Excretory Products and Their Elimination

Question1

Given below are two statements:

Statements I: Concentrated urine is formed due to counter current mechanism in nephron.

Statement II: Counter current mechanism helps to maintain osmotic gradient in the medullary interstitium.

In the light of the above statements, choose the most appropriate answer from the options given below.

[NEET 2024 Re]

Options:

A.

Statement I is correct but Statement II is incorrect.

B.

Statement I is incorrect but Statement II is correct.

C.

Both Statement I and Statement II are correct.

D.

Both Statement I and Statement II are incorrect.

Answer: C

Solution:

The correct answer is option (3) as mammals have the ability to produce a concentrated urine. The Henle's loop and vasa recta play a significant role in this. The flow of filtrate in the two limbs of Henle's loop as well as flow of blood through the two limbs of vasa recta are in a counter current pattern. The proximity between the Henle's loop and vasa recta, as well as the counter current in them help in maintaining the increasing osmolarity towards the inner medullary interstitium, i.e., from 300 mOsmol L^{-1} in the cortex to about 1200mOsmolL−1 in the inner medulla. So, counter current mechanism of loop of Henle of juxtamedullary nephron participates in concentration of urine.

Question2

Given below are two statements :
Statement I : In the nephron, the descending limb of loop of Henle is

impermeable to water and permeable to electrolytes.
Statement II : The proximal convoluted tubule is lined by simple columnar brush border epithelium and increases the surface area for reabsorption.

In the light of the above statements, choose the correct answer from the option given below :

[NEET 2024]

Options:

A.

Both Statement I and Statement II are true

B.

Both Statement I and Statement II are false

C.

Statement I is true but Statement II is false

D.

Statement I is false but Statement II is true

Answer: B

Solution:

Correct answer is option (2) becaus

Statement I is false as the descending limb of loop of Henle is permeable to water and almost impermeable to electrolytes.

Statement II is false as proximal convoluted tubule is lined by simple cuboidal brush border epithelium which increases the surface area for reabsorption.

Question3

Choose the correct statement given below regarding juxta medullary nephron.

[NEET 2024]

Options:

A.

Juxta medullary nephrons are located in the columns of Bertini.

B.

Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla.

C.

Loop of Henle of juxta medullary nephron runs deep into medulla.

D.

Juxta medullary nephrons outnumber the cortical nephrons.

Answer: C

Solution:

The correct answer is option no, (3) because the length of loop of Henle of juxta medullary nephron is longer than the length of loop of Henle of cortical nephron and runs deep into medulla.

Option (1) is incorrect as juxta medullary nephron are not present in columns of Bertini.

Option (2) is incorrect because renal corpuscle of juxta medullary nephron lies in inner cortical region.

Option (4) is incorrect as juxta medullary nephrons are lesser in number than cortical nephrons.

Question4

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: Nephrons are of two types: Cortical & Juxta medullary, based on their relative position in cortex and medulla.
Reason R: Juxta medullary nephrons have short loop of Henle whereas, cortical nephrons have longer loop of Henle.
In the light of the above statements, choose the correct answer from the options given below:

[NEET 2023]

Options:

A.

Both A and R are true but R is NOT the correct explanation of A.

B.

A is true but R is false.

C.

A is false but R is true.

D.

Both A and R are true and R is the correct explanation of A.

Answer: B

Solution:

The correct answer is option (2) because Assertion is true as there are two types of nephrons, i.e., cortical nephrons and juxtamedullary nephrons based on their relative position in the cortex and medulla.

Reason is not correct as loop of Henle in juxtamedullary nephrons is very long and runs deep into the medulla. Therefore, Assertion is true but Reason is false.

Question5

Which of the following statements are correct?
A. An excessive loss of body fluid from the body switches off osmoreceptors.
B. ADH facilitates water reabsorption to prevent diuresis.
C. ANF causes vasodilation.
D. ADH causes increase in blood pressure.
E. ADH is responsible for decrease in GFR.

Choose the correct answer from the options given below:

[NEET 2023]

Options:

A.

B, C and D only

B.

A, B and E only

C.

C, D and E only

D.

A and B only

Answer: A

Solution:

Solution:

Option (1) is the correct answer because statements B, C and D are true statements. ADH facilitates water reabsorption from DCT of nephron to prevent diuresis, which causes increase in blood pressure.
ANF which is secreted by the heart is a vasodilator.

Options (2), (3) and (4) are not correct because statements A and E are false. Excessive loss of body fluid from the body switches on the osmoreceptors

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Question6

Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R)

Assertion (A) :

Ascending limb of loop of Henle is impermeable to water and allows transport of electrolytes actively or passively.

Reason (R) :
Dilution of filtrate takes place due to efflux of electrolytes in the medullary fluid.
In the light of the above statements, choose the correct answer from the options given below :

[NEET 2023 mpr]

Options:

A.

(A) is true but (R) is false

B.

(A) is false but (R) is true

C.

Both (A) and (R) are true and (R) is the correct explanation of (A)

D.

Both (A) and (R) are true and (R) is not the correct explanation of (A)

Answer: C

Solution:

The Assertion (A) states: "Ascending limb of loop of Henle is impermeable to water and allows transport of electrolytes actively or passively." This is true. The ascending limb of the loop of Henle is indeed impermeable to water. This means that as the filtrate passes through this part of the loop, water cannot pass out of the tubule and back into the body, but electrolytes (like sodium and chloride ions) can be transported out, either actively (using energy) or passively (without using energy, following their concentration gradient).

