EXCRETION AND HOMEOSTASIS MARKING SCHEME

1. 1990 Q7 P1

(a) Heat from the body metabolism is not lost to the surrounding through sweating because evaporation of sweat will be low; as air is already saturated with moisture

(b) Hypothalamus

2. 1991 Q16P1

(a) Excess amino acids; converts into urea/ deaminated/ in the lever

(b) Urea in the blood plasma is carried through hepatic vein into inferior/ posterior venacava; right auricle; right ventricle; pulmonary artery into lungs, aorta renal artery; glomarular into Bowman's capsule; kidney tubules ascending and descending/ nephrone uriniferous tubule to urinary bladder, urethra and out of the body in urine;
Acc. Urea in urine is passed out.

3. 1992 Q4 P1

(a) Sweat produced does not evaporate due high humidity and the body does not cool; hence more produced leading to accumulation.

(b) Hypothalamus

4. 1992 Q10 P1

- Elimination of uric acid requires less water than ammonia hence (more) water is
converse

- Uric acid is less toxic than ammonia hence safer to excrete where there is less
water.

5. 1992 Q19P1

(a) Insulin is produced when there is an increase in the blood sugar level; Its role is to convert glucose into glucagons which is done in the liver/muscle thus lowering the sugar level:
Note-Acc. Bringing sugar level back to normal

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- If site of production is wrong mark the rest right - x- cell- insulin
- When the glucose level decreases the glucagons is produced which break down of glycogen to glucose thus raising blood sugar level.

OR

- Insulin is produced when there is increase in concentration of blood sugar level; its role is to convert glucose to glycogen, which is in the liver/ muscle: thus lowering the blood sugar level.

- When the glucose level decreases glucagons is produced which cause breakdown of glycogen to glucose thus raising the blood sugar level.

(b) ADH is produced when there is less water/ high osmotic pressure/ a rise above normal concentration in the blood; (Rej. Body instead of blood) it acts as kidney tubules/ nephrone; (If parts of the nephrone is maintained then at least two must be mentioned) Thus increasing water reabsorbsion from the tubules to the blood stream/ tissues thus resorting/ conserving/ lowering the osmotic pressure;

- When there is more water/ lower the osmotic pressure/ decreased salt concentration on the blood little or no ADH is produced, less water is reabsorbed hence more water in urine/ more dilute urine is produced; hence raising the osmotic pressure of the body fluid/ blood.

OR

- ADH is produced when there is less water/ high osmotic pressure/ a rise above normal salt concentration in the blood.

  Rej: Very dilute urine instead of more dilute urine.

(c) When blood vessel is cut, there is an exposure of blood platelets to the air, this triggers fibrinogen to be converted to fibrin; the fibrin plugs the cuts surface preventing body fluid/ body fluid/ blood from being lost thus conserving the salts in the water.

6. 1993 Q2 P1

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(a) Regulation of blood sugar/ lowers blood sugar level/ controls the conversion of blood sugar to glycogen/ maintains correct blood sugar level(90-100 mg/100cc of blood)

(b) Controls the absorption of H_2O in the kidney (tubules) nephrone/ regulation of H2O in the body/O.P in the blood: rej./kidney body

7. 1993 Q10 P1

More water will enter the amoeba (by osmosis) rate of water discharge be contractile vacuole will increase: contractile vacuoles will formed to discharge the excess water.

8. 1994 Q2 P1

PROTEINS/PLASMA; protein/ fibrinogen, albumin, globulin, prothrombin

BLOOD CELLS; RBC/ white blood cells/ platelets

9. 1994Q3 P1

- Test/ React/ Boil urine with Benedicts/ Fehlings; Positive results/orange red precipitate is an indication of disease diabetes mellitus
- Brick red instead of orange. Use of benedicts solution with boiling/ heat

10. 1995 Q17 P1

(i) Mammalian Kidney

Blood reaches the kidney from the renal/ renal artery enters the kidney; then branches into capillaries/ glomeruli/ in the Bowmna's capsule, blood vessels leaving the capsule/ efferent are those entering it/ afferent causing high pressure to develop in the glomeruli. This forces the plasma/ causes ultra filtration into the capsule. The filtrate contains waste products (acc. One example) The filtrate moves into the proximal/ first convolulated tubule; where selective reabsorption of glucose amino acids, some water and vitamins take through the loop of henle; excretory products/ urea, excess water and salts acc, one example) pass into the distal tubule, where the remaining useful substance (acc. One example e.g salts and water) are reabsorbed; The filtrate passes into the collecting tubule; where more reabsorption of water takes place: Excess water,

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urea and salts (all three must appear)/Urine are removed through the ureter.

