

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Ordinary Level

## MARK SCHEME for the May/June 2007 question paper

### **5096 HUMAN AND SOCIAL BIOLOGY**

**5096/02**

Paper 2 (Theory), maximum raw mark 100

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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|               |                                    |                 |
|---------------|------------------------------------|-----------------|
| <b>Page 2</b> | <b>Mark Scheme</b>                 | <b>Syllabus</b> |
|               | <b>GCE O LEVEL – May/June 2007</b> | <b>5096</b>     |

- 1 (a) St. moves out / up / left;  
Di flattens / moves down, contracts.
- (b) volume increases;  
pressure decreases. [2]
- (c) (i) mucus traps; particles / bacteria / dust; R lubrication [2]  
(ii) move mucus; upwards / away from lungs. R filters [2]
- (d) 1 more mucus;  
2 cilia shorter / less developed / damaged. Ignore number refs i.e. less, fewer [2]
- (e) (i) tar.  
(ii) nicotine.  
(iii) carbon monoxide. [3]
- (f) (i) exercise requires respiration / energy; R refs to oxygen  
more carbon dioxide formed / released;  
carbon dioxide triggers / stimulus for (brain / breathing). [max. 2]  
(ii) automatic / AW;  
can go to sleep / think of other things etc. [2]
- (g) more carbon dioxide now exhaled;  
lowers carbon dioxide levels (in blood); ignore refs to oxygen,  
takes longer (for carbon dioxide);  
to reach threshold level / to make you breathe. [3]
- [Total: 20]**
- 2 (a) X = brain / hypothalamus / osmoreceptors  
Y = pituitary gland  
Hormone = ADH [3]
- (b) (i) decreases;  
(ii) increases;  
(iii) decreases. [3]
- [Total: 6]**

|        |                             |          |
|--------|-----------------------------|----------|
| Page 3 | Mark Scheme                 | Syllabus |
|        | GCE O LEVEL – May/June 2007 | 5096     |

- 3 (a) (i) larger relative surface area / s.a. large relative to volume;  
so more heat lost / less heat generated.
- (ii) blood closer to surface; so heat lost more easily. **R** refs to insulation here.
- (iii) less insulation; [1]
- (iv) generates less heat. **A** opposite – shivering generates heat [1]
- (b) (i) foil reflects body heat / keeps heat in / so body heat not lost; **R** insulates
- (ii) prevents evaporation / slows sweating / reduces loss by sweating. [2]
- [Total: 8]
- 4 (a) (i) bacteria / germs / microbes; (**A** only once) **R** viruses.  
entered A (from air);  
grew / reproduced in A;  
could not enter C / C corked / C no bacteria. **A** A not corked. [max. 2]
- (ii) disinfectant; added in D;  
no growth of bacteria / inhibits / kills bacteria. [max. 2]
- [Total: 4]
- 5 (a) A = pupa  
B = larva **R** wriggler [2]
- (b) oil / paraffin on water; insecticide in water. [2]
- (c) (i) introduce fish to eat them / Gambusia.
- (ii) Bacillus / B. thuringiensis. [2]
- (d) non-polluting / ref. to build up in food-chain of chemicals / no harm to humans;  
**A** opposite disadvantages of chemicals, **R** cost refs  
no resistance to them is possible. [2]
- [Total: 8]

|        |                             |          |
|--------|-----------------------------|----------|
| Page 4 | Mark Scheme                 | Syllabus |
|        | GCE O LEVEL – May/June 2007 | 5096     |

- 6 J = to fovea;  
K = to edge of retina;  
L = to blind spot.  
M = to ciliary muscle.  
N = to iris

[5]

[Total: 5]

- 7 P = viruses  
Q = Fungi  
R = Bacteria  
S = Protozoa

[4]

[Total: 4]

[Section A = 55]

- 8 (a) **Distinguish between the terms *signs* and *symptoms* of a disease, giving an example of each for *cholera*.**

sign is what an observer sees in a patient; watery stools / diarrhoea / sweating vomiting. (2)

symptom is what patient feels; fever / feels hot / cramps / stomach ache / thirst / headache. (2)

[4]

- (b) **What is the causative organism of cholera?**

bacterium / Vibrio.

[1]

- (c) **Explain why after a natural disaster, such as an earthquake or flood, an outbreak of cholera may occur.**

earthquake can fracture pipes; so (treated) water can be contaminated with faeces / pathogens / sewage.

flooding can wash sewage (from latrines / fields); into water supplies.

[4]

- (d) **Vaccines are available for many diseases.**

**Explain**

- (i) **what is meant by the term *vaccine*.**

mark (d) straight through up to 6.

is active (immunisation);

- (ii) **how vaccines provide protection against infectious diseases.**

dead / weakened / inactive / attenuated bacteria / viruses injected into patient;

white blood cells / lymphocytes;

make antibodies;

which clump / agglutinate / lyse pathogens;

system has memory / has memory cells; **R** blood remembers

takes some time to develop / need vaccinating before disease arrives;

disease dealt with, if met, before it can affect person/before symptoms;

**A** prepares body to fight disease if linked.

longer lasting / antibodies stay in system / in blood / in body;

can be boosted by further injections / treatments at intervals.