The Reason (R) states: "Dilution of filtrate takes place due to efflux of electrolytes in the medullary fluid." This is also true. As the filtrate ascends the limb and electrolytes are transported out, the filtrate becomes more diluted. This is because the volume of the filtrate remains the same, but the number of electrolytes (which contribute to the filtrate's 'concentration') decreases.

Moreover, Reason (R) is explaining why the filtrate becomes dilute in the ascending limb, which is mentioned in Assertion (A). Therefore, (R) is indeed the correct explanation for (A).

So, the correct option is Option C: Both (A) and (R) are true and (R) is the correct explanation of (A).

Question7

Given below are two statements :

Statement I :-
Goblet cells are unicellular glands.

Statement II :-

Earwax is the secretion of exocrine gland.
In the light of the above statements, choose the correct answer from the options given below:

[NEET 2023 mpr]

Options:

A.

Statement I is true but Statement II is false

B.

Statement I is false but Statement II is true

C.

Both Statement I and Statement II are true

D.

Both Statement I and Statement II are false.

Answer: C

Solution:

Explanation :

Statement I is true as goblet cells are indeed unicellular glands. They secrete mucus and are found in the lining of the intestines and respiratory tracts, where the mucus acts as a protective layer.

Statement II is also true. Earwax, also known as cerumen, is a secretion from the ceruminous glands in the ear canal, which are a type of exocrine gland. Exocrine glands are glands that secrete their products onto body surfaces or into body cavities.

Question8

Arrange the events of Renin - Angiotensin mechanism in correct sequence.
(A) Activation of JG cells and release of renin.
(B) Angiotensin II activates release of aldosterone.
(C) Fall in glomerular blood pressure.
(D) Reabsorption of Na+and water from distal convoluted tubule.
(E) Angiotensinogen is converted to Angiotensin I and then to Angiotensin II.

Choose the correct answer from the options given below:

[NEET 2023 mpr]

Options:

A.
(C), (A), (E), (B), (D)

B.

(A),(D),(E),(C),(B)

C.

(A),(D),(C),(B),(E)

D.

(B), (A), (E), (D), (C)

Answer: A

Solution:

The Renin-Angiotensin-Aldosterone System (RAAS) is a hormone system that regulates blood pressure and fluid balance. The sequence of events is as follows :

1. Fall in glomerular blood pressure (due to dehydration, sodium deficiency, or hemorrhage, for example) - This is detected by the juxtaglomerular cells (JG cells) in the kidneys.
2. Activation of JG cells and release of renin - In response to low blood pressure, the JG cells release the enzyme renin into the bloodstream.
3. Renin catalyzes the conversion of the protein angiotensinogen (produced by the liver and always present in the blood) into angiotensin I.
4. Angiotensin I is then converted into angiotensin II, a powerful vasoconstrictor that also stimulates the release of aldosterone from the adrenal cortex.
5. Angiotensin II activates the release of aldosterone, which stimulates the reabsorption of sodium ions and water from the distal convoluted tubules in the kidneys, leading to an increase in blood pressure.

Question9

Select the correct statements.
(a) Angiotensin Il activates the cortex of adrenal gland to release aldosterone. (b) Aldosterone leads to increase in blood pressure.
(c) ANF acts as a check on renin-angiotensin mechanism.
(d) ADH causes vasodilation.
(e) Vasopressin is released from adenohypophysis.
Choose the most appropriate answer from the options given below:
[NEET Re-2022]

Options:

A. (a), (b) and (c) only

B. (a), (b) and (e) only

C. (c), (d) and (e) only

D. (b), (c) and (d) only

Answer: A

Solution:

- Hypothalamus release ADH or vasopressin through the neurohypophysis.
- ADH affects the kidney function by its constrictory effect on blood vessels

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Question10

Nitrogenous waste is excreted in the form of pellet or paste by : [NEET-2022]

Options:

A. Ornithorhynchus

B. Salamandra

C. Hippocampus

D. Pavo

Answer: D

Solution:

Solution:

Option (4) is the correct answer because birds (Pavo) excrete nitrogenous wastes as uric acid in the form of pellet or paste with a minimum loss of water.

Option (3) and (2) are incorrect because many bony fishes (like Hippocampus) and aquatic amphibians(like Salamandra) are ammonotelic in nature.

Option (1) is incorrect because mammals (like Ornithorhynchus) mainly excrete urea and are called ureotelic animals.

Question11

Presence of which of the following conditions in urine are indicative of Diabetes Mellitus? [2020]

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Options:

A. Uremia and Renal Calculi

B. Ketonuria and Glycosuria

C. Renal calculi and Hyperglycaemia

D. Uremia and Ketonuria

Answer: B

Solution:

Presence of Ketone bodies in urine (Ketonuria) and presence of glucose in urine (Glycosuria) are indicative of Diabetes mellitus.
High ketone levels in urine may indicate diabetic ketoacidosis (DKA), a complication of diabetes that can lead to a coma or even death. Renal glycosuria, also known as renal glucosuria, is a rare condition in which the simple sugar glucose is eliminated (excreted) in the urine despite normal or low blood glucose levels.

