Adabistan-e-Soophia

General Certificate of Education Ordinary Level – III **(Test 1)**

.Adabistan-e-Soophia
School for Boys & Girls

CANDIDATE NAME	

CENTER NUMBER						CANDIDATE NUMBER						

Biology 5090/01

Paper II

Session 2020-21

Time **60minutes**

Marks 40

Additional Materials: *Answer Booklet/Paper*

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet. Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions from Section A and B and attempt any ONE question from Section C.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

[TURN OVER]

1. Fig. 1.1 is a transmission electron micrograph of a cell from the root of thale cress, *Arabidopsis thaliana*.

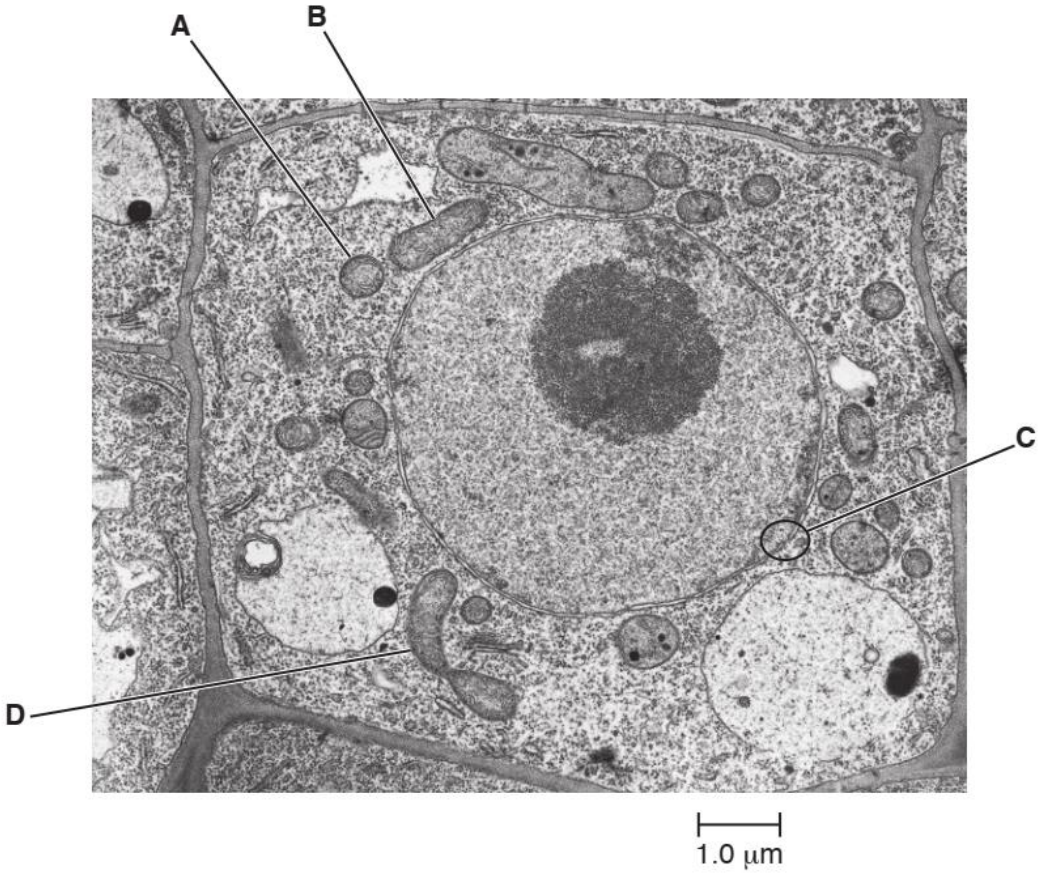

Fig. 1.1

(a) (i) The structures labelled **A** and **B** on Fig. 1.1 are sections of two mitochondria.

Suggest why **A** and **B** are different shapes.

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.....[1]

(ii) The structure labelled **D** on Fig. 1.1 is a mitochondrion about to divide.

Explain the importance of the division of mitochondria for the cell shown in Fig. 1.1 **and** for cells in the root tips of thale cress.

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.....[2]

[Total: 3]

2. **a)** A student carried out an investigation into osmosis using red blood cells.

Red blood cells were placed in sodium chloride (salt) solutions at five different concentrations. For each concentration, a sample was added immediately to a microscope slide and the cells were viewed using a light microscope for a period of time. The observations recorded are shown in Table 3.1.

Table 3.1

concentration of salt solution / %	observation of red blood cells
0.0	swell and burst, numbers decrease
0.4	increase in size
0.9	remain the same size
1.5	decrease in size
3.0	smaller and shrivelled

Explain, in terms of **water potential** and osmosis, the results that the student obtained.

