Excretion

Improve your learning

Q. 1. What is meant by excretion? Explain the process of formation of urine (AS1)

Answer : Excretion of the process of elimination of waste products produced by the organism into its surrounding.

The formation of urine takes place in two steps:

i. Ultracentrifugation: The blood flows through the glomerulus under very high pressure which causes the liquid part of the blood to filter out from the glomerulus into the renal tubules. This filtration under extraordinary force is called ultrafiltration.

ii. Reabsorption: The glomerular filtrate entering the renal tubule is not urine. As this filtrate passes down the tubule most of the water is reabsorbed with the reusable substances. This process concentrates the glomerular filtrate finally forming urine.

Q. 2. How are waste products excreted in amoeba? (AS1)

Answer : In unicellular organism excretory organs are absent and thus excretion takes place through the process of simple diffusion. Fresh organism like amoeba possess osmoregulatory organelle called the contractile vacuole which collects water and waste produced in the body, swells up and reaches the surface and bursts to release its contents outside.

Q. 3. Name different excretory organs in human body and excretory material generated by them? (AS1)

Answer : The different excretory organs in human body and excretory material generated by them are as follows:

Organ	Excretory product
• Lungs • Kidney • Skin • Large intestine	• Carbon dioxide • Nitrogenous metabolic wastes and urea • Excess salt and water • Bile pigments from the breakdown of hemoglobin.

Q. 4. Deepak said that 'Nephrons are functional and structural units of kidneys' how will you support him? (AS1)

Answer : Nephrons are known as the structural and functional units of kidney. They are also known as auriferous tubules, renal tubules or simply kidney tubules. Each kidney tubule is composed of the following structures:

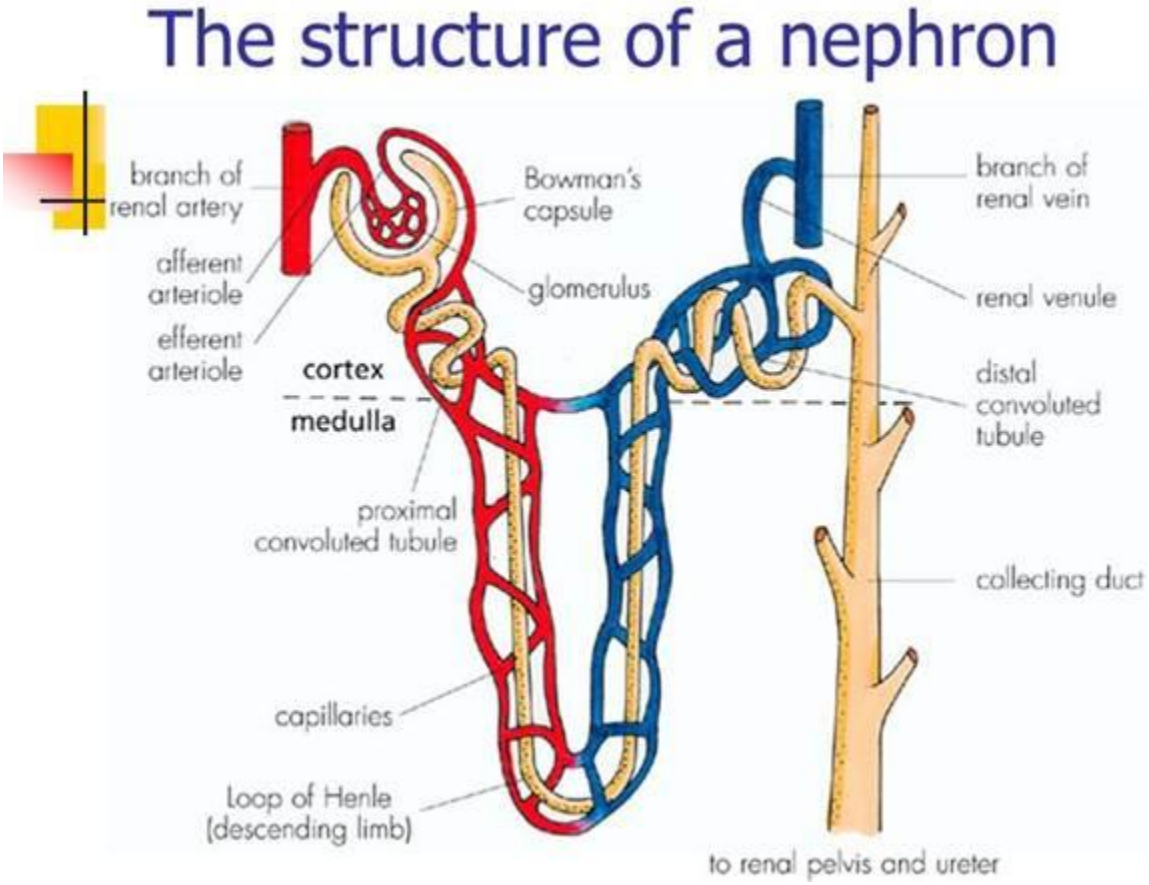
i. Bowman's capsule: It is a thin walled cup whose hollow internal space continues into the tube. The outer concavity of the cup lodges a knot like mass of blood capillaries called the glomerulus. This is where the ultra filtration occurs.