Question12

Which of the following would help in prevention of diuresis? 2020

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Options:

A. Reabsorption of Na^+ and water from renal tubules due to aldosterone

B. Atrial natriuretic factor causes vasoconstriction

C. Decrease in secretion of renin by JG cells

D. More water reabsorption due to undersecretion of ADH

Answer: A

Solution:

Solution:
(a) Adrenal cortexsecretesmineralocorticoids like aldosterone which increase the reabsorption of Na^+ and water from renal tubule that prevent diuresis. Diuresis is a condition in which the kidneys filter too much bodily fluid.
Atrial natriuretic factor (ANF) is a 28 amino acid polypeptide hormone secreted mainly by (2 the heart atria in response to atrial stretch. ANF acts on the kidney to increase sodium excretion and GFR, to antagonize renal vasoconstriction, and to inhibit renin secretion.

Question13

Match the following parts of a nephron with their function :

Column-I	Column-II
(A) Descending limb	(i) Reabsorption of Henle's loop of salts only
(B) Proximal	(ii) Reabsorption convoluted tubule of water only
(C) Ascending limb of	(iii) Conditional Henle's loop reabsorption of sodium ions and water
(D) Distal convoluted	(iv) Reabsorption tubule of ions, water and organic nutrients

Select the correct option from the following : [2019, Odisha]

Options:

A. (A)-(iv), (B)-(i), (C)-(iii), (D)-(ii)

B. (A)-(i), (B)-(iii), (C)-(ii), (D)-(iv)

C. (A)-(ii), (B)-(iv), (C)-(i), (D)-(iii)

D. (A)-(i), (B)-(iv), (C)-(ii), (D)-(iii)

Answer: C

Solution:

Solution:
(c) Descending limb of - Reabsorption of water Henle's loop only PCT - Reabsorption of ions, water organic nutrients

Ascending limb of - Reabsorption of salts Henle's loop only. DCT Conditional reabsorption of sodium ions and water

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Question14

Which of the following factors is responsible for the formation of concentrated urine ?
[2019]

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Options:

A. Low levels of antidiuretic hormone.

B. Maintaining hyperosmolarity towards inner medullary interstitium in the kidneys.

C. Secretion of erythropoietin by juxtaglomerular complex.

D. Hydrostatic pressure during glomerular filtration.

Answer: B

Solution:

an important role in the concentration of urine. The proximity between loop of Henle and vasa recta as well as counter current in them help in maintaining an increasing osmolarity towards the inner medullary interstitium. This mechanism helps to maintain a concentration gradient in medullary interstitium so human urine is nearly four times concentrated than initial filtrate formed. The urine concentrating mechanism plays a fundamental role in regulating water and sodium excretion

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Question15

Use of an artificial kidney during hemodialysis may result in:
(a) Nitrogenous waste build-up in the body.
(b) Non-elimination of excess potassium ions .
(c) Reduced absorption of calcium ions from gastro-intestinal tract.
(d) Reduced RBC production.
Which of the following options is the most appropriate?
[2019]

Options:

A. (a) and (b) are correct

B. (b) and (c) are correct

C. (c) and (d) are correct

D. (a) and (d) are correct

Answer: C

Solution:

Statements (iii) and (iv) are correct.
Dialysis is a procedure that is a substitute for many of the normal functions of the kidney.
(a)It remove waste, salt and extra water to prevent them from building up in the body.
(b)It keep a safe level of certain chemicals in your blood, such as potassium, sodium and bicarbonate helping to control blood pressure.
(c)There will be reduced absorption of calcium ions from gastrointestinal tract.
(d)RBC production will be reduced, due to reduced erythropoietin hormone.

Question16

Match the items given in Column I with those in Column II and select the correct option given below :

Column I	Column II
A. Glycosuria	i. Accumulation of uric acid in joints
B. Gout	ii. Mass of crystallised salts within the kidney
C. Renal calculi	iii. Inflammation in glomeruli
D. Glomerular	iv. Presence of in nephritis glucose urine

[2018]

Options:

A.

A	B	C	D
iii	ii	iv	i

B.

A	B	C	D
i	ii	iii	iv

C.

A	B	C	D
iv	i	ii	iii

D.

A	B	C	D
ii	iii	i	iv

Answer: C

Solution:

(c) Glycosuria denotes presence of glucose in the urine. Gout is due to deposition of uric acid crystals in the joint. Renal calculi are precipitates of calcium phosphate produced in the pelvis of the kidney. Glomerular nephritis is the inflammatory condition of glomerulus characterised by proteinuria and haematuria.

Question17

A decrease in blood pressure/volume will not cause the release of (NEET 2017)

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Options:

A. atrial natriuretic factor

B. aldosterone

C. ADH

D. renin

Answer: A

Solution:

Solution:
(a) : Atrial natriuretic factor (ANF) is responsible for lowering of blood pressure and volume. The walls of the atria of the heart release ANF in response to an increase in blood volume and pressure. It opposes regulation by RAAS. It inhibits release of renin from JGA thereby inhibiting NaCl reabsorption by the collecting duct and reduces aldosterone release from adrenal gland.

Question18

Which of the following statements is correct? (NEET 2017)

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Options:

A. The descending limb of loop of Henle is impermeable to water.

B. The ascending limb of loop of Henle is permeable to water.

C. The descending limb of loop of Henle is permeable to electrolytes.

D. The ascending limb of loop of Henle, is impermeable to water

Answer: D

Solution:

(d) : Descending limb of loop of Henle is permeable to water but impermeable to electrolytes. Ascending limb of loop of Henle is impermeable to water but permeable to electrolytes.

