UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
GCE Ordinary Level

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

5096 HUMAN AND SOCIAL BIOLOGY

5096/22   Paper 2 (Theory), maximum raw mark 100

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1 (a) (i) correctly labelled
    A <u>aorta</u>;
    P <u>pulmonary vein</u>;
    R <u>right ventricle</u>;
    V <u>vena cava</u>;   [4]
    (label line to end on wall or lumen, reject if left ventricle labelled)

(ii) muscle / cardiac muscle;   [1]

(iii) sends electrical impulses through the heart wall;
which makes the heart / muscle contract regularly;   [2]
(stimulates (heart) muscle to contract = 1 mark)

(iv) atrio-ventricular / mitral / bicuspid valve;
prevents backflow of blood / prevents blood flowing into atrium;   [2]
(accept left or right a-v valve)

(v) <u>aortic valve / semilunar valve / pocket valve</u>;   [1]

(vi) in the veins;   [1]
(accept in the lymphatic vessels, ignore at the base of pulmonary artery)

(b) (i) blood clot / thrombus;   [1]
(accept plug of cholesterol / fat)

(ii) heart muscle cells deprived of blood / oxygen / glucose;
cells die as they lack of energy; AW   [2]

(iii) reduced contraction of (left) ventricle;
pumping action of the heart less efficient / ceases;   [2]

(c) inherited disposition; AW
(high) blood pressure;
(high) levels of stress;
lack of exercise;
high level of animal / saturated fats in the diet;
high levels of blood cholesterol;
smoking;   [max 4]

[Total: 20]

2 **nose**
influenza
tuberculosis (TB)

mouth
cholera
typhoid
tuberculosis (TB)
(accept) schistosomiasis / bilharzias
(any 2 correct for 1 mark)

reproductive system
HIV infection
gonorrhoea

skin
ringworm
schistosomiasis / bilharzia

;;;;   [max 4]

[Total: 4]

3 **(a)** **A** axes labelled;
P correct plotting;
B bars drawn neatly and not touching;
L bars identified; bars same width   [4]

(b) the risk of early death is increased if (men) smoke;
the younger (men) are when they started to smoke, the more likely they are to die early;
the more cigarettes smoked per day, the higher the risk of early death;   [3]

[Total: 7]

4 **(a)** **(i)** label to the
P cervix;
Q ovary;   [2]
(label lines to end on the structure)

(ii) chromosome numbers inserted
muscle cell of uterus = <u>46</u> **and** cell of uterus lining = <u>46</u>;
ovum = <u>23</u> **and** sperm = <u>23</u>;
zygote = <u>46</u>;   [3]

(iii) <u>mitosis</u>;   [1]

(b) **(i)** <u>dominant</u>;   [1]

(ii) individuals **6** + **7** both affected / have polydactyly;
but individual **11** is normal thus condition must be dominant;
and received a recessive allele from <u>both</u> parents; AW   [3]
(accept **11** could not occur if condition were recessive)

[Total: 10]

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5 (a) (i) chemical / protein made by lymphocyte;
in response to presence of antigen;
reference to specificity; [max 2]

(ii) antibodies gradually destroyed / excreted by body of person **R**;
person **R**'s lymphocytes are not producing any more; AW [2]

(iii) lymphocytes of person **S** take time to sense antigen / AW;
and produce specific antibody required / AW; [2]

(b) <u>passive</u>;
<u>natural</u>; [2]

[Total: 8]

6 (a) total water loss = 2500 cm^3 per day;
% lost as sweat = 100 × 500 / 2500 = 20 %; [2]

(b) volume of water lost as sweat will increase;
needed to cool the body; [2]

(c) evaporation of water from lung / alveolar surface; AW
expired air contains water <u>vapour</u>; AW [2]

[Total: 6]

7 **(a)** **carbohydrate**   energy source;
energy store / glycogen;
fibre / roughage / prevent constipation;
synthesis of nucleic acids / ATP / NAD;   [max 2]

         fat   cell membrane constituent;
energy source;
energy store;
heat insulation;
solvent for vitamins / A / D / E / K;   [max 2]

         protein   growth;
repair;
replacement;
constituent of cytoplasm;
cell membranes;
energy source;
haemoglobin / myoglobin;
enzymes / insulin / glucagon;
chromosomes;
collagen / elastin / keratin;
antibodies;
actin / myosin;   [max 2]

     (b) **rich source of calcium**
named dairy produce / beans / oily fish / carrots / hard water / AVP;

         use in body
constituent of bones / teeth;
needed for muscle contraction / at neuro-muscular junction;
needed for nerve impulse / transmission across synapse;
needed for blood clotting;
increases beating of sperm tail;
promotes acrosome reaction;   [max 4]