ii. Proximal convoluted tubule: It is the starting of the convoluted region lying within the cortex of the kidney. This is where the reabsorption starts.

iii. Loop of Henle: It is a hairpin shaped structure which connects the proximal and the distal convoluted tubules and lies within the medulla.

iv. Distal convoluted tubule: It is the end part of the kidney tubule which opens into the collecting duct. This collecting duct receives the concentrated urine which it carried to the urinary bladder.

Thus, nephrons are the structural and functional units of kidney.



Q. 5. How plants manage the waste materials? (AS1)

Answer : Plants manage wastes by various processes which are as follows:

i. Transpiration: removal of excess water and O_2 during the day

ii. Guttation: removal of excess water and mineral salts

iii. Respiration: removal of CO_2 at night

iv. Secretion: Removal of nitrogenous wastes in form of gums, latex, resins, tannins, etc.

Q. 6. Why do some people need to use a dialysis machine? Explain the principle involved in it. (AS1)

Answer : Some people need to use the dialysis machine as the kidneys of those people are unable to work efficiently due to some diseased condition or kidney damage. Thus to rid the body of nitrogenous wastes the dialyzer is used which works as an artificial kidney.

The principle behind the working of the dialyzer is diffusion of solutes and ultrafiltration of fluid across a semi-permeable membrane. This is the same principle followed by the nephrons of the kidney for the production of urine.

Q. 7. What is meant by osmoregulation? How is it maintained in human body? (AS1)

Answer : Osmoregulation is the maintenance of osmotic pressure of the blood. During the removal of wastes, like urea, from our body the blood also regulates its composition, that is, the percentage of water and salts in the blood. For example in the summer we urinate fewer times and the urine that passes is thicker than that in winter. This is because; in summer we lose a considerable amount of water through perspiration and thus the kidney has to reabsorb more water from the urine thus making the urine thick and more concentrated.

Q. 8. Do you find any relationship between circulatory system and excretory system? What are they? (AS1)

Answer : Yes, there is a relationship between circulatory system and excretory system. The relationship between circulatory system and excretory system is-

i. The circulatory system collects the waste product from the different parts of the body and carries it to the excretory organs.

ii. It also releases certain hormones to increase the blood pressure and promote RBC production by the process of erythropoisis.

iii. It is closely related to circulatory system by the virtue of removal of wastes from the body although maintaining osmoregulation of the process.

Q. 9 A. Give reasons (AS1)

Always vasopressin is not secreted.

Answer : Concentration of the urine takes place in the presence of the hormone vasopressin. If person drinks excess water the osmoregulation is maintained externally and excessive reabsorption of water from the convoluted tubules is not required thus vasopressin is not secreted.

Q. 9 B. Give reasons (AS1)

When urine is discharged, in beginning it is acidic in nature later it become alkaline.