Question19

The part of nephron involved in active reabsorption of sodium is (NEET II 2016)

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Options:

A. distal convoluted tubule

B. proximal convoluted tubule

C. Bowman's capsule

D. descending limb of Henle's loop

Answer: B

Solution:

Solution:
(b) : From the Bowman's capsule, a glomerular filtrate enters the proximal convoluted tubule. Absorption of selected materials takes place from the filtrate into the blood of the peritubular capillaries or vasa recta. It is termed the tubular reabsorption. Reabsorption involves both passive and active transport across the tubular epithelium. About 65 per cent of the glomerular filtrate is normally reabsorbed in the proximal convoluted tubule before reaching the loop of Henle. Glucose, amino acids, vitamins, hormones, sodium, potassium, chlorides, phosphates, bicarbonates, much of water and some urea from the filtrate are absorbed. Sodium and potassium are reabsorbed by primary active transport.

Question20

Human urine is usually acidic because (2015)

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Options:

A. potassium and sodium exchange generates acidity

B. hydrogen ions are actively secreted into the filtrate

C. the sodium transporter exchanges one hydrogen ion for each sodium ion, in peritubular capillaries.

D. excreted plasma proteins are acidic

Answer: B

Solution:

(b) Urine has acidic nature because hydrogen ions (H^+) are components of an acid which are secreted into the filtrate.

Question21

Which of the following does not favour the formation of large quantities of dilute urine?
(2015 Cancelled)

Options:

A. Renin

B. Atrial-natriuretic factor

C. Alcohol

D. Caffeine

Answer: A

Solution:

Solution:
(a) The secretion of Renin is induced by decrease in blood pressure and blood volume. It maintains the proper BP and BV. It has no role in the formation of large quantities of urine.

Question22

Removal of proximal convoluted tubule from the nephron will result in (2015 Cancelled)

Options:

A. no change in quality and quantity of urine

B. no urine formation

C. more diluted urine

D. more concentrated urine

Answer: C

Solution:

PCT helps in absorption of glucose, amino acids, sodium and potassium along with absorption of water. Removal of proximal convoluted tubule from the nephron results in lack of reabsorption of high threshold substances from renal tubules, and obligatory reabsorption of water is also affected leading to more diluted urine. So, the correct answer is 'More diluted urine'.

Question23

Which of the following causes an increase in sodium reabsorption in the distal convoluted tübule? (2014)

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Options:

A. Increase in aldosterone levels

B. Increase in antidiuretic hormone levels

C. Decrease in aldosterone levels

D. Decrease in antidiuretic hormone levels

Answer: A

Solution:

Solution:
(a) : Aldosterone is a hormone secreted by the outer layer of the adrenal gland (cortex part). Decreased blood volume and interstitial fluid level, resulting in decreased blood pressure, trigger aldosterone secretion. When aldosterone is present in the blood, reabsorption of Na^+ in the filtrate is increased by the epithelial cells of the collecting duct. Retaining Na^+, raises the osmotic pressure of the blood and reduces water loss from the body. When aldosterone is absent, some Na^+ remains in the filtrate and is excreted with the urine.

Question24

Select the option which shows correct matching of animal with its excretory organ and excretory product.

	Animal	Excretory organ	Excretory product
(a)	Labeo (Rohu)	Nephridial tubes	Ammonia
(b)	Salamander	Kidneys	Urea
(c)	Peacock	Kidneys	Urea
(d)	Housefly	Renal tubules	Uric acid

(KN NEET 2013)

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: B

Solution:

Solution:
(b) : In salamander, kidneys (mesonepheric) are the excretory organs and the excretory matter is urea. In Labeo, mesonephric kidney is the excretory organ and excretion is ammonotelic.
Peacock has metanephrid kidneys with excretory matter being uric acid. In housefly, excretion takes place by Malpighian tubules. Excretory waste is uric acid chiefly.

Question25

Which one of the following options gives the correct categorization of six animals according to the type of nitrogenous waste they give out?

	Ammonotelic	Ureotelic	Uricotelic
(a)	Pigeon, humans	Aquatic , amphibia, lizards	Cockroach, frog
(b)	Frog, lizards	Aquatic amphibia, humans	Cockroach, pigeon
(c)	Aquatic amphibia	Frog, humans	Pigeon, lizards, cockroach
(d)	Aquatic amphibia	Cockroach, humans	Frog, pigeon, lizards

(Mains 2013)

Options:

A. (a)

B. (b)

C. (c)

D. (d)

Answer: C

Solution:

(c) Those animals that excrete ammonia are called as ammonotelic, eg. aquatic amphibia. Those animals that excrete urea are called as ureotelic, eg. frog, humans. Those animals that excrete uric acid are called as uricotelic, eg. pigeon, lizards, and cockroach.

Question26

The maximum amount of electrolytes and water (70 − 80 percent) from the glomerular filtrate is reabsorbed in which part of the nephron? (2012)

Options:

A. Ascending limb of loop of Henle

B. Distal convoluted tubule

C. Proximal convoluted tubule

D. Descending limb of loop of Henle

Answer: C

Solution:

(c) : During glomerular filtration in kidneys, ultrafittration of blood occurs i.e., almost all the constituents of plasma except proteins pass onto the Bowman's capsule. Then nearly 99% of the filtrate is reabsorbed by renal tubules. Proximal convoluted tubules shows maximum reabsorption and nearly all the essential nutrients and 70 − 80% of electrolytes and water are reabsorbed by this segment.