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..... [4]

b) The student also carried out a similar investigation using plant cells with cell walls removed. These cells were suspended in a 12% mannitol solution so that the water potential inside and outside of the cells was equal.

Fig. 3.1 is a photomicrograph of these cells.

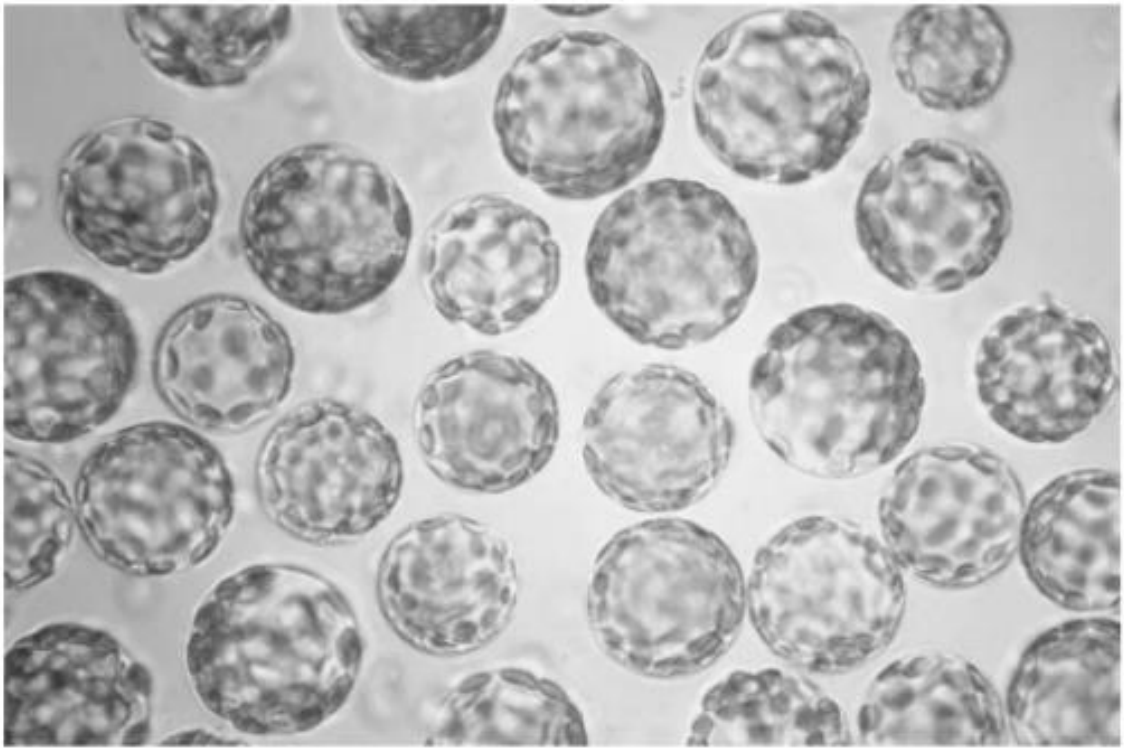

Fig. 3.1

The student removed a sample of these cells. The sample was placed into distilled water and was viewed using a light microscope.

Describe what you would expect the student to observe and explain why this would not occur with normal plant cells.

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..... [2]

[Total: 6]

3. **a)** Starch, glucose and fructose are carbohydrates. Fructose syrup is used as a sweetening agent as an alternative to sucrose.

The flow chart in Fig. 3.1 shows how fructose is prepared from maize starch.

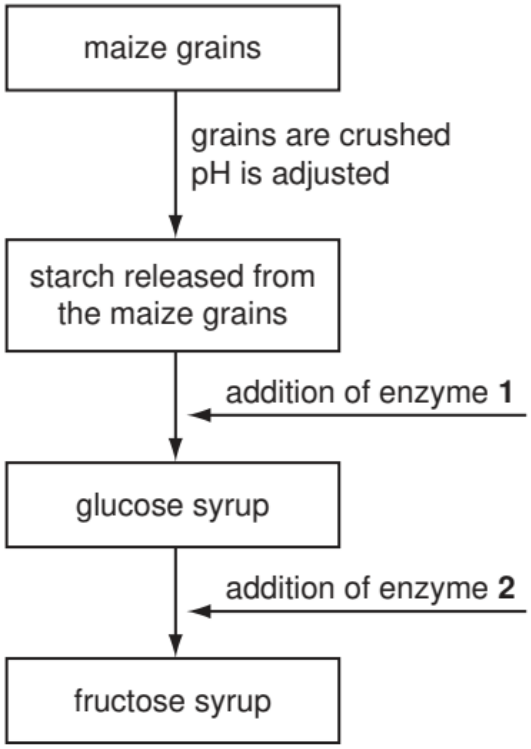

Fig. 3.1

(i) Name enzyme **1**.