Answer : The urine when discharged is acidic in nature but it becomes alkaline due to its decomposition forming ammonia giving urine its characteristic pungent smell. Thus when urine is discharged, in beginning it is acidic in nature later it become alkaline.

Q. 9 C. Give reasons (AS1)

Diameter of afferent arteriole is bigger than efferent arteriole.

Answer : The afferent arteriole ends as the glomerulus which continues out of the Bowman's capsule as the efferent arteriole. The diameter of afferent arteriole is bigger than efferent arteriole to produce an extraordinary force of blood in the glomerulus which directly contributes in the efficiency of ultrafiltration of the blood and production of the pre-urine which then passes down the convoluted tubules for reabsorption.

Q. 9 D. Give reasons (AS1)

Urine is slightly thicker in summer than in winter?

Answer : In the summer we urinate fewer times and the urine that passes is thicker than that in winter. This is because; in summer we lose a considerable amount of water through perspiration and thus the kidney has to reabsorb more water from the urine thus making the urine thick and more concentrated.

Q. 10 A. Write differences (AS1)

Functions of PCT and DCT

Answer : Functions of PCT and DCT

Proximal convoluted tubule	Distal convoluted tubule
• It is the starting of the convoluted region of the tubule. • Reabsorption of water takes place in this region.	• It is the end part of the convoluted region of the tubule. • Wastes like K^+, Na^+, Cl^- and H^+ is secreted in this region

Q. 10 B. Write differences (AS1)

Kidney and artificial kidney

Answer : Kidney and artificial kidney

Kidney	Artificial kidney
• Kidney is a living organ made up of cells. • It is found in every animal which is the main organ that produces urine for the removal of urea from the blood. • It works internally.	• Artificial kidney is a dialysis machine. • It is used for the patient suffering from kidney damage to remove urea and waste from his body. • It works externally.

Q. 10 C. Write differences (AS1)

Excretion and secretion

Answer : Excretion and secretion

Excretion	Secretion
• It is the process of elimination of waste products produced by the organism into its surrounding. • It is toxic to the body.	• It is the process of production of certain proteinaceous substances such as hormones for the benefit of our body. • It is non-toxic to the body and generally carries out certain functions for the benefit of the body.

Q. 10 D. Write differences (AS1)

Primary metabolites and secondary metabolites

Answer : Primary metabolites and secondary metabolites

Primary metabolites	Secondary metabolites
• They perform physiological functions of the body. • They play the direct role in growth and development of the organism. • They are same in all plant species. • They are produced in large amount and extraction is comparatively easy.	• They are the derivatives of the primary metabolites. • They take part in ecological functions. • They are unique to each plant species. • They are produced in small amount and extraction is comparatively tough.

Q. 11. There is a pair of bean-shaped organs 'P' in the human body towards the back, just above the waist. A waste product 'Q' formed by the decomposition of unused proteins in liver is brought into organ 'P' through blood by an artery 'R'. The numerous tiny filters 'S' present in organ 'P' clean the dirty blood goes into circulation through a vein 'T'. The waste substance 'Q' and other waste salts and excess water form a yellowish liquid 'U' which goes from organ 'P' into a bag like structure 'V' through two tubes 'W'. This liquid is then thrown out of the body through a tube 'X'. (AS1)

A. What is (i) organ P and (ii) waste substance Q.
B. Name (i) artery R and (ii) vein T
C. What are tiny filters S known as?
D. Name (i) liquid U (ii) structure V (iii) tubes W (iv) tube X.

Answer : A. (i) organ P is the kidney.

(ii) waste substance Q is bile pigment.

B. (i) artery R is renal artery

(ii) vein T is renal vein

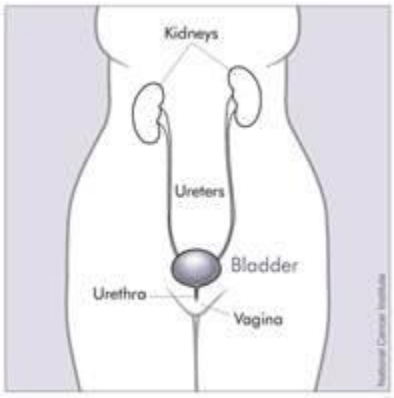
C. The tiny filters S are known as the glomerulus.