(ii) Green plants

CO_2 / O_2 /H_2O diffuse through the stomata lentils/ hydrathods some toxic wastes are converted into non – toxic substances; these are deposited in certain tissues of the plant/ stored in ageing structures. Resins/ tannins – are exuded though the bark of the stem; or lost during leaf fall.

11. 1996 Q3 P1

After vigorous activity when blood fall below normal

12. 1996 Q21 P1

The cornified layer is made up of dead cells, that prevent entry of bacteria and prevent physical damage; melanin protects the body against U-V variation; sebaceous glands produce a chemical/ ring substance which is of blood vessel; which when the body temperature is high dilate and heat is lost or when body temp is low blood vessels constrict. And heat is retained. Hair when it is called, stands and traps air between themselves; to retain heat/ stop heat loss or when it is hot hair lies flat close on the skin; so does not trap air, and therefore heat is retained and sweat is lost; the skin has sweat glands which produces sweat; sweat evaporates thus cooling the body.

13. 1997 Q8 P1

(a) Disease the person was suffering from

Diabetes inspidus ref. Diuresis/ water diabetes

(b) Hormone that was deficient

Antidiuretic hormone/ ADH/Vasopressin

14. 1997 Q15 P1

(a) Deamination

(b) Removal of excess amino acids availing energy in the body formation glycogen/ fat for storage.

(c) Proteins

(d) Essentials amino acids are acquired from food

Non- essential are synthesized in the body

15. 1999 Q11 P1

a) Most enzymes in the body function within a narrow range of temperature;

High temperature denature enzymes

Low temperature inactive /inhabit enzymes

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b) Sugar in a raw material for respiration, hence less energy, available to body/low/rate of metabolism.

16. 2000 Q5 P1

– Maintenance of constant levels of water/ salt/ ions/ osmotic pressure/ for optimum conditions of metabolism/ cellular functions

17. 2000 Q13 P1

(a) Heat loss by conduction/ convection from the blood vessels
The body skin to the cold water, the cooler blood leaving skin enters general circulation cooling the whole body.

(b) Vasoconstriction; thus less blood flowing to the skin reducing heat loss.
Sweating eases heat produced through metabolism
Accept shivering producing heat

18. 2001 Q6 P1

The surface area to volume ratio is higher in calves than in adults; hence adults retain more heat than the young.
- The surface area to volume ratio is lower in adults than in calves; hence calves loose more heat than adults.

19. 2001 Q11 P1

(a) (i) Efferent arteriole/ vessels
(ii) Loop of henle
(b) Ultra – filtration (acc. Pressure filtration) rej. Filtration
(c) Glucose (acc. Blood sugar)
(d) (i) Disease – diabetes mellitus (acc. Sugar diabetes)
(ii) Hormone – insulin
(e) – Small Bowman's capsule/ Groleruli`; Rej few Bowman's capsule
- long Loop of Henle

20. 2003 Q14 P1

a) Swallow plenty of sea water to increase amount of water in the body

- Have chloride secretory cells in the gills to remove excess salts
- Eliminate nitrogenous wastes in form of trimthylamine exide which requires little water for elimination.
- Few / small glomeruli; thus slow filtration rate in the kidneys.

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b) Less ADH secreted (by pituitary gland); causing less reabsorption of water in the kidney tubules; thus resulting in dilute urine.