[max. 6]

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|--------|-----------------------------|----------|
| Page 5 | Mark Scheme                 | Syllabus |
|        | GCE O LEVEL – May/June 2007 | 5096     |

- 9 (a) Define the term enzyme and describe the main features that all enzymes have in common.

is a catalyst;  
 made in cells / in living organism / is biological; *biological catalyst* = 2  
 speeds up reaction; **R** alters reaction.  
 does not alter products;  
 is not altered itself;  
 effective in small amounts.  
 is a protein;  
 sensitive to pH; **R** all have own pH.  
 is specific;  
 temp. sensitive / has optimum temp. / inactivated at low temp.;  
 destroyed by boiling / above 80°C; **R** at high temp.  
 easily poisoned / inhibited / denatured;

[max. 7]

- (b) Given a solution of starch and a solution of saliva, describe how you would show that it is an **enzyme** in saliva that converts the starch to sugar.

two tubes / suitable containers

same amount;

\* of starch added;

\* add saliva to one;

\* add **boiled** saliva / **acidified** saliva to second / no saliva / water;

same amount;

\* leave for same time / suitable time / up to 30 mins / test every 5 mins;

at same temp. / suitable temp / 20°–60°;

\* test each for sugar;

**OR**

\* **how**: boil;

\* with equal volume;

\* Benedict's solution;

\* red / brown colour / ppt. shows sugar;

\* here boiled / acidified saliva = no sugar / stays blue;

\* so active principle must be an enzyme.

\* since boiling / acidification destroys enzyme.

\* test each for starch;

\* add iodine (solution);

\* a few drops;

\* blue-black / black = starch;

\* brown / yellow = no starch;

\* stays blue / black ;

[max. 8]

If only one tube used i.e. only boiled saliva or only saliva, credit points marked \* up to 5.

|        |                             |          |
|--------|-----------------------------|----------|
| Page 6 | Mark Scheme                 | Syllabus |
|        | GCE O LEVEL – May/June 2007 | 5096     |

EITHER

- 10 (a) Using fig. 10.1 to help you, describe the steps by which a blow on the tendon is converted to a movement of the lower leg.

(blow) stretches muscle;  
 (receptor converts stretch into) impulses;  
 (impulses) up / via sensory neurone:  
 into dorsal root;  
 of spinal cord;  
 synapse; **R** refs to relay neurone  
 via chemical transmission / or named one;  
 (impulses down) motor neurone;  
 through ventral root;  
 to (thigh) muscle;  
 muscle contracts;  
 pulls on tendon;  
 pulling / raising / moving lower leg / tibia.

[max. 8]

- (b) Both bone and muscle are *tissues*. State how the structure of bone differs from the structure of muscle.

bone has cells;  
 and a matrix;  
 (matrix of) calcium salts; **R** refs to hard, inflexible etc.  
 and protein / collagen fibres;  
 muscle has cells;  
 no matrix;  
 muscle cells are long (cylindrical) fibres;  
 ref. to protein here. **R** refs to flexibility etc.

[max. 5]

- (c) Write an equation for the process that supplies the muscle cells with energy.

glucose (sugar) + oxygen; **A** chemicals, if correct formulae. (1)  
 carbon dioxide + water (+ energy) (1)

[2]

|        |                             |          |
|--------|-----------------------------|----------|
| Page 7 | Mark Scheme                 | Syllabus |
|        | GCE O LEVEL – May/June 2007 | 5096     |

OR

- 10 (a) State 4 pollutants that may enter the river as it flows from A to B, and for each pollutant you name, describe its effect on the river water.

One mark for pollutant; one for effect; ×4. First 4 only.

nitrate / fertiliser; eutrophication / renders water unsafe to drink etc.;

phosphate / fertilisers; eutrophication / lowers oxygen levels;

herbicides; damage water plants / algae;

pesticides / insecticides; kill insect life / kill fish / concd. via food chains;

(power station releases) hot water; lowers oxygen levels;

sewage; spreads disease / named one / lowers oxygen (on decay);

and worms / flukes / eggs of gut parasites; named example;

petroleum products / oil; damage to birds / lowers O<sub>2</sub> (on decaying)

detergents / soaps; frothing slows entry of O<sub>2</sub>; etc.

heavy metals / chemicals; toxic to life / build up via food chains.

[max. 8]

- (b) River water contains bacteria. Explain how *filtration* and *chlorination* make river water safe to drink.

filter contains sand / gravel;

covered in film / slimy layer;

traps / filters bacteria;

protozoa ingest bacteria;

algae release O<sub>2</sub>;

which kills some bacteria;

chlorine sterilises / kills all microbes; R removes here

water in closed tanks;

to give time to act / prevent escape of chlorine.

[max. 5]

- (c) Write out a word equation for the biological process that increases oxygen levels in a river.

carbon dioxide + water; A formulae here if correct, (1)

glucose (sugar) + oxygen (1)

[2]