D. (i) liquid U is urine.

(ii) structure V is urinary bladder.

(iii) tubes W is ureter.

(iv) tube X is urethra.



Q. 12. The organ 'A' of a person has been damaged completely due to a poisonous waste material 'B' has started accumulation in his blood, making it dirty. In order to save this person's life, the blood from an artery in the person's arm is made to flow into long tubes made of substance 'E' which are kept in coiled form in a tank containing solution 'F'. This solution contains three materials 'G', 'H' and 'I' similar proportions to those in normal blood. As the person's blood passes through long tubes of substance 'E', most if the wastes present in it go into solution 'F'. The clean blood is then put back into a vein in the person for circulation. (AS1)

A. What is organ A?
B. Name the waste substance B.
C. What are (i) E, and (ii) F?
D. What is the process described above known as?

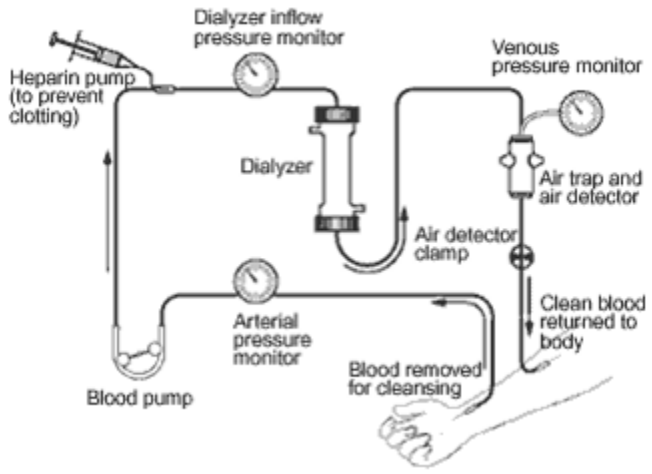
Answer : A. The organ A is kidney.

B. The wastes substance B is urea.

C. (i) E is the dialyzer channel made up of synthetic fibers forming a semi-permeable membrane.

(ii) F is the dialyzing fluid which has the same composition as that of plasma free of nitrogenous wastes.

D. The above process is known as haemodialysis. In this process blood is taken out from the main artery and is mixed with an anticoagulant known as heparin. It is then pumped into the dialyzer where the ultrafiltration takes place. The cleaned blood is the pumped back into the through a vein after the addition of an anticoagulant.



Q. 13. Imagine what happens if waste materials are not sent out of the body from time to time? (AS2)

Answer : Uric acid is relatively less soluble in water that crystallizes and gets deposited in the joints causing gout. Along with certain salts, like calcium oxalate, uric acid may get deposited in the kidney forming stones which interrupts the efficiency of the function of kidney.

Q. 14. To keep your kidneys healthy for long period what questions will you ask a nephrologists/ urologist? (AS2)

Answer : some of the questions that I can ask a nephrologists to keep my kidney healthy are:

i. How can I prevent the formation of kidney stones?

ii. Is renal failure a hereditary disease?

iii. What are the harmful effects of diabetes on kidneys?

iv. What dietary measures should be taken to keep the kidney healthy?

v. What are the factor promoting kidney damage?

vi. What are the different types of kidney disorders?

vii. What are the symptoms of kidney disease?

viii. What is the correct amount of intake of water per day for a healthy kidney?

Q. 15. What are the gum yielding trees in your surroundings? What procedure you should follow to collect gum from trees? (AS3)

Answer : The gum yielding trees in our surroundings are neem, eucalyptus, acacia, etc. These plants ooze out a gum like sticky substance when wounded.'

The procedure for the collection of gums from trees is as follows:

i. Introduce a wound about 10 inches wide about 3 feet above the ground.

ii. Attach a V shaped tube to the wound to direct the flow of the gum.

iii. Place a collecting vessel just below the V shaped tube so that the gum collects in the collecting vessel.

