HUMAN AND SOCIAL BIOLOGY

GCE Ordinary Level

Paper 5096/01
Multiple Choice

Question Number	*Key*	*Question Number*	*Key*
1	**D**	21	**A**
2	**C**	22	**A**
3	**D**	23	**D**
4	**B**	24	**C**
5	**C**	25	**D**
6	**C**	26	**D**
7	**B**	27	**B**
8	**C**	28	**B**
9	**C**	29	**A**
10	**C**	30	**A**
11	**D**	31	**D**
12	**A**	32	**B**
13	**C**	33	**A**
14	**B**	34	**D**
15	**C**	35	**D**
16	**B**	36	**D**
17	**C**	37	**B**
18	**D**	38	**D**
19	**D**	39	**D**
20	**B**	40	**A**

General comments

This year a standard deviation of 5.902 (14.75%) was obtained. The mean score was 21.104 (52.76%). This indicates that the overall standards are roughly the same as last year. **Questions 31**, **32**, **33**, **34** and **38**, which all tested understanding of various diseases, were particularly well done. Greatest difficulty was experienced where the questions needed more depth of thought and deductive skills, as illustrated by **Questions 4**, **13**, **19** and **20**. The low discrimination shown by **Questions 4**, **10**, **13**, **15**, **18**, **19**, and **20**, appeared to show that the high scoring candidates rely more on rote memory and are not so good at the deductive type questions. In which case, more emphasis should be placed on deductive reasoning and understanding.

Comments on specific questions

Questions 1 – 3

These provided an easy start and they performed well.

Question 4

The low discrimination here was no doubt due to encountering diffusion, in an experiment more normally performed to test starch with iodine solution. Candidates had difficulty in transferring their understanding of diffusion, to this new situation. Adopting an enquiry approach to experimental work would enable candidates to apply more thought and understanding in such unfamiliar situations.

Question 13

This proved to be the most difficult question on the paper, with more candidates choosing the distractors than the correct answer. The basic syllabus objective tested was 5(i) 'structure in relation to function of veins' and 7(h) 'that muscles provide movement'. Each of the distractors are syllabus objectives which are clearly wrong in this context and should not have been selected by so many candidates.

Question 15

Although over half the candidates chose the correct answer, the low discrimination again shows that deductive skills may be lacking in the higher scoring candidates. Knowledge of a section of the heart had to be transposed to an external view, along with understanding the function and position of the blood vessels leaving the heart.

Question 17

Candidates should note that the syllabus requires that the differences between the function of the internal and the external intercostal muscles have to be made.

Question 18

Candidates are expected to be able to describe the technique of mouth to mouth resuscitation and hence be able to select the unnecessary action shown in the diagram. It is difficult to understand the low discrimination here, when so many candidates gave the correct answer. Distractor C shows that many of the more able candidates must not know that it is necessary to press down on the chest to help expiration.

Question 19

This is another example of a lack of the ability to 'work out' the answer rather than memorise facts. Many candidates were unable to deduce the position of the points of attachment of the muscles needed to extend the arm.

Question 23

This proved a difficult question as shown by the two positive distractors. Knowledge that the kidney removes urea from the blood and that the renal vein carries the blood from the kidney, could not be associated together by many candidates.

Question 39

Two syllabus objectives, 14(e) 'describe large-scale treatment of sewage' and 14(f) 'the part played by microorganisms', duplicate the requirement for knowledge to answer this question. The low facility suggests a neglected topic of study, particularly concerning the settlement tank, which was wrongly thought by over half the candidates to be the stage where most organic matter is broken down by aerobic bacteria.

Paper 5096/02

Theory

General comments

It was pleasing to note that very few candidates failed to follow the instructions or the new format in ***Section B*** and relatively few seemed short of time. This paper contained more questions requiring an experiment to be designed or answers to be deduced from information given. These frequently caused more difficulties for the candidates and, once again, showed that practical work is lacking in many Centres. Those candidates that did suggest a practical procedure omitted a suitable control apparatus.

Comments on specific questions

Question 1

(a) Concerned growth curves of boys and girls over 20 years and required candidates to read values from these curves.

The answers were:

6 cm + or – 2,
3 years + or – 0.5,
4 years + or – 0.5,
between 10 and 13 years,
boys at 18 years, girls at 16 years.

Most candidates scored well on this opening section, although several quoted the actual height of boys at 6 years instead of the difference in height of boys and girls.

(b) Expected the answer mass or weight. Foot, head or hand-sizes were acceptable alternatives but *size* or physiological features were not.

(c) Asked for a test for protein. The correct response was to add biuret reagent, noting a colour change from blue to violet or purple.

Many wrongly offered Benedict's solution and while the majority stated purple as the final colour, they failed to state the original colour as blue.

(d) The answers were stomach, pancreas, amino acids, liver and urea.

While this was generally well-answered, common errors were *mouth* for stomach, *kidney* for liver and *urine* for urea.