21. 2003 Q17 P1

a)

b) $\frac{80 - 18}{2.5} = \frac{62;}{25}$ 2.48C /Min

c) **Control**

d) Rate was faster in tube A; because the film of methylated sprit evaporated; removing heat from the tube;

e) Convection; radiation

f) Lower rate of heat loss;

g) i) birds
Feather
ii) Mammals?
Fur

h) i) external temperature changes
Temperature
ii) Internal temperature changes
Hypothalamus

22. 2004 Q18 P1

The skin is made of epidermis and dermis. The epidermis is made up of three layers. The outermost layer is known as cornified layer; made up of dead cells that protect against mechanical damage/ desiccation/ microbes; the granular layer; is made up of living cells that give rise to the cornified layer, the malpighian layer; contain actively dividing cells that rise to new epidermal cells, that contain melanin that protects the skin against ultra violet rays.

- The dermis has several components has sweat glands' sudondic glands that produce sweat; sweat evaporates carrying it with latent of vaporization) thus reducing the body temperature; under cold conditions little/ no.
- Sweat is produced thus heat is conserved; the sweat contains water/ sodium chloride/ uric acid/ urea; the skin is excretory organ.
- Has hair, the hair stands erect to trap air when temperature is low to reduce heat loss/ lies flat to allow heat loss when the temperature is high.

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- Has nerve endings, which are sensitive to stimuli/ such as heat/ cold/ pain/ pressure/ touch
- Has subcutaneous fats/ adipose tissue that insulate the body against heat loss.
- Has arteriole; that vasodilate when temperature are high to lose heat by radiation/ convection (see converse)
- Has sebaceous gland; which secrete sebum, an antiseptic/ water repellant/ that prevent drying/ cracking of skin/ skin supple

Acc blood vessels/ capillaries for arterioles to supply food/ nutrients/ oxygen/ remove excretory products.

23. 2005 Q13 P1

a) E – Malpighian layer
F – Nerve cell
G – Erector pili muscle

b) i) H – Excretion of waste products of metabolism from the body e.g.
excess.
-Water, mineral salts traces of urea, lactic acid etc.
-Temperature regulation in the body brings a cooling effect through
- Loss of excess heat by evaporation of water.

(ii) -Keeps the hair and epidermis flexible and water proof
-Contains antiseptic substances for protection against bacteria.

24. 2006 Q4 P1

(a) Sebum
(b) Kills micro organisms
- Cools the body
- Getting rid of waste/ excretion

Accept named example. E.g. urea, sodium chloride, excess water, uric acid, tactic acid.

25. 2006 Q7 P2

The afferent arteriole which is the branch of renal artery supplies blood to glomerulus; the afferent arteriole has a wider diameter than the afferent arteriole; this causes high pressure; leading to ultra filtration. The walls of the blood capillaries are one cell thick hence glucose, amino acids, (vitamins, hormones) salts, (creatinine) urea and water filter

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into Bowman's Capsule to form glomerular filtrate; White blood cells/ red blood cells and plasma proteins such as (Globulin, fibrinogen, platelets) are too large to pass through the capillaries: the filtrate flow into the proximal convoluted tubule; where amino acids (vitamin) and all glucose are selectively reabsorbs back into the blood stream. Many mitochondria provide energy for re- absorption of these substances against concentration gradient/ by active transport. The Glomerular filtrate flow into loop of henle.
Water in descending loop moves by osmosis into the blood capillaries; sodium chloride is actively pumped from the ascending arm of loop henle into the blood capillaries.

The glomerular filtrate flow into the distal convoluted tubule, water is absorbed from distal convoluted tubule into blood capillaries; the glomerular filtrate flows into collection tube/ duct from where more water is reabsorbed into the blood stream.

Antidiuretic hormone influences the amount of water reabsorbed (depending on osmotic pressure of blood); the glomerular filtrate from collecting duct now referred to as urine; is emptied into pelvis. The urine passes through pelvis and ureter into bladder out of the body through urethra.

26. 2007 Q14 P1

(a) (ii) maintenance of a concentration of water and salts ion the body fluid.

(b) Insulin - Glucagon

27. 2007 Q2 P2

(a) The amino acids are broken into amino group (NH_2) and carboxyl group (CoOH). The amino group combines with hydrogen forming highly toxic ammonia
It immediately combines with carbon (iv) oxide forming urea that is less toxic.