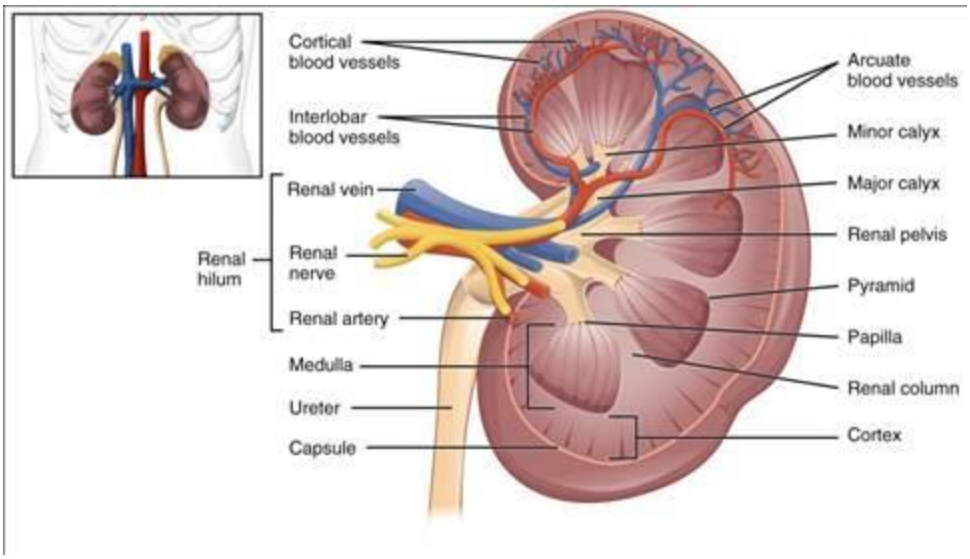
Q. 16. Collect the information about uses of different kinds alkaloids, take help of Library or internet? (AS4)

Answer : The uses of different kind alkaloids are:

Alkaloid	Uses
• Quinine	• Anti-malarial drug
• Nicotine	• Insecticide
• Morphine	• Painkiller
• Cocaine	• Painkiller
• Caffeine	• Anti-venom drug
• Reserpine	• Central nervous system stimulant
• Nimbi	• Antiseptic
• Scopolamine	• Sedative
• Pyrethroid	• Insecticide

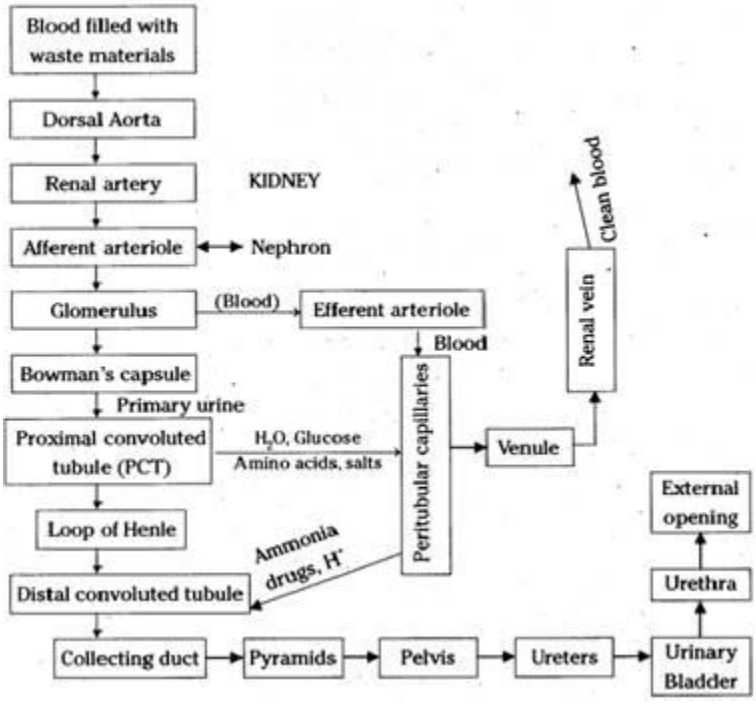
Q. 17. Draw a neat labeled diagram of L.S of kidney? (AS5)