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[1]

(ii) State why it is necessary to adjust the pH before an enzyme is added to the process.

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[1]

b) Maize grains contain protease enzymes. With reference to the processes shown in Fig. 3.1, suggest why it is important that these enzymes do not contaminate the glucose syrup.

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[1]

c) The formation of fructose syrup from glucose syrup is carried out at a temperature of 60 °C.

Suggest an important property of enzyme **2** that allows it to be used at temperatures as high as 60 °C.

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d) Enzyme **2** is found naturally in many bacteria. Enzymes for use in washing powders are obtained from bacteria.

Describe how bacteria are used to produce enzymes for washing powders.

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..... [3]

e) Pectinase is an enzyme that breaks down compounds known as pectins. Cell walls of fruits, such as apples and mangoes, contain pectins.

Explain the **advantages** of using pectinase in fruit juice production.

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[Total: 10]

4. Blood flows through the hepatic portal vein from some organs to the liver.

Fig. 2.1 shows the hepatic portal vein and these organs.

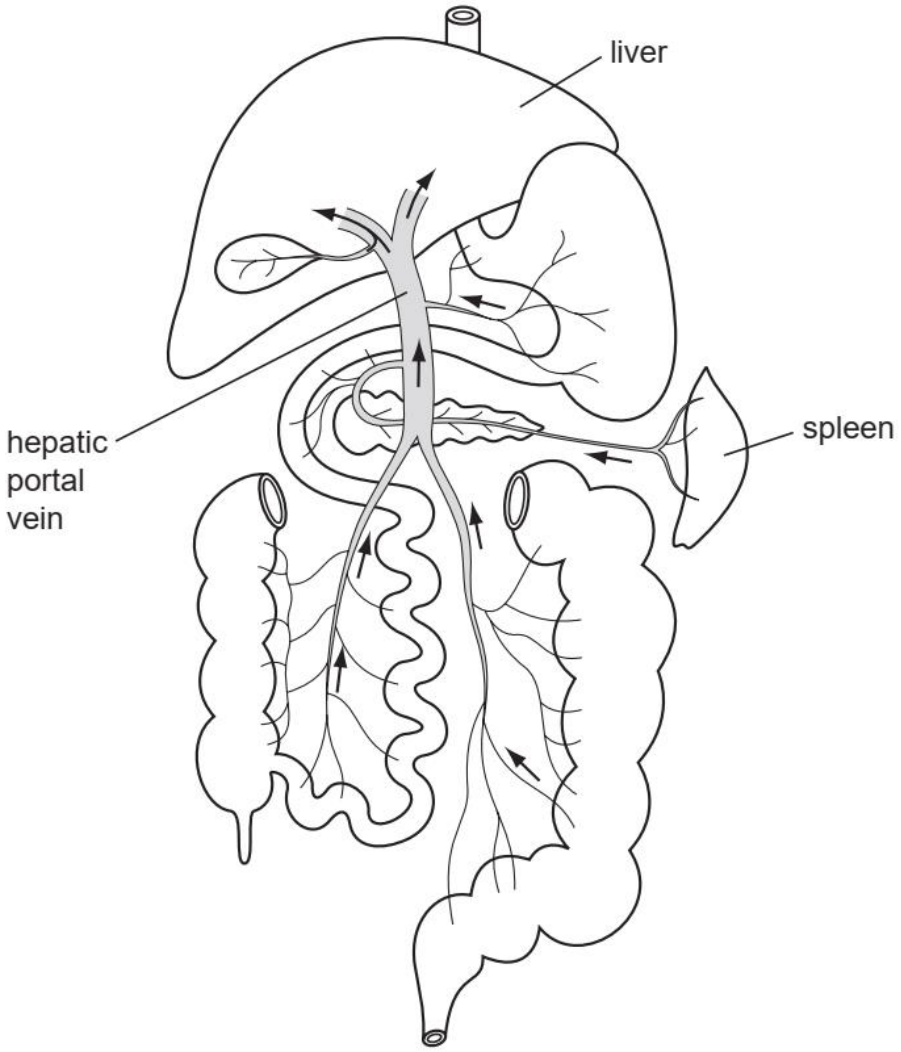

Fig. 2.1

a) Blood in the hepatic portal vein is deoxygenated.

Explain why the blood in the hepatic portal vein is deoxygenated rather than oxygenated.

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..... [2]

b) Name **four** organs, **other than** the spleen, that are shown in Fig. 2.1 and from which blood flows into the hepatic portal vein.

1 .....

2 .....

3 .....

4 ..... [4]

c) Describe the role of the hepatic portal vein in the transport of absorbed nutrients.

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d) Explain how the liver is involved in regulating the composition of the blood **and** in protecting the body against toxic substances.