Question27

A fall in glomerular filtration rate (GFR) activates (Mains 2012)

Options:

A. juxtaglomerular cells to release renin

B. adrenal cortex to release aldosterone

C. adrenal medulla to release adrenaline

D. posterior pituitary to release vasopressin

Answer: A

Solution:

Solution:
(a) : The amount of the filtrate formed by the kidneys per minute is called glomerular filtration rate (GFR). GFR in a healthy individual is approximately 125. ml/minute, i.e., 180 litres per day.
The kidneys have built-in mechanisms for the regulation of glomerular filtration rate. One such efficient mechanism is carried out by juxtaglomerular apparatus (JGA). JGA is a special sensitive region formed by cellular modifications in the distal convoluted tubule and the afferent arteriole at the location of their contact. A fall in GFR can activate the JG cells to release renin which can stimulate the glomerular blood flow and thereby the GFR come back to normal.

Question28

Which one of the following characteristics is common both in humans and adult frogs?
(Mains 2012)

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Options:

A. Four chambered heart

B. Internal fertilization

C. Nucleated RBCs

D. Ureotelic mode of excretion

Answer: D

Solution:

Solution:
(d) : Excretion of urea is known as ureotelism and the animals which excrete urea are called ureotelic. Ureotelic animals include Ascaris, earthworm (both are ammonotelic and ureotelic), cartilaginous fishes like sharks and sting rays, semiaquatic amphibians such as frogs and toads, aquatic or semi- aquatic reptiles like turtles, terrapins and alligators, and man and all other mammals. Urea is less toxic and less soluble in water than ammonia.
Hence, it can stay for some time in the body. Amphibian tadpole (e.g., tadpole of frog) excrete ammonia but after metamorphosis frog excretes urea.

Question29

Which one of the following is not a part of a renal pyramid?
(Mains 2011)

Options:

A. Peritubular capillaries

B. Convoluted tubules

C. Collecting ducts

D. Loop of Henle

Answer: B

Solution:

Solution:
Proximal and distal convoluted tubules lie in the cortex and loop of Henle lies in the medulla. The collecting duct system begins in the renal cortex and extends deep into the medulla. These help in the maintaining the concentration of urine. These are not a part of the renal pyramid.

Question30

Which one of the following correctly explains the function of a specific part of the human nephron?
(Mains 2011)

Options:

A. Podocytes: create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

B. Henle's loop : most reabsorption of the major substances from the glomerular filtrate

C. Distal convoluted tubule : reabsorption of K^+ ions into the surrounding blood capillaries

D. Afferent arteriole : carries the blood away from the glomerulus towards renal vein.

Answer: A

Solution:

(a) : The visceral layer of Bowman's capsule surrounds the glomerulus and is composed of special type of cells, the podocytes. The podocytes are so called because they possess foot like processes (projection), the pedicels. The space between pedicels are called slit pores (= filtration slits) through which the glomerular filtrate filters.

Question31

Which one of the following statements is correct with respect to kidney function regulation?
(Mains 2011)

Options:

A. When someone drinks lot of water, ADH release is suppressed.

B. Exposure to cold temperature stimulates ADH release.

C. An increase in glomerular blood flow stimulates formation of angiotensin II.

D. During summer when body loses lot of water by evaporation, the release of ADH is suppressed

Answer: A

Solution:

Solution:
(a) : Antidiuretic hormone (ADH) or vasopressin increases the reabsorption of water in the distal convoluted tubule, collecting tubules and collecting ducts of the nephrons of the kidneys. As a result, the reabsorption of water from the glomerular filtrate is increased. When someone drinks lot of water, requirement of absorption of water decreases, so ADH release is suppressed.

Question32

Uricotelic mode of excreting nitrogenous wastes is found in (Mains 2011)

Options:

A. reptiles and birds

B. birds and annelids

C. amphibians and reptiles

D. insects and amphibians.

Answer: A

Solution:

Solution:
(a) : Reptiles, birds, land snails and insects excrete nitrogenous wastes as uric acid in the form of pellet or paste with a minimum loss of water and are called uricotelic animals.

Question33

Which one of the following statements in regard to the excretion by the human kidneys is correct?
(2010)

Options:

A. Descending limb of loop of Henle is impermeable to water.

B. Distal convoluted tubule is incapable of reabsorbing $\mathrm{H\,CO_3^-}$

C. Nearly 99 per cent of the glomerular filtrate is reabsorbed by the renal tubules.

D. Ascending limb of loop of Henle is impermeable to electrolytes.

Answer: C

Solution:

Solution:
(c) : Urine formation involves three main processes namely, glomerular filtration, reabsorption and secretion, that takes place in different parts of the nephron. A comparison of the volume of the filtrate formed per day (180 litres per day) with that of the urine released (1.5 litres), suggest that nearly 99 percent of the filtrate is reabsorbed by the renal tubules. The descending limb of loop of Henle is permeable to water but almost impermeable to electrolytes. The ascending limb is impermeable to water but allows transport of electrolytes actively or passively. Conditional reabsorption of $\mathrm{Na^+}$ and water takes place in distal convoluted tubule. It is also capable of reabsorption of $\mathrm{H\,CO_3^-}$

Question34

The principal nitrogenous excretory compound in humans is synthesised
(2010)

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Options:

A. in kidneys but eliminated mostly through liver

B. in kidneys as well as eliminated by kidneys

C. in liver and also eliminated by the same through bile

D. in the liver, but eliminated mostly through kidneys.

Answer: D

Solution:

Solution:
(d) : The principle nitrogenous excretory compound in humans is urea. Urea is produced in a series of reactions (urea cycle) which take place in the mitochondrial matrix and cytosol of liver cells. Urea cycle (ornithine cycle) is the series of biochemical reactions that converts ammonia, which is highly toxic, and carbon dioxide to the much less toxic urea during the excretion of metabolic nitrogen derived from the deamination of excess amino acids. The urea is ultimately excreted in solution in urine.