Answer : The labeled diagram of L.S of kidney is as follows:



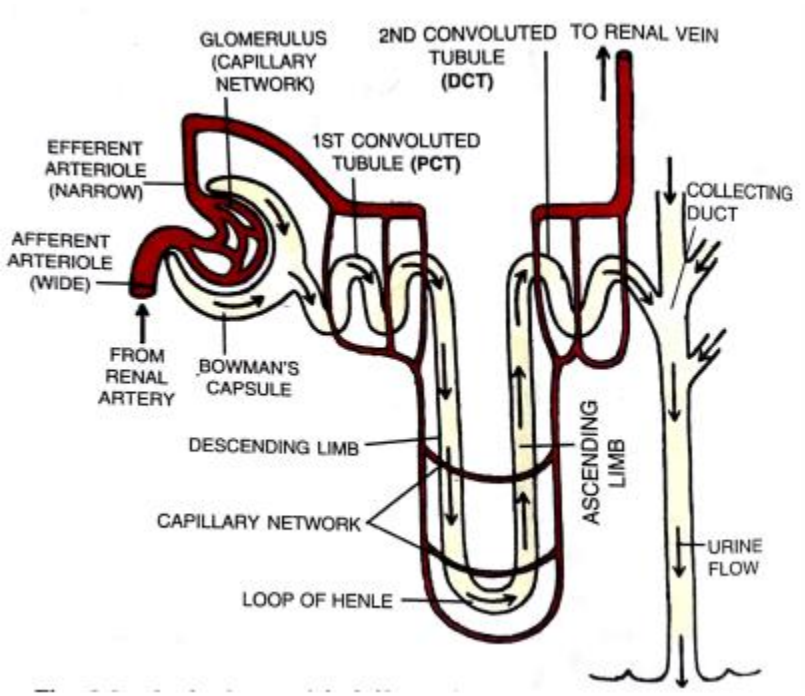
Q. 18. Draw a block diagram showing the path way of excretory system in human being. (AS5)

Answer : The block diagram showing the path way of excretory system in human being is as follows:



Q. 19. If you want to explain the process of filtration in kidney what diagram you need to draw. (AS5)

Answer : The process of filtration in kidney can be explained by the following diagram which shows the pathway of urine formation in the nephrons in the kidney.



Q. 20. List out the things that makes you amazing in excretory system of human being. (AS6)

Answer : The things that makes me amazing in excretory system is the formation of urine in the nephrons and its contribution in osmoregulation.

Formation of urine:

Nephrons are known as the structural and functional units of kidney. They are also known as uriniferous tubules, renal tubules or simply kidney tubules. Each kidney tubule is composed of the following structures:

i. Bowman's capsule: It is a thin walled cup whose hollow internal space continues into the tube. The outer concavity of the cup lodges a knot like mass of blood capillaries called the glomerulus. This is where the ultra filtration occurs.

ii. Proximal convoluted tubule: It is the starting of the convoluted region lying within the cortex of the kidney. This is where the reabsorption starts.

iii. Loop of Henle: It is a hairpin shaped structure which connects the proximal and the distal convoluted tubules and lies within the medulla.

iv. Distal convoluted tubule: It is the end part of the kidney tubule which opens into the collecting duct. This collecting duct receives the concentrated urine which it carried to the urinary bladder.

This is how urine is produced in the nephrons and further carried to the urinary bladder for storage.

Osmoregulation:

Osmoregulation is the maintenance of osmotic pressure of the blood. During the removal of wastes, like urea, from our body the blood also regulates its composition, that is, the percentage of water and salts in the blood.

Q. 21. You read about 'Brain dead' in this chapter. What discussions would you like to have why you think so? (AS6)

Answer : Brain dead is the term used to define the person who has lost the complete functioning of the brain cells and is labeled as legal death. Although brain death of the person occurs but some vital body organs of the person still remains biologically active for some times. In this situation organ from the brain-dead person is collected for the purpose of transplantation. This process of transplantation provides the recipient with the required organ without causing inconvenience to the donor itself. Thus the awareness about the process of organ donation after brain death can save many lives and is a work to promote human welfare.