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..... [5]

[Total: 14]

5. Fig. 1.1 shows a section of a villus at two different magnifications.

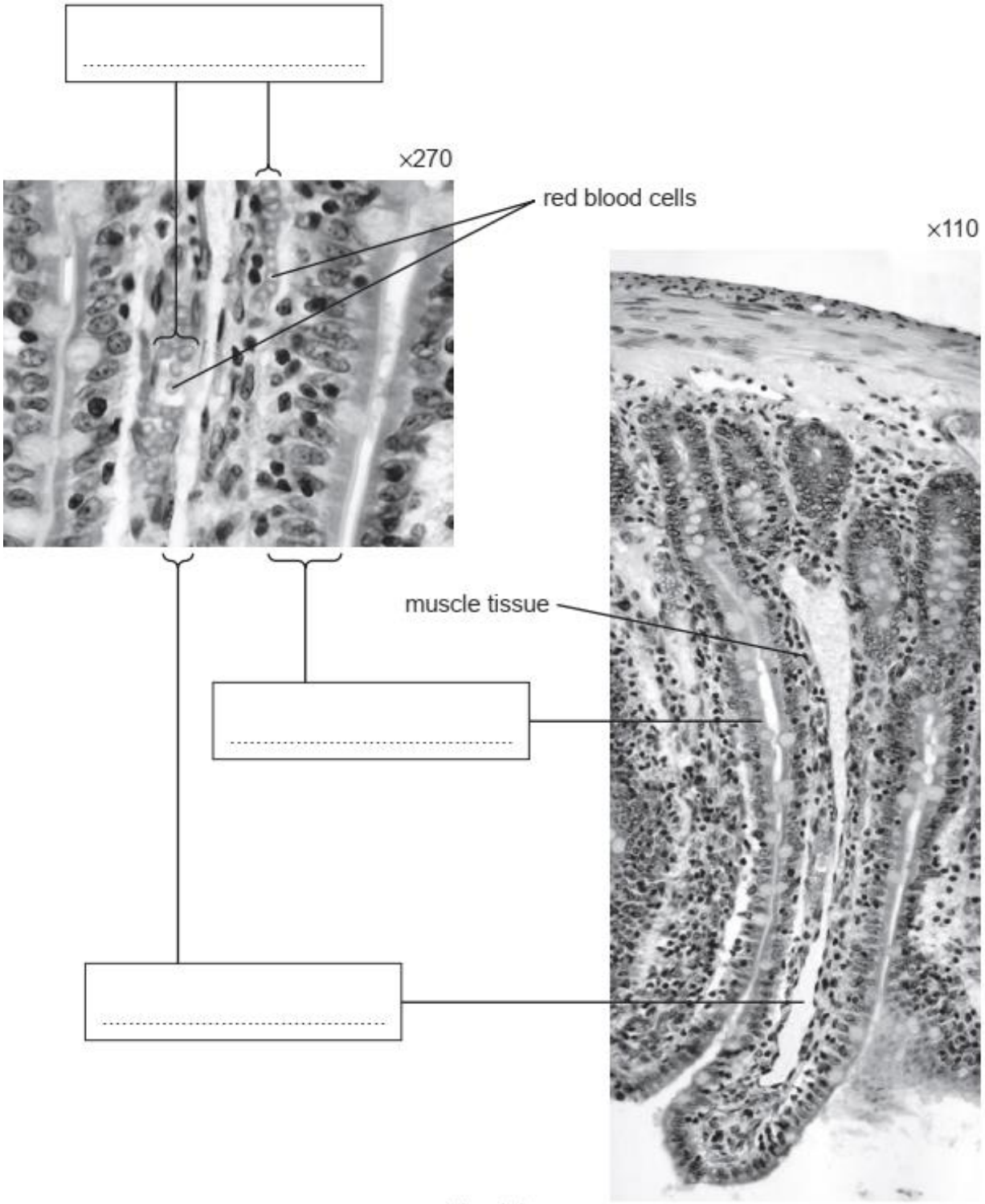

Fig. 1.1

(a) Label the structures shown in Fig. 1.1.

Write the labels in the boxes in Fig. 1.1. [3]

[Total: 3]

6. Mycoprotein is similar to single cell protein and is sold as an alternative to meat such as beef.

Table 3.1 shows the composition of mycoprotein and beef.

Table 3.1

nutrient	dry mass / g per 100 g	
	mycoprotein	**beef**
protein	49.0	51.4
fat	9.2	48.6
fibre (roughage)	19.5	0.0
carbohydrate	20.6	0.0

a) **(i)** State two differences in composition between mycoprotein and beef.

1. .....

2. ..... [2]

(ii) Using data from Table 3.1, suggest two reasons why eating mycoprotein is better for health than eating beef.

Explain your answers.

reason 1 .....

explanation .....

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[2]

[Total: 4]