(e) This part on the nitrogen cycle caused the most problems. The answers were any 5 of the following: urine to ammonium compounds; by decay bacteria; ammonium to nitrite; to nitrate; by nitrifying bacteria; nitrates absorbed by plants; combined with sugars; from photosynthesis; to form amino acids; which are linked up to make proteins.

Very few candidates knew this sequence invoking *nitrogen-fixation, denitrifying bacteria and root nodules.*

Question 2

This question showed the life cycle of the Chinese liver fluke.

(a) Three ways to prevent the spread of the fluke were to be deduced from the life cycle, namely: proper disposal of human feces; kill the snails; cook **fish** thoroughly or using drugs to kill the fluke in man.

While many scored well here, weaker candidates talked of *food* rather than fish or suggested methods for controlling the mosquito.

(b) The snail is killed by the larvae so must also be a host, since vectors are not harmed by the parasite they carry. Few candidates appreciated this difference but many scored 1 mark for stating that the snail *did not directly transfer the larvae into man or the fish.*

Question 3

This question was on water treatment.

(a) Sunlight/UV light kills bacteria in open reservoirs, not *heat.*

(b) The chlorination tank is closed to stop contamination entering from the air; to prevent chlorine escaping, so that its concentration remains high enough to destroy the pathogens. The question was worth 2 marks, but most candidates ignored this and settled for just one answer out of the ones given.

(c) Fluoride is added to reduce tooth decay or strengthen enamel. Many answers were insufficiently precise here or referred to *bones.*

(d) Algae form oxygen, by photosynthesis, and this oxygen will kill some bacteria. Protozoa ingest or feed on bacteria. Many got the protozoa mark but had little idea of the purpose of the algae. Many incorrectly talked of the algae *eating the bacteria* or *using up the oxygen which killed the bacteria.*

Question 4

This question dealt with the formation and return of tissue fluid at the capillaries.

(a) Fluid passes through the wall easily, because it is thin or only one cell thick, as shown in the drawing. Saying the wall is *permeable* only restates the question.

(b) Raised blood pressure will **increase** the formation of tissue fluid but **decrease** its rate of return. Few candidates deduced this from the information given.

(c) Children lacking protein in their blood will have a lower blood osmotic pressure, so **more** fluid will leave the blood (blood pressure now much greater than osmotic pressure), but **less** will be returned (osmotic pressure now insufficient to overcome blood pressure). Hence the tissues are distended. Only a few candidates were able to use the information given to work out this relationship.

(d) Tissue fluid also leaves the tissues by the lymph vessels. Common errors here were *urine* or *sweat.*

Question 6

This was usually well answered with scores of 5 or 6 being common.

Influenza is caused by a virus; a sexually transmitted disease caused by a bacterium could be syphilis or gonorrhea; typhoid is commonly caught from food handled by carriers (not *cholera* which is usually water-borne); a contact fungus disease is athlete's foot or ringworm; the pathogen of malaria is plasmodium or a protistan not the *mosquito;* a virus disease spread by intercourse is genital herpes, AIDS or HIV/AIDS not *HIV* which is the virus, not the disease.

(a) Required figures to be read from the table.

(i) The organs showing greatest reduction in blood flow are the kidneys and the gut - both answers were required.

(ii) Blood flow to the muscles is increased by 4 times or 400%.

(b) The answers were respiration and glucose and oxygen. It was surprising to see candidates who got respiration correct then giving *lactic acid* or *carbon dioxide* for part **(ii)**.

Question 7

This question was on tendons and ligaments. Both are connective tissues.

Tendons have fibres that are white, inelastic or made of collagen; ligaments have fibres that are yellow, elastic or are made of elastin.

Tendons join muscle to bone, while ligaments join bone to bone.

Stating that either structure was *flexible* was not rewarded. Many candidates got the type of fibre correct but then reversed their functions.

Section B

This section contained **Questions 8**, **9** and **10**, with **Question 10** consisting of two alternative parts. Candidates were asked to attempt **Questions 8**, **9** and one alternative from **10**. Each question was worth 15 marks.

Question 8

(a) A catalyst speeds up a reaction without altering the products and is not altered or used up in the process.

An enzyme is a protein, made in the cells, which acts as a catalyst but has the following special properties: it is temperature sensitive, working efficiently at body temperatures but is denatured at higher temperatures and inactivated at low ones. It is specific, works within a narrow pH range and is denatured outside this range. It is faster than a chemical catalyst but is easily poisoned. 5 marks were available in this section from some 12 possible points. Most candidates could get at least one feature of a catalyst and knew enough to score 3 on the enzyme. Common errors were to say that a catalyst *speeds up and slows down a reaction* and to state that the enzyme *was killed.* There was confusion between inactivation (a reversible process) and denaturation which is irreversible.

(b) The candidates were asked to design an experiment to show that saliva contains an enzyme that changes a starch solution to sugar.

The simplest method is to take **two** test tubes, each with the **same** amount of starch solution. To one, add some saliva, to the other add either water or boiled saliva, as a control. Ideally, each mixture should be pre-tested with Benedict's reagent to show there is no sugar there to start with. The two mixtures are set aside for a few minutes under identical temperatures and then samples from each are tested for starch using Iodine solution. The tube with starch and saliva should test negative for starch but give a positive reaction, when tested for sugar. The control tube should still contain its starch and, therefore, no sugar.