     (c) do not damage / bruise fruit;
wash food before cutting up;
scrub root vegetables or peel very thinly;
do not chop fruit into small pieces;
do not soak before cooking;
do not use cooking soda;
cook rice in just enough water so that all is absorbed;
cook in small amount of water;
use water from cooking to make e.g. sauces / gravy / soup;
put food into boiling water;
cook for as short a time as possible;
cook with lid on pan;
cook food as soon as possible;
eat cooked food as soon as possible;
do not fry food;   [max 5]
(AW throughout)

                                                       [Total: 15]

8 (a) impulse; (credit once only)

sensory neurone
transmission from sense organ / receptor;
to (neurone in) brain / spinal cord / CNS;
(if message / signal is used, penalise once only)

intermediate / relay neurone
transmission (of impulse) from sensory neurone;
to motor neurone;
within brain / spinal cord / CNS;

motor neurone
transmission (of impulse) from neurone in brain / spinal cord / CNS;
to effector organ / muscle / gland;   [max 6]

(b) gap is called <u>synapse</u>;
when impulse reaches the end of one neurone;
triggers release of chemical transmitter / neuro-transmitter / named example;
this <u>diffuses</u> across gap / synapse / to next neurone;
which is stimulated to generate an impulse;   [max 3]

(c) (i) **short term effects of drinking alcohol**
slows down speed at which nerve impulses travel;
reaction times increase;
reduces / impairs co-ordination;
reduces ability to think rationally;
reduces sensation of pain;
loss of inhibitions;
dilation of superficial blood vessels;
lowers blood pressure
increases heart rate;
vision blurred;
speech slurred;
aggression increases;
urine production increases;
intestinal / gastric upsets;   [max 4]
(AW throughout)

(ii) **long-term effects of drinking alcohol**

brain
mental health problems;
memory loss;
dementia;   [max 1]

liver
damage / cirrhosis / formation of fibrous tissue;
impaired liver functions;   [max 1]

                                                                                    [Total: 15]

9 (a) pancreas
produces (enzyme) protease / trypsin;
converts proteins to polypeptides / peptides;
produces (enzyme) lipase;
converts fats to glycerol and fatty acids;
produces (enzyme) amylase;
converts starch to maltose;
secretions are alkaline to neutralise stomach acid;

liver
produces bile;
emulsifies fats / increases surface area;
speeds up fat digestion;
bile is alkaline to neutralise stomach acid; [max 7]

(b) pancreas
Islets of Langerhans;
detect high glucose level (in blood);
secretes hormone <u>insulin</u>;
stimulates liver cells; *
to convert glucose to glycogen; *
blood glucose level is lowered / returns to normal;
detects low glucose level (in blood);
secretes hormone <u>glucagon</u>;
stimulates liver cells; * (if not given in section on insulin)
to convert glycogen to glucose; *
blood glucose level is raised / returns to normal; [max 4]

(c) liver
conversion of excess glucose to fats;
<u>deamination</u>;
of excess amino acids;
to produce chemical used as energy source;
and urea / excretory product;
storage of / vitamins / vit. A, / vit. D, / vit. K / it. B_{12};
storage of iron;
AVP; [max 4]
allow for glucose / glycogen conversions if not given under pancreas;

the marking points with an asterisk (*) to be credited once only in **either** section
(b) or (c)

[Total: 15]

10 (a) **fat digestion**
food chewed in the mouth to increase surface area; *
speeds up enzyme activity; *
churning in stomach increases surface area even more; *
in duodenum;
bile added (from liver);
emulsifies / increases surface area (of fats);
pancreatic secretion;
contain lipase;
converts fats to glycerol and fatty acids;
bile / pancreatic secretions alkaline to neutralise stomach acid;*
pancreatic lipase continues to act throughout ileum;
AVP;   [max 5]

(b) **protein digestion**
food chewed in mouth to increase surface area; *
speeds up enzyme activity; *
stomach produces protease / pepsin;
reference to acidic optimum pH;
proteins converted to polypeptides; AW
churning in stomach to mix contents / increase surface area; *
pancreatic secretion contains protease / trypsin;
converts polypeptides to peptides; AW
bile / pancreatic secretions alkaline to neutralise stomach acid; *
optimum pH for pancreatic enzymes is (slightly) alkaline;*
ileum produces protease / peptidase; AW
converts (peptides) to amino acids;
AVP;   [max 5]

the marking points with an asterisk (*) to be credited once only in section **(a)** or **(b)**

(c) **absorption of products**
absorption in the ileum;
folds in the wall increase surface area (for absorption);
villi increase surface area (for absorption);
reference to micro-villi;
amino acids absorbed into blood capillaries in villi;
glycerol and fatty acids absorbed into lacteal in villi;
by diffusion;
by active transport;
AVP;   [max 5]

[Total: 15]