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

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2007 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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 <u>monoxide</u>. [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]

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. [1]

(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]

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]

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.

<u>two</u> 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**	* test each for starch;
* **how**: boil;		* add iodine (solution);
* with equal volume;		* a few drops;
* Benedict's solution;		* blue-black / black = starch;
* red / brown colour / ppt. shows sugar;		* brown / yellow = no starch;
* here boiled / acidified saliva = no sugar / stays blue;		* stays blue / black ;

* so active principle must be an enzyme.
* since boiling / acidification destroys enzyme. [max. 8]

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

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]

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.**

nitrates / 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_2 (on decaying)
detergents / soaps; frothing slows entry of O_2; 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_2;
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]