Question35

What will happen if the stretch receptors of the urinary bladder wall are totally removed?
(2009)

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Options:

A. Micturition will continue

B. Urine will continue to collect normally in the bladder

C. There will be no micturition

D. Urine will not collect in the bladder

Answer: C

Solution:

Solution:
Urinary bladder is the hollow, muscular, distensible organ of the urogenital system and it is located inferior to the peritoneum. Its main function is to collect urine. The volume of the bladder varies from person to person, but on average, it can hold $400 - 1000$ milliliters of urine.
Urine gets accumulated in the urinary bladder where stretch receptors are present. When it gets filled with urine then stretch receptors present in the wall of the urinary bladder send a signal to the central nervous system (CNS) and in return, it stimulates the contraction of smooth muscles of the bladder and relaxation of the urethral sphincter and this causes the discharge of urine.
This process is called micturition.
But, when stretch receptors are removed from the urinary bladder then also urine continue to form and they are transported by the ureter as usual but now they are not accumulated in the urinary bladder because stretch receptors used to create space for the urine, and hence bladder was able to hold urine for some hours but as now stretch receptors are not present urinary bladder will not hold urine and hence there is a continuous discharge of urine (that means continuous micturition).

Question36

Uric acid is the chief nitrogenous component of the excretory products of
(2009)

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Options:

A. earthworm

B. cockroach

C. frog

D. man

Answer: B

Solution:

(b) : Cockroach shows uricotelism. Excretion of uric acid is known as uricotelism and the animals which excrete uric acid are called uricotelic. Animals which live in dry conditions have to conserve water in their bodies. Therefore, they synthesize crystals of uric acid from ammonia. Uric acid crystals are non-toxic and almost insoluble in water. Hence, these can be retained in the body for a considerable time. Uricotelic animals include most insects, (e . g. cockroach), land reptiles (e. g., lizards and snakes) and birds.

Question37

A person who is on a long hunger strike and is surviving only on water, will have
(2007)

©

Options:

A. less amino acids in his urine

B. more glucose in his blood

C. less urea in his urine

D. more sodium in his urine

Answer: C

Solution:

(c): A person who is on a long hunger strike and is surviving only on water, will have less urea in his urine. Urea, also called carbamide, is an organic chemical compound which essentially is the waste produced when the body metabolizes protein. Manufactured in the liver, by broken down protein or amino acids, and ammonia, the kidneys transfer urea from the blood to the urine. The average person excretes about 30 grams of urea a day. During total starvation with no food being eaten, the body must rely on its own tissues to provide the essential mixture of fuels to sustain life. The primary fuel is stored fat but we also need a continuous supply of glucose. The body has a very small store of glycogen that can provide glucose for about 36 hours, then the body must make its glucose. The body has three sources of glucose, one is the diet (but the person is starving), a second is glycogen (but this is all gone) and the third is a process called gluconeogenesis where the body makes glucose from amino acids. During starvation, the body must rely on body proteins for the amino acids. On high-protein diets the carbon skeletons of the amino acids are oxidized for energy or stored as fat and glycogen, but the amino nitrogen must be excreted. To facilitate this process, enzymes of the urea cycle are controlled at the gene level. When dietary proteins increase significantly, enzyme concentrations rise. On return to a balanced diet, enzyme levels decline. Under conditions of starvation, enzyme levels rise as proteins are degraded and amino acid carbon skeletons are used to provide energy, thus increasing the quantity of nitrogen that must be excreted in the form of urea.

Question38

Angiotensinogen is a protein produced and secreted by
(2006)

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Options:

A. juxtaglomerular (JG) cells

B. macula densa cells

C. endothelial cells (cells lining the blood vessels)

D. liver cells

Answer: D

Solution:

(d) : Angiotensinogen is a plasma protein produced and secreted by the liver cells. Renin is secreted from juxtaglomerular cells and acts enzymatically on angiotensinogen to release 10 amino acid contaning peptide angiotensin-I. Macula densa is actually a plaque in wall at the end of thick assending limb of nephrons.

Question39

In ornithine cycle, which of the following wastes are removed from the blood?
(2005)

©

Options:

A. CO_2 and urea

B. Ammonia and urea

C. CO_2 and ammonia

D. Urea and urine

Answer: C

Solution:

Solution:
Two waste products removed from the blood in the liver by Ornithine cycle are Ammonia NH_3 and Carbon dioxide CO_2. The liver contains molecules and enzymes which act on the carbon dioxide and ammonia and changes them to urea, being known as the urea cycle. One cycle takes away two molecules of ammonia and one molecule of carbon dioxide. So, the correct option is 'Carbon dioxide and ammonia'.

