fluid mosaic*.

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..... [2]

(iii) Describe how the **structure** of the receptor shown in Fig. 1.1 is similar to the structure of an antibody molecule.

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(b) Describe the roles of T-lymphocytes in a primary immune response.

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..... [4]

(c) Describe three functions of cell surface membranes, **other than** the recognition of antigens.

1 .....

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2 .....

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3 .....

..... [3]

[Total: 12]

3 **(a)** State the roles of glycoproteins, carrier proteins and cholesterol in the cell surface membrane of an animal cell.

glycoproteins .....

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carrier proteins .....

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cholesterol .....

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.....[4]

(b) Fig. 5.1 is a diagram of an animal cell showing the concentrations and direction of movement of an ion **(A)** and a non-polar molecule **(B)** on either side of the cell surface membrane.

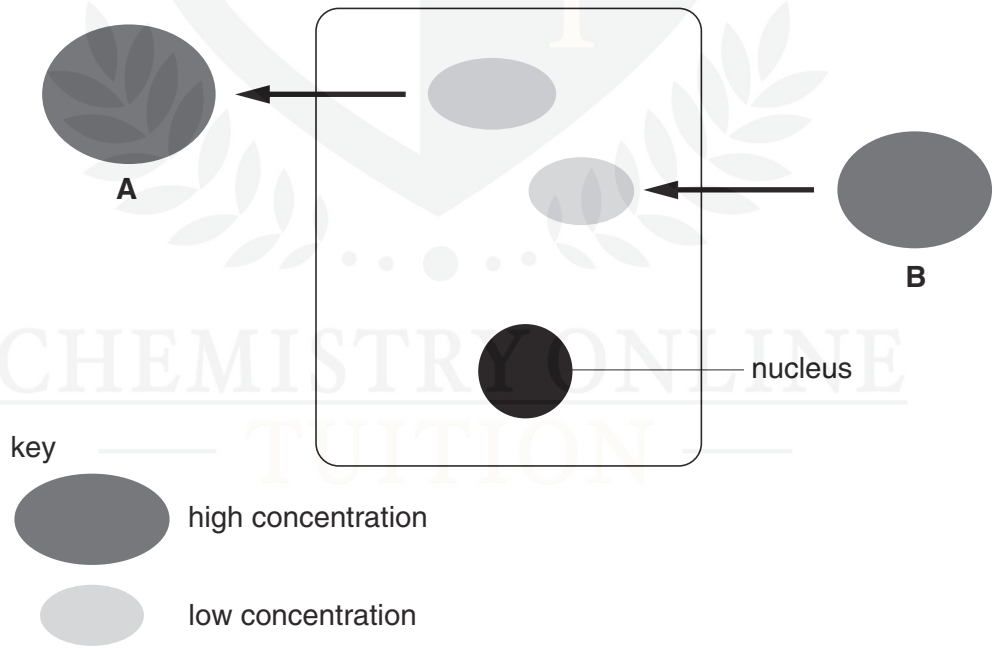

Fig. 5.1

With reference to Fig. 5.1, explain how **A** and **B** cross the cell surface membrane of the cell.

A .....

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B .....

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.....[4]

(c) Describe how particles, such as bacteria, are taken up by phagocytes.

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(d) Phagocytes contain many lysosomes.

State the function of lysosomes in phagocytes.

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[Total: 11]

4 The cell surface membrane has a fluid mosaic structure.

(a) Describe what is meant by the term *fluid mosaic*.

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(b) In 1934, the biologists Davson and Danielli published their suggestion for the structure of the cell surface membrane, as shown in Fig. 1.1.

They suggested that the membrane was a phospholipid bilayer with a layer of hydrophilic protein on both surfaces.

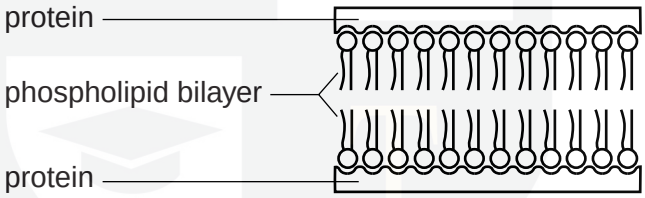

Fig 1.1

State **one** way in which the Davson-Danielli structure is similar to the fluid mosaic structure **and one** way in which it differs from the fluid mosaic model.

similarity

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.....[1]

difference

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.....[1]

(c) One way in which substances can cross cell membranes is by active transport.

Describe the mechanism of active transport.

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(d) High temperature can damage cell membranes. One factor contributing to this damage is the denaturation of membrane proteins.

Describe how proteins become denatured at high temperature **and** explain how this could lead to damaging cell membranes.

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[Total: 10]