

**MARK SCHEME for the October/November 2007 question paper**

**5096 HUMAN AND SOCIAL BIOLOGY**

**5096/02**

Paper 2 (Theory), maximum raw mark 100

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**Section A**

- 1 (a) nitrogen [1]
- (b) (i) A, B
- (ii) B
- (iii) C [4]
- (c) so temp. is even in the tube A/W [1]
- (d)  $4.2 \times 50 \times 30 = 6300 \text{ J}$  [2]
- (e) heat losses, mass of sample etc. [1]
- (f) 1. elderly less active [1]  
 2. 0–1 growing more/larger s/a for heat loss [1]  
 3. male has more muscle; muscle uses more energy/male metabolic rate higher or female has more fat; fat uses less energy [2]
- (g) (i) F = bile  
 G = lipase [2]
- (ii) F in liver, R. gall bladder  
 G in pancreas [2]
- (h) (i) coronary [1]
- (ii) they supply heart muscle; with food/oxygen; in absence of these heart stops [2]
- [Total: 20]**
- 2 (a) A = nitrification/A nitrifying bacteria  
 B = nitrogen fixation/A N- fixing bacteria [2]
- (b) both points plotted correctly, line joined [1]
- (c) up to 150 kgs fertiliser; crop yield rises steadily; rises from 2.6 to 4.7 tonnes;  
 from 150–200 little or no effect; rises only from 4.7 to 4.8 tonnes. [Max. 3]
- [Total: 6]**

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- 3 (a) (i) transmitter present only/made in neurone 1;  
receptors on neurone 2. [2]
- (ii) diffusion a slow process/transmitter must diffuse. [1]
- (b) (lots of) mitochondria in bulb. [1]
- [Total: 4]**
- 4 (a) G: salts removed (by acid); only protein/collagen left. [2]  
H; protein destroyed; only salts left. [2]
- (b) 1. growth;  
2. repair. [2]
- [Total: 6]**
- 5 (a) prevent faeces, urine reaching water/ use latrines A/W;  
kill snails;  
purify/chlorinate drinking water;  
do not bathe/paddle, or wear shoes in water.  
drugs to kill adults in man. [Max. 3]
- (b) age when most likely to play in water. [1]
- (c) one (adapted) to enter snail; one to enter man; one to rep. Asexually. [Max. 2]
- [Total: 6]**
- 6 (a) (i) W      *Letters only*  
X  
S  
S  
T [5]
- (b) (i) two blood supplies/artery and portal vein/ox. and deox supplies. R two arteries. [1]
- (ii) liver must process foods from gut (before they enter circulation). [1]
- [Total: 7]**
- 7 (a) clot hardens/forms; arterioles constrict. [2]
- (b) less activators/less elastic fibres/A less serotonin. [1]
- (c) 1. calcium needed to form thrombin/activate prothrombin. [1]  
2. enzymes involved in reactions; low temps. slow enzymes/slow reaction. [2]
- [Total: 6]**

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### Section B

- 8 (a)**
- (i) grids/filters;
  - (ii) remove sticks, paper etc.;
  - (iii) sedimentation;
  - (iv) to trap/ collect solids;
  - (v) liquor pumped;
  - (vi) to trickling filter/to aeration tank;
  - (vii) organic material broken down;
  - (viii) to salts;
  - (ix) by aerobic/in presence of oxygen;
  - (x) bacterial action;
  - (xi) credit ref. to protozoa/nematodes/fungi/insects (if T. filter);
  - (xii) effluent to river;
  - (xiii) sludge digested by anaerobic bacteria;
  - (xiv) or dried;
  - (xv) ref to methane generated.
- [Max. 11]

- (b)**
- pit deeper: more room for faeces/less chance of overflow;
  - screen over door: keep flies out;
  - concrete lining: prevent entry of rats;
  - lid added: smell/prevent flies;
  - wider base: stability/prevent rats.
- [Max. 4]

**[Total: 15]**

- 9 (a)**
- (i)**
- (i) named hormone;
  - (ii) correct origin;
  - (iii) correct target;
  - (iv) travels in blood.
- (ii)**
- (v) 'quick' hormone named, e.g. insulin, glucagon, adrenaline, ADH etc;
  - (vi) acts on cell membranes/enzymes/or specific effect;
  - (vii) 'slow' hormone named, e.g. estrogen, progesterone, testosterone, FSH etc.;
  - (viii) acts on genes/growth processes/ or specific effect.
- (iii)**
- (ix) suitable 'all-time' hormone named e.g. insulin;
  - (x) linked to what it does, e.g. sugar levels;
  - (xi) a process necessary all our life;
  - (xii) suitable periodic hormone named, e.g. estrogen;
  - (xiii) active for only a period, e.g. after puberty/before menopause/in first half of cycle etc.;
  - (xiv) since what it regulates is periodic/A/W.
- [Max. 10]

- (b)**
- (i)**
- (i) (more thyroxine) pituitary gland depressed/switched off;
  - (ii) less TSH;
  - (iii) less growth of thyroid;
  - (iv) less secretion;
  - (v) of thyroxine;
  - (vi) so thyroxine levels fall.
- [Max. 5]

**[Total: 15]**

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**10 Either**

**(a) (i) Protein**

- (i) stays in blood;
- (ii) (proteins) too large;
- (iii) to be filtered/to pass through;
- (iv) at glomerulus;
- (v) into bowman's capsule.

**(ii) Glucose**

- (vi) filtered;
- (vii) at glomerulus (unless given in (iv));
- (viii) into b. capsule (unless given in (v));
- (ix) all reabsorbed;
- (x) at PCT;
- (xi) by active transport.

**(iii) Urea**

- (xii) filtered; (see (vii) and (viii) above);
- (xiii) most/all passes through to urine/not reabsorbed.

**(iv) Water**

- (xiv) filtered; (see (vii) and (viii) above);
- (xv) most/99% reabsorbed;
- (xvi) suitable site named, e.g. PCT, loop, DCT, collecting duct.

[Max. 10]

- (b)**
- (i) blood concd./has less water;
  - (ii) detected at brain/hypothalamus;
  - (iii) pituitary;
  - (iv) secretes (more) ADH;
  - (v) travels to kidney;
  - (vi) in blood;
  - (vii) makes collecting duct more permeable;
  - (viii) more water reabsorbed;
  - (ix) less volume/less urine;
  - (x) more concd. urine.

[Max. 5]

**[Total: 15]**

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**10 Or**

- (a)** (i) single cells/are gametes R used in reproduction;  
(ii) haploid/half set of chromosomes etc.;  
(iii) formed by meiosis;  
(iv) short lived. [Max. 3]

- (b)** (i) fertilisation is fusion of egg and sperm;  
(ii) of nuclei;  
(iii) in oviduct;  
(iv) forms zygote;  
(v) fert. before implantation/ mplant. after fert.;  
(vi) implant. in uterus;  
(vii) lining/endometrium;  
(viii) now ball of cells/blastocyst. [Max. 5]

- (c)** (i) may have different blood groups;  
(ii) maternal blood pressure too high;  
(iii) maternal blood contains bacteria. [3]

- (d)** (i) carbon monoxide poisons Hb;  
(ii) blood (either) carries less oxygen;  
(iii) lower respiration of fetus;  
(iv) less energy for growth/less growth;  
(v) nicotine;  
(vi) can cross placenta;  
(vii) constricts arterioles/reduces blood flow;  
(viii) less foods, oxygen to fetus;  
(ix) so less growth (unless given in (iv) above) [Max. 4]

**[Total: 15]**