Question40

The net pressure gradient that causes the fluid to filter out of the glomeruli into the capsule is
(2005)

©

Options:

A. 50 mm Hg

B. 75 mm H g

C. 20 mm H g

D. 30 mm Hg

Answer: C

Solution:

(c) : Walls of glomerular capillaries and Bowman's capsule are very thin and are semipermeable due to the presence of pores in the former and slit-pores in the latter. They allow water and small molecules in the blood to pass through them. Fluid containing these materials is forced out of the glomerular capillaries into the Bowman's capsule by the high pressure of the blood in the glomerular capillaries. This pressure is about $70 \mathrm{mmH\,g}$ in man. The fluid tends to move in the reverse direction due to (i) the osmotic pressure of plasma proteins in the glomerular capillaries, and (ii) hydrostatic pressure of the fluid in the urinary tubule. These pressures in man are about $30 \mathrm{mm\,.\,H\,g.}$ and $20 \mathrm{mm\,.\,H\,g.}$ respectively. The net force moving the fluid from the glomerular capillaries, called the filtration pressure, is $70 - (30 + 20)$ or $20 \mathrm{mmH\,g}$

Question41

A person is undergoing prolonged fasting. His urine will be found to contain abnormal quantities of (2005)

©

Options:

A. fats

B. amino acids

C. glucose

D. ketones

Answer: D

Solution:

Solution:
(d) : Under fasting conditions which are associated with high rate of fatty acid oxidation, the liver produces large amount of ketone bodies viz. acetoacetate, β -hydroxybutyrate and acetone. The normal level of ketone blood level is $0.2 \mathrm{\ mmol\ /\ L}$. Presence of excess ketone bodies in urine is termed as ketonuria.

Question42

If Henle's loop were absent from mammalian nephron, which one of the following is to be expected? (2003)

©

Options:

A. There will be no urine formation.

B. There will be hardly any change in the quality and quantity of urine formed

C. The urine will be more concentrated.

D. The urine will be more dilute

Answer: D

Solution:

(d) : Reabsorption is a process by which useful constituents of glomerular filtrate are returned into the blood streams. It occurs in convoluted tubules (proximal convoluted tubule) as well as loop of Henle. Basically loop of Henle, in association with vasa rectae, plays an important role in the counter current mechanism (the process which makes urine hypertonic, i.e., more concentrated). Therefore, if Henle's loop was absent from mammalian nephron the urine will be more dilute.

Question43

Conversion of ammonia to urea is done by (2000)

©

Options:

A. ornithine cycle

B. arginine cycle

C. fumaric cycle

D. citrulline cycle

Answer: A

Solution:

Solution:
(a) : The principle nitrogenous excretory compound in humans is urea. Urea is produced in a series of reactions (urea cycle) which take place in the mitochondrial matrix and cytosol of liver cells. Urea cycle (ornithine cycle) is the series of biochemical reactions that converts ammonia, which is highly toxic, and carbon dioxide to the much less toxic urea during the excretion of metabolic nitrogen derived from the deamination of excess amino acids. The urea is ultimately excreted in solution in urine.

Question44

Concentration of urine depends upon which organ? (2000)

©

Options:

A. Bowman's capsule

B. Length of Henle's loop

C. PCT

D. Network of capillaries arising from glomerulus

Answer: B

Solution:

Solution:
(b) : Concentration of urine depends upon the length of Henle's loop. Loop of Henle is the hairpin shaped section of a kidney tubule situated between the proximal and distal tubules in the nephron. It consists of a thin descending limb which is permeable to water and a thick ascending limb which is impermeable to water complex movements of ions and water across the walls of the loop enable it to function as a countercurrent multiplier, resulting in the production of concentrated urine in the collecting duct.

Question45

A condition of failure of kidney to form urine is called (1998)

©

Options:

A. anuria

B. deamination

C. uremia

D. none of these

Answer: A

Solution:

Solution:
(a) : Anuria is the complete suppression of urine formation by the kidney. In this case most of the nephrons are destroyed. Uremia is the presence of an excessive amount of urea in the blood. Deamination is the removal of ammonia from amino acids.

Question46

The basic functional unit of human kidney is (1997)

©

Options:

A. nephridia

B. Henle's loop

C. nephron

D. pyramid

Answer: C

Solution:

(c) : A nephron is a unit of structure and function in a kidney. A kidney contains about a million nephrons, each approximately $3\mathrm{cm}$ long. A nephron is a long tubule differentiated into four regions haying different \/ anatomical features and physiological role : Bowman's capsule, proximal convoluted tubule (PCT), loop of Henle, and distal convoluted tubule (DCT). The latter opens into one of the collecting ducts. Nephridia are the excretory organs of annelids.

Question47

In ureotelic animals, urea is formed by (1997)

Options:

A. Krebs' cycle

B. EM pathway

C. Ornithine cycle

D. Cori cycle

Answer: C

Solution:

Solution:
31. (c) : Urea is formed of two molecules of ammonia and one molecule of CO_2
During catabolism, proteins break up into amino acids. The amino acids are converted into keto-acids (such as α -keto-glutaric acid) with the removal of ammonia (deamination). The keto-acid enters the Krebs cycle to yield energy. Carbon dioxide is formed during decarboxylation.
Ornithine (amino acid) combines with one molecule of NH_3 and CO_2 producing citrulline (amino acid) and water.
Citrulline combines with another molecule of ammonia and forms arginine (essential amino acid) and water. Arginine is broken into urea and ornithine in the presence of an enzyme arginase and water. Thus the cycle is repeated. This is called urea or ornithine or Krebs-Henseleit cycle after the names of its discoverers.

