Mark Scheme

Q1.

Question number	Answer	Notes	Marks
(a)	C hypothalamus; A does not control sweating B does not control sweating D does not control sweating		1
(b)	B motor; A transmits impulse from sensory to motor C alternative name for A with same function D transmits impulse to brain		1
(c)	• (sweat) evaporates from (the surface of) the skin; • using heat from body/blood; • cools body/reduces body temperature;		3
(d)	• runs in families; • must be faulty/mutated gene/chromosome/allele; • which transfers/passes on information to offspring;		3
(e)	obesity / high sugar intake / high BMI;		1
(f)	• exercise/activity of individual varies; • greater rate of aerobic respiration; • heat given off as by-product/increased body temperature; • external temperature varies; • hotter more sweating/cooler less sweating; • mass of individual varies; • volume of water in the body/fluid intake varies;	Allow reverse argument for mps 2 and 3	5 Total 14

Q2.

Question number	Answer	Notes	Marks
(a) (i)	A; (brain)		1
(ii)	B; (endocrine)		1
(b) (i)	• 75 (from weight of man) (1) • 320 × 2 (extra from drinking beer) (1) • 715cm^3 (1)		3
(ii)	• 715 - 75 (1) • (640 ÷ 75) × 100 (1) • = 853% (1)		3
(c)	any two from • increases permeability of collecting duct (1) • more water reabsorbed (1) • into blood (1)		2
(d)	any two from • red blood cells loses water (1) • become distorted (1) • less oxygen transported (1) • volume of plasma decreases (1) • blood becomes thicker/more difficult to circulate(1) • increase in blood pressure (1)	Ignore less water in blood Allow water potential decreases	2
(e)	any three from • waste products continue to be produced (1) • toxic (1) • need to be removed in urine (1) • less reabsorption of water (1) • less ADH produced (1)	Allow named waste product(s)	3

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Q3.

Question number	Answer	Notes	Marks
(a)(i)	• high (blood) pressure (in the glomerulus); • small molecules/named small molecule forced / filtered/pass through (into Bowmans capsule);	Do not allow protein	1 1
(ii)	Any four from: • lower concentration of glucose/oxygen in blood in renal vein; • used in respiration; • less/no urea in renal vein; • urea excreted in urine; • more carbon dioxide in renal vein; • carbon dioxide produced in respiration;	Allow reverse argument throughout	Max 4

(b)	(i)	quantity of salt (in food);		1
	(ii)	Any two from: • different foods used (which may affect the amount of urea produced/amount of water reabsorbed); • different people used who may be different genders/ages/ have a medical condition/different metabolism (that affects osmoregulation/water balance); • the food/drink consumed by the people prior to the investigation was not taken into account (which will influence the quantity of urea/water in urine produced);		Max 2
	(iii)	use one person only (and vary salt intake)/monitor / control food/water consumption/give each person the same food (but vary salt content);	Allow valid alternatives	1
			Total question = 10 marks	

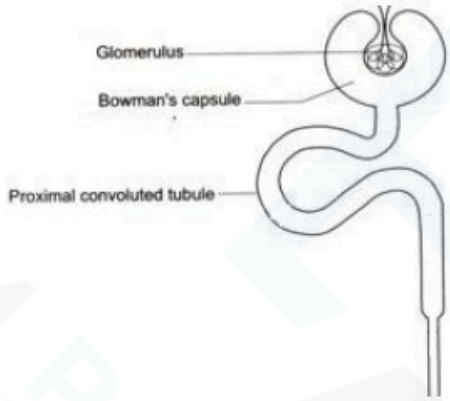
Q4.

Question number	Answer	Notes	Marks
(a) (i)	absorbs uv light; reduces/prevents risk of skin cancer;		2
(ii)	eye/ retina/ choroid/ red blood cell/ haemoglobin ;		1
(b) (i)	mother x father Hh hh; gametes H h h; fertilisation Hh hh; phenotype white forelock normal;		4
(ii)	chance of producing a boy is 0.5/½; chance of producing offspring with condition 0.5/½; chance of producing boy with condition is ½ × ½ = ¼;		3
(c)	Any 4 from different (genetic) code produced; different order of amino acids; codes for different proteins/enzymes; enzyme substrate complex not formed; causes change in pigment;		4
			Total 14 marks

Q5.

