

**ADVANCED SUBSIDIARY GCE
HUMAN BIOLOGY**

2858/01

Case Studies

MONDAY 4 JUNE 2007

Morning

Time: 45 minutes

Additional materials: Electronic calculator
Ruler (cm/mm)



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Candidate
Name

Centre
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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED.**
ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	22	
2	23	
TOTAL	45	

This document consists of **9** printed pages, **3** blank pages and **2** inserts.

Answer **all** the questions.

1 This question is based on the article ‘**CYTOLOGICAL STAINING**’ (Case Study 1).

(a) Explain the meaning of the following terms which are used in Case Study 1:

(i) *buffer*
..... [1]

(ii) *isotonic*
..... [1]

(iii) *denature*
..... [1]

(b) Case Study 1 explains that tissue samples are fixed by placing them in a formalin solution which is isotonic.

Suggest what would happen to the cells in the tissue sample if the formalin solution was **not** isotonic.

.....
.....
..... [2]

(c) In Case Study 1 it states that, since cytoplasm is water-based, the water must be removed from the tissue sample and replaced with wax.

State one property of water **and** explain why this property makes water an important component of cytoplasm.

property
reason
..... [2]

- (d) Case Study 1 explains that haematoxylin is a stain which is commonly used in the preparation of tissue samples. There is no synthetic substitute for this stain. It is important that the species of tree from which haematoxylin is extracted is conserved. Many species of tree are found exclusively in a certain habitat, such as rainforest.

Discuss the conflicts that can arise when attempts are made to conserve areas of rainforest.

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..... [4]

- (e) Fig. 1.1, on insert 2, shows a section through blood vessels which have been stained using haematoxylin and eosin (H & E).

- (i) Using the information given in Fig. 1.1, calculate the actual width of the artery wall as shown by the line from X to Y on the micrograph.

Show your working.

Answer = μm [2]

- (ii) State one example of a tissue which is present in an artery wall **and** explain the function of this tissue in an artery.

tissue

function of tissue

.....

..... [2]

- (f) Fig. 1.2, on insert 2, shows a photomicrograph of a blood smear which has been stained in order to see the blood cells clearly.

Describe a method which could have been used to **stain** this blood smear.

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..... [3]

- (g) You are told in Case Study 1 that orcein is used to stain rough endoplasmic reticulum (RER) in liver cells infected by the Hepatitis-B virus.

- (i) Describe the function of rough endoplasmic reticulum in **normal** liver cells.

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.....
..... [2]

- (ii) Suggest how **and** explain why the function of the rough endoplasmic reticulum might change when a cell becomes infected with a virus.

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..... [2]

[Total: 22]

5
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2 This question is based on the article ‘**CYTOLOGICAL SCREENING**’ (Case Study 2).

(a) In Case Study 2, Anna says that there may be neutrophils present in the cervical smear slides.

(i) Describe the **function** of neutrophils.

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.....
..... [2]

(ii) Suggest a reason for the presence of neutrophils on cervical smear slides.

.....
..... [1]

(b) In the cervix, the cells in the basement layer of stratified epithelial tissue divide by mitosis.

(i) Explain why mitosis is the type of cell division used to replace these cells.

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..... [2]

(ii) Outline the behaviour of chromosomes during the stages of mitosis.

You may use labelled diagrams to illustrate your answer.

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(c) In Case Study 2, Anna explains that some of the cells in the cervix contain glycogen.

Suggest why bacteria invade cells to obtain glycogen.

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..... [2]

(d) In Case Study 2, Anna explains about the Human Papilloma Virus (HPV). Some strains of HPV are known to carry oncogenes.

(i) Suggest how a virus such as HPV is transmitted.

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..... [1]

(ii) Outline how viruses, such as HPV, may cause the development of cancers.

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..... [3]

(iii) Briefly describe **one** ethical issue associated with the development of a vaccine for HPV.

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..... [2]

(e) Epithelial tissue does not normally contain blood vessels. Cancerous cells which are restricted to the epithelial tissue of the cervix are referred to as cervical intraepithelial neoplasia (CIN). This can also be called a '*carcinoma in situ*'. Treatment for this is by removal of the area in a Colposcopy Clinic as outlined in Case Study 2. Diagnosis of cervical cancer is made only when the cells have invaded tissues other than epithelial tissues.

(i) Suggest why diagnosis of cervical cancer is made only when the cancer cells have invaded tissues other than epithelial tissues.

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..... [2]

(ii) State **two** methods which may be used to **treat** cervical cancer.

1
2 [2]

[Total: 23]

END OF QUESTION PAPER

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