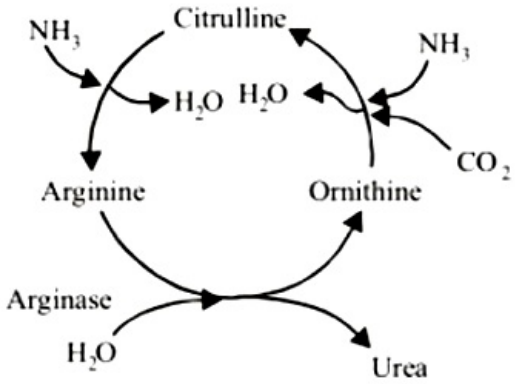

Fig. : Urea cycle

Question48

The ornithine cycle removes two waste products from the blood in liver. These products are (1996)

©

Options:

A. CO_2 and ammonia

B. ammonia and uric acid

C. CO_2 and urea

D. ammonia and urea

Answer: A

Solution:

Solution:
(a) Urea $NH_2 - CO - NH_2$ is formed from two molecules of ammonia and one molecule of carbon dioxide. A molecule of ammonia combines with carbondioxide to form carbonyl phosphate. It reacts with ornithine to form citrulline. Citrulline accepts another molecule of NH_4^+ giving rise to arginine. Arginine is hydrolysed into urea and ornithine with the help of enzyme arginase.

Question49

Which one of the four parts mentioned below does not constitute a part of single uriniferous tubule? (1994)

Options:

©

A. Distal convoluted tubule

B. Collecting duct

C. Bowman's capsule

D. Loop of Henle

Answer: B

Solution:

(b) : A nephron is a unit of structure and function in a kidney. A kidney contains about a million nephrons, each approximately $3\mathrm{cm}$ long. A nephron is a long tubule differentiated into four regions haying different anatomical features and physiological role : Bowman's capsule, proximal convoluted tubule (PCT), loop of Henle, and distal convoluted tubule (DCT). The latter opens into one of the collecting ducts. Nephridia are the excretory organs of annelids.

Question50

If excess water passes out from the tissue without being restored by the kidneys, the cells would
(1994)

©

Options:

A. burst open and die

B. take water from the plasma

C. not be affected at all

D. shrivel and die

Answer: D

Solution:

Solution:
The loop of Henle creates a high concentration of salts in the tissue fluid in the medulla of the kidney, allowing a lot of water to be reabsorbed from the fluid in the collecting duct, as it flows through, producing very concentrated urine and preserving water for the body. In the absence of this process, the cells would shrink and die.

Question51

Glucose is taken back from glomerular filtrate through
(1993)

©

Options:

A. active transport

B. passive transport

C. osmosis

D. diffusion

Answer: A

Solution:

(a) : Glucose is taken back from the glomerular filtrate by the proximal convoluted tubule by active transport.

Question52

Nitrogenous waste products are eliminated mainly as (1991)

©

Options:

A. urea in tadpole and ammonia in adult frog

B. ammonia in tadpole and urea in adult frog

C. urea in both tadpole and adult frog

D. urea in tadpole and uric acid in adult frog

Answer: B

Solution:

Solution:
(b) : Ammonia is highly soluble in water, so in aquatic animals e.g., tadpole of frog, the nitrogenous waste products are excreted in the form of ammonia. In terrestrial animals e.g., adult frog, these wastes are excreted in the form of urea.

Question53

Under normal conditions which one is completely reabsorbed in the renal tubule? (1991)

©

Options:

A. Urea

B. Uric acid

C. Salts

D. Glucose

Answer: D

Solution:

Solution:
(d) : The cells lining the proximal convoluted tubule are well adapted for reabsorption of materials from the filtrate. They have abundant mitochondria and bear numerous microvilli on the free side thus giving brush border appearance. The cells reabsorb entire glucose, amino acids, most of the inorganic ions, much of the water as well as some urea from the filtrate.

Question54

Proximal and distal convoluted tubules are parts of (1990)

©

Options:

A. seminiferous tubules

B. nephron

C. oviduct

D. vas deferens

Answer: B

Solution:

Solution:
(b) : A nephron is a unit of structure and function in a kidney. A kidney contains about a million nephrons, each approximately $3\mathrm{cm}$ long. A nephron is a long tubule differentiated into four regions haying different \/ anatomical features and physiological role : Bowman's capsule, proximal convoluted tubule (PCT), loop of Henle, and distal convoluted tubule (DCT). The latter opens into one of the collecting ducts. Nephridia are the excretory organs of annelids.

Question55

Brush border is characteristic of (1990)

©

Options:

A. neck of nephron

B. collecting tube

C. proximal convoluted tubule

D. all of the above

Answer: C

Solution:

(c) Brush border cells are found mainly in the following organs: The small intestine tract: This is where absorption takes place. The microvilli that constitute the brush border have enzymes for this final part of digestion anchored into their apical plasma membrane as integral membrane proteins.

Question56

Reabsorption of useful substances from glomerular filtrate occurs in (1989)

Options:

©

A. collecting tube

B. loop of Henle

C. proximal convoluted tubule

D. distal convoluted tubule

Answer: C

Solution:

(c) : The cells lining the proximal convoluted tubule are well adapted for reabsorption of materials from the filtrate. They have abundant mitochondria and bear numerous microvilli on the free side thus giving brush border appearance. The cells reabsorb entire glucose, amino acids, most of the inorganic ions, much of the water as well as some urea from the filtrate.