- The carboxyl group converted to carbohydrates and then oxidized or converted into neutral fats and deposited on the parts of the human

(b) Bowman's capsule
- Proximal convulated tubule
- Distal convulated tubule

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(c) (i) Less water reabsorbed the blood stream and dilute urine produced

(ii) Diabetes insipidus

28. 2008 Q2 P1

(a) To remove toxic/ harmful substances/ urea nitrogenous waste from the blood streams

(b) To return useful substances/ glucose and Amino acids loose into the Bloodstream.

29. 2008 Q11 P1

(a) Ability of organism to maintain a stable/ constant internal/ tissue fluid

(b) Gaseous exchange; Thermoregulation; Osmoregulation; regulation of blood sugar; regulation of pH of tissue fluid.

30. 2009 Q17 P1

Some wastes e.g. gases easily diffuse out;

- Waste products are mainly made from carbohydrates and (NB: Must mention some /most) hence are not as harmful as proteineous materials; / waste products are formed slowly / little accumulation of wastes / plants are less active; / some waste products (such as 0_2 and are re-usable – recycled; / some water products are store in non-toxic forms in leaves, flowers, fruits and old bark.

31. 2009 Q21 P1

– Pancrease releases glucagons; to stimulate liver cells to convert stored glycogen to glucoses; fat converted to glucose; / reduces rate of respiration. *Rej: if source of glycogen is the liver*

32. 2009 Q8 P2

Regulation of blood glucose

The normal amount of glucose in the blood is 90mg/1000m3, increase in blood sugar level is detected by cell of the (beta cells) pancrease, which secrete insulin; insulin stimulates the liver to convert excess glucose to glucogen. Further excess glucose is converted to fats. Excess glucose is also oxidized to energy (carbon IV) oxide & water / respiration

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Decrease in blood sugar level below the normal level is detected by the (alpha cells) by the pancreases, which secretes glucogen that stimulates the liver, to convert glocogen to glucose, fats/ amino acids are converted to glucose, there is reduced oxidation of glucose until the normal level of blood sugar is attained).

14 marks

Deamination / excess amino acids are deaminated (removal) of amino group; the amino group is converted to ammonia which combines carbon (iv) oxide to form urea that is excreted through the kidney, urea is excreted through the skin s sweat

(4 marks)

- Detoxification / poisonous substances are converted to less harmful compounds
  (1mark)
- Thermoregulation / maintenance of body temperature heat is generated (in the liver) by chemical activities; the heat is distributed (3 marks)

$NH_2 + H \longrightarrow NH_3$

$2NH3 + CO2 \longrightarrow CO(NH_2)_2 + H_2O$

Ammonia urea

33. 2010 Q19 P1

When temperature is high they dilate; when low they constrict
(Acc. Vasodilatation)

34. 2011 Q1 P1

(i) Nephritis

(ii) Kidney stones

(2 marks)

35. 2011 Q25 P1

(a) Softening of leather;
(1 mark)

(b) Treatment of malaria;
(1 mark)

(c) Stimulant used in beverages;
(1 mark)

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36. 2011 Q7b P2

- Erector pili muscles relax; and hair lies flat; trapping les air; thus reducing insulation; more heat is lost;
- Blood capillaries / vessels / arterioles in the skin vasodilate and more blood is brought near the skin surface; increasing heat loss, the sweat takes away heat from the body when it evaporates;

37. 2012 Q18 P1

Most of the waste products are harmless; converted into harmless products

38. 2012 Q19 P1

Passing urine frequently/polyuria; Glucose/excess glucosein urine/constant feeling of thirst/Dehydration;excess glucose in blood/hyperglycaemia;loss of weight;excessive eating;poor resistance to diseases;excessive eating/polyphagia/hyperphagia

39. 2012 Q2 P2

. (a) Glomerulus

(b) (i) It is long;to increase surface area for reabsorption of water

(ii) It is lined with a network of capillaries;to enhance reabsorption of water

(iii) It is U-shaped;to bring about counter current multiplier effect/to concentrate salts in the medulla to bring about reasborption of water;

(iv) Has ascending and descending limb;In the descending limb water is reasbsorbed into the blood stream while in the ascending limb solutes/sodium ions/potassium chloride ions are reabsorbed into the bloodstream.

(c) Vasoconstriction

Hair rises; Acc piloerection

Metabolic rate increases

Shivering

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