Q. 22. We people have very less awareness about organ donation, to motivate people write slogans about organ donation? (AS7)

Answer : We people have very less awareness about organ donation and it should be promoted. "Don't take your organs to heaven with you, heaven knows we need them here", if we can even save one life by donating an organ "what is a better way of living even after ones death". It is important to take initiative for a better and brighter future and if there is something that one can do to give life to someone else, it is definitely for a greater cause, an act of humanity.

Q. 23. After learning this chapter what habits you would like to change or follow for proper functioning of kidneys? (AS7)

Answer : For the proper functioning of kidney the following measures should be taken:

i. Staying fit and active is important which helps reduce blood pressure and thus protect kidney from damage

ii. Blood sugar level should be kept in control.

iii. Maintenance of food habit and intake of fluid is very essential for kidney health.

iv. Smoking should be prohibited as it slows down the flow of blood to kidney.

v. Non-steroidal and anti-inflammatory drugs should not be taken regularly as it causes kidney damage.

Fill in the blanks

Q. 1. Fill in the blanks

Earthworm excretes it's waste material through _____.

Answer : Earthworm excretes its waste material through flame cells.

Explanation: Earthworms or flatworms excrete its waste material through the structure known as flame cells. This structure is found in all Platyhelminthes.

Q. 2. Fill in the blanks

The dark coloured outer zone of kidney is called _____.

Answer : The dark coloured outer zone of kidney is called cortex.

Explanation: The L.S. of the kidney shows two main regions: the outer dark region called cortex and the inner lighter region known as medulla.

Q. 3. Fill in the blanks

The process of control of water balance and ion concentration with in organism is called _____.

Answer : The process of control of water balance and ion concentration with in organism is called osmoregulation.

Explanation: Osmoregulation is the maintenance of osmotic pressure of the blood. During the removal of wastes, like urea, from our body the blood also regulates its composition, that is, the percentage of water and salts in the blood.

Q. 4. Fill in the blanks

Reabsorption of useful product takes place in _____ part of nephron.

Answer : Reabsorption of useful product takes place in proximal convoluted tubule part of nephron.

Explanation: In the proximal convoluted tubule of nephron the peritubular capillaries reabsorb the useful substances such as glucose, amino acids, salt ions and 75% of water.

Q. 5. Fill in the blanks

Gums and resins are the _____products of the plants.

Answer : Gums and resins are the secondary metabolic products of the plants.

Explanation: Gums are secreted from wounds which promote plan healing. Resins are highly viscous substance produced by the gymnosperms in resin passages.

Q. 6. Fill in the blanks

Bowman's capsule and tubule taken together make a _____.

Answer : Bowman's capsule and tubule taken together make a nephron.

Explanation: A nephron is composed of the Bowman's capsule and the tubule. The tubule has three parts proximal convoluted tubule, loop of Henle and distal convoluted tubule.

Q. 7. Fill in the blanks

The alkaloid used for malaria treatment is _____.

Answer : The alkaloid used for malaria treatment is quinine.

Explanation: Quinine is an alkaloid which is used to treat malaria. It is produced by the Chinchona officinalis (Chinchona) plant and is extracted from its bark.

Q. 8. Fill in the blanks

The principle involved in dialysis is _____.

Answer : The principle involved in dialysis is diffusion and ultrafiltration.

Explanation: The principle behind the working of the dialyzer is diffusion of solutes and ultrafiltration of fluid across a semi-permeable membrane. This is the same principle followed by the nephrons of the kidney for the production of urine.

Q. 9. Fill in the blanks

Rubber is produced from _____ of Heave Brasiliense's.

Answer : Rubber is produced from latex of Heave Brasiliense's.

Explanation: Latex is the sticky, milky white substance that is secreted by plants such as Heave Brasiliense's. This latex, producer by the latex cells, is used for the production of rubber.