The weakest candidates merely described carbohydrate digestion with no attempt to demonstrate it. Many managed some sort of experiment which involved chewing a piece of bread and spitting out the result and testing this for sugar or merely noting that *it tasted sweet.* Very few set up a proper experiment in vitro and fewer still used any sort of valid control. This is clearly an area that needs more attention.

(c) Required references to enzymes to explain why adding vinegar or freezing were effective in preserving foods. Even candidates who had mentioned the effects of pH change or low temperature on enzymes in **(a)** often failed to make the connection here. Many talked of *bacteria* instead of enzymes.

Question 9

(a) Asked how bacteria are prevented from reaching the lungs and how smoking affects the mechanisms described. There were 8 marks available for this part. Complete answers were expected to include references to nasal hairs and mucus; mucus and cilia in the tubes of the system; the mucus to trap the bacteria and the cilia to sweep the result up to the pharynx, where it is swallowed and digested in the stomach.

Tars in cigarette smoke coat the linings of the tubes, stopping or paralysing the cilia. The mucus secretion is increased but cannot now be shifted, so the resultant mucus and bacteria are now stuck in the tubes or lungs.

Many candidates scored well on the basic mechanism but there were the inevitable confusions between *hairs* and *cilia.* Many identified tars as the agent in stopping the cilia but did not explain the consequences of this.

(c) Asked why women who smoke have smaller babies, which substances are responsible and how these components of smoke reach the fetus and have their effects. Many correctly identified carbon monoxide and nicotine as the active substances and could state how they passed from maternal to fetal bloods, but were often confused as to how they produced their results. Carbon monoxide blocks haemoglobin so that the blood carries less oxygen. There is thus less respiration in fetal tissues and so less energy for growth. Nicotine constricts the arterioles in the placenta, so less food and oxygen is passed into the fetus. Nevertheless, this question produced the best scores for most candidates.

Question 10 (either)

Dealt with a simple method of estimating reaction time in a subject and the circuit involved.

(a) In this part the candidates were asked to draw the reflex circuit involved.

The diagram should show a receptor in the retina of the eye, a sensory neurone running to the brain (this is a cranial reflex), at least one relay neurone and a motor neurone passing to the muscles of the hand. Marks were also awarded for relevant labels. This was generally poorly answered, even though most candidates can draw and label the reflex arc associated with, say, the knee-jerk.

(b) Candidates had to design an experiment, using the apparatus shown, to see the effect of drinking alcohol on a person's reaction time.

Very few were able apply their knowledge to this simple situation or indeed to construct a suitable procedure. Many simply described the effects of alcohol and attempted no investigation. Some who did design a procedure used **two different people or groups of people** in their scenario. Once again, practice in practical problem-solving would seem a worthwhile area to pursue.

(c) This part asked for the differences between nervous and hormonal co-ordination. 5 marks were awarded for any of the following points:

A hormone is a chemical, travelling in the blood. All hormones are different and their effects are slower and last longer. They travel all over the body and their effect varies with the concentration of the hormone reaching the target. Nervous co-ordination uses electrical impulses which are all identical, travelling in circuits of neurones. Their effects are seen more rapidly and are short term; their targets are localised and their effects vary with the frequency of the signal.

Many candidates scored well on this section.

The **alternative Question 10** proved more popular with the majority of the Centres.

(a) Asked for the differences between antibodies and antibiotics. 4 marks were available from a possible 12 points, so many scored well here.

Antibodies are proteins, made in the body by lymphocytes in response to antigens. They are effective against bacteria and viruses and each antibody is specific. Antibiotics are chemicals (but not proteins). They are man-made or extracted from fungi or bacteria. They are effective against bacteria and are usually non-specific or wide spectrum in their action.

Weaker candidates confused the two or talked loosely *of treating disease.*

(b) Concerned the BCG vaccination and how it provides immunity to tuberculosis. The marking points included: live but weakened (attenuated) bacteria are injected, stimulating the lymphocytes to form antibodies. Memory cells are also formed to combat future infections. This is active immunity.

Common errors were to talk of *dead bacteria* or *viruses* or to have *phagocytes* forming the antibodies. Few identified this as active immunity.

(c) Another practical procedure was tested. Candidates were asked how they would test a new fungus for antibiotic properties. A suitable suggestion would be to grow some bacteria on an agar plate, add the fungus or an extract of the fungus, and incubate for 24 hours. Then examine the plate to see if the bacteria had been killed, by looking for clear areas around the fungus.

Too many candidates had not the vaguest idea of how to grow bacteria, what sort of apparatus to use, or what they were looking for as a result. Some realised the two organisms must be cultivated together but gave few relevant experimental details.

(d) This part, on why new antibiotics must face a long series of trials on volunteers proved popular and, for the majority, an easy 2 marks. The most frequent answers were: to see if the antibiotic was effective; to see if there were any side-effects. Other possible answers were to find the **dosage** that is effective or to test **which** bacteria it kills.