Question number	Answer	Notes	Marks
(a)	Same diagram with the following modifications: • shunt vessel noticeably more narrow(1) • capillaries noticeably wider(1)		2
(b)	Any four from: • capillaries dilated/get wider/vasodilation(1) • to allow greater blood flow nearer to skin surface(1) • shunt vessel constricts/becomes more narrow(1) • to divert more blood through capillaries(1) • more heat lost through skin's surface/by radiation(1)	Allow blood vessels for capillaries Ignore arteries/veins	4
(c)	• (change in body temperature) detected by the hypothalamus(1) • impulses sent to effector/named effector (1) • temperature change reversed/named reverse process (1)	Allow reverse argument for both marking points Allow signals for impulses Allow temperature returns to normal	2
		Total for Question = 8 Marks	

Q6.

Question number	Answer	Notes	Marks
(a) (i)	• evidence of 23500 – 4000 (= 19500) (1) • 19500 ÷ 4000 (x 100)(1) • 488(%)	Allow full marks for correct final answer. Allow 487.5(%) Allow ecf if incorrect answer from mp1 – max 2 marks	3
(ii)	other lifestyle factors/genetic predisposition could have an influence/named lifestyle factor(1)	Allow gender/age	1
(b)	A diagram similar to:  	One mark for diagram. One mark for each correct label.	4
(c)	any four from • ultrafiltration does not take place(1) • in glomerulus(1) • less/no waste products/named waste product/water/glucose pass through to tubule(1) • greater volume of waste in blood/more water in blood(1) • glucose/ions not reabsorbed(1) • glucose found in urine(1) OR any four from • blood not filtered effectively/ultrafiltration ineffective(1) • in glomerulus (1) • larger molecules/named larger molecules pass through to tubule/Bowmans capsule(1) • not all glucose/ions reabsorbed(1) • glucose/protein found in urine/urine more concentrated(1)		4
		Total for Question = 12 marks	

Q7.

Question number	Answer	Notes	Marks
(a) (i)	• both increase; • males more than females; • fluctuations; accept any two from;		3 marks
(ii)	• layer of actively dividing cells; • can become uncontrolled; • when exposed to ultraviolet/sun light;		2 marks
(b) (i)	17 - 48; = 31 per 100 000; $\frac{31}{25}$ = 1.2/1.24 per 100 000;	allow 16.7 - 17 and 47.8 - 48 then ECF	3 marks
(ii)	20 per 100 000; $\frac{20 \times 7\,000\,000}{100\,000}$; = 1400;	ECF	3 marks
			Total 11 marks

Q8.

Question number	Answer	Mark
(a)(i)	An answer that makes reference to any two of the following points: • maintenance of (1) • a constant internal environment (1) • despite external changes (1)	2

Question number	Answer	Mark
(a)(ii)	Liver	1

Question number	Answer	Mark
(b)	A description that makes reference to any three of the following points: • in diet/food as protein (1) • protein is digested (1) • resulting amino acids are absorbed (1) • non-essential amino acids produced by body (1)	3

Question number	Answer	Mark
(c)(i)	An explanation that makes reference to the following points: • more protein in diet A (1) • therefore more urea in urine (1) • 14.3 g versus 2.1 g (1) • excess amino acids converted to urea then excreted (1)	4

Question number	Answer	Mark
(c)(ii)	Does not come from the breakdown of excess amino acids	1

Question number	Answer	Mark
(d)	Body tissue/muscle increases	1

Q9.

Question number	Answer	Notes	Marks
(a) (i)	• separating different sized molecules out of the blood/only allows small molecules to pass; • under pressure;		2
(ii)	• A has more glucose; • A has more urea; • A more amino acids;	ORA vessel B allow references to more oxygen in A and less carbon dioxide in A	3
(iii)	• Vessel A bring blood to Bowman's capsule/glomerulus; • vessel B has narrow(er) lumen/diameter; • causes increase/higher blood pressure; • to force out molecules;		4
(b)	• glucose would pass from blood; • respiration affected/reduced; • lack of energy/ATP;		3
			Total 12 marks

Q10

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Question number	Answer	Notes	Marks
(a) (i)	water;		1
(ii)	• allows urea to pass; • prevents other larger molecules from passing;		2
(iii)	• breaks down urea; • to produce ammonium ions; • to react with/stimulate sensor;		3
(b)	• temperature affects enzyme; • higher temperature, higher rate of reaction; • more ammonium ions produced; • higher reading;	ORA for lower temperature	4
(c)	any two from • can be reused; • products not contaminated; • enzymes more stable;		2
			Total 12 marks