Q. 10. Fill in the blanks

_____ **performed first Kidney Transplantation.**

Answer : Dr. Charles Hufnagel performed first Kidney Transplantation.

Explanation: Dr. Charles Hufnagel performed first kidney transplantation in the year 1954. It was performed between two identical twins in Washington, USA.

Choose the correct Answer

Q. 1. The structural and functional unit of human kidney is called ( )

A. Neuron
B. nephron
C. nephridia
D. flame cell

Answer : Nephron is the structural and functional unit of kidney. A nephron is composed of the Bowman's capsule and the tubule. The tubule has three parts proximal convoluted tubule, loop of Henle and distal convoluted tubule.

Q. 2. The excretory organ in cockroach ( )

A. Malpighian tubules
B. rapids
C. ureters
D. nephridia

Answer : Malpighian tubules and green glands are the structures found in arthropoda. Cockroach belongs to the phylum arthropoda.

Q. 3. Which of the following is the correct path taken by urine in our body? ( )

A. Kidney, urethra, ureters, bladder
B. Kidney, ureters, bladder, urethra
C. Kidney, bladder, ureters, urethra
D. Kidney, urethra, bladder, ureters

Answer : Urine is produced in the kidneys which are collected from there by the ureters which deposit the urine in the bladder. In the bladder the urine is stored and then excreted through the urethra.

Q. 4. Malpighian tubes are excretory organs in ( )

A. earth worm
B. house fly
C. flat worm
D. hen

Answer : Malpighian tubules and green glands are the structures found in arthropoda. House fly belongs to the phylum arthropoda.

Q. 5. Major component of urine is ( )

A. urea
B. sodium
C. water
D. creatine

Answer : Urine consists of 96% water and 2.5% organic substances including urea, uric acid, creatine, vitamins, etc., and the remaining 1.5% inorganic solutes such as sodium, chloride, phosphate, sulphate, etc.

Q. 6. Special excretory organs are absent in ( )

A. birds
B. amoeba
C. sponges
D. a and b

Answer : Amoeba being a unicellular organism has no specialized excretory system. They excrete via simple diffusion form the body surface with the help of contractile vacuole.

Q. 7. Which of the following hormone has direct impact on urination? ( )

A. adrenal
B. vasopressin
C. testosterone
D. estrogen

Answer : Concentration of the urine takes place in the presence of the hormone vasopressin. Decrease in level of vasopressin leads to formation of dilute urine formation.

Q. 8. Amber colour to urine due to ( )

A. urochrome
B. bilerubine
C. bileverdine
D. chlorides

Answer : urine is a transparent fluid produced by the kidneys. Presence of urochrome provides urine its characteristic amber color.

Q. 9. Sequence of urine formation in nephron is ( )

A. Glomerular filtration →Tubular reabsorption →Tubular secretion

B. Tubular reabsorption → Tubular secretion → Glomerular filtration
C. Tubular secretion → Glomerular filtration → Tubular reabsorption
D. Tubular reabsorption → concentration of urine → Tubular secretion

Answer : Glomerular filtration occurs in the Bowman's capsule through the glomerulus. The glomerular filtrate then passes through the proximal convoluted tubule where reabsorption occurs. It then continues down the loop of Henle into the distal convoluted tubule where secretion of inorganic components takes place.

Q. 10. Part of the nephron that exists in outer zone of kidney. ( )

A. Loop of the Henle
B. PCT
C. DCT
D. Bowman's capsule

Answer : DCT or distal convoluted tubule exists in the outer zone of the kidney as it open into a collecting tube. This collecting tubule forms the pyramid and calyces which opens in the pelvis region which in turn leads into the ureter.

Q. 11. After having lunch or dinner one can feel to pass urine, because of a ( )

A. stomach pressures on bladder
B. solids become liquids
C. water content in food material
D. sphincter relaxation

Answer : With the intake of food the quantity of water passed into the kidney increases. This leads to the stretching of bladder that stimulates the nerve ending to develop reflex thus, leading to the passage of urine after eating.