Important Questions for Class 11

Biology

Chapter 19 – Excretory Products and their Elimination

1 Mark

1. In which part of nephron filtration takes place?

Ans: Glomerulus.

2. What difference is observed in the ascending and descending limb of Henle's loop with reference to permeability of water?

Ans: Ascending limb of Henle's loop is impermeable to water. Water can pass through the descending limb of Henle's loop.

3. What is the PH of urine?

Ans: Urine is slightly acidic with PH – 6.0

4. Name the three kinds of nitrogen excretion.

Ans:

(a) Ammonotelism

(b) Ureotelism

(c) Uricotelism

5. What are podocytes?

Ans: Bowman's capsule epithelial cells are known as podocytes.

6. Besides water, name any two constituents of human sweat.

Ans: Sodium chloride and urea are the constituents of human sweat.

7. What happens in glomerulonephritis?

Ans: Glomerulonephritis is a condition in which the small filters in your kidneys become inflamed (glomeruli).

8. Name the excretory organ of cockroach.

Ans: Malpighian tubules is the excretory organ of cockroach

9. Name the hormone which controls the concentration of sodium in the body.

Ans: Aldosterone is a hormone that regulates sodium levels in the body.

10. Which gland secrete sebum?

Ans: Sebaceous glands within skin are small exocrine glands that release sebum, an oily or waxy material.

11. Which limb is impermeable to water. Name it.

Ans: Ascending limb is impermeable to water.

12. Besides water, name any two constituents of human sweat.

Ans: Sodium chloride, Lactic acid, glucose.

13. Explain the function of the vasa recta.

Ans: It aids in the retention of reabsorbed ions and urea in the medulla's interstitial fluid, allowing it to maintain its high osmotic pressure.

14. Name two types of nephrons found in the human kidney.

Ans:

(i) Juxtamedullary nephron

(ii) Cortical nephron.

15. Define GPR (Glomerular Filtration Rate)

Ans: The amount of filtrate produced by the kidney per minute.

16. The mechanism of concentration of filtrate is also known as the countercurrent mechanism. Justify the statement.

Ans: The outflow in the ascending limb is parallel to and in the opposite direction of the descending limb's input.

17. What Is Urination?

Ans: Urination is the process of excreting urine from the urinary bladder. It is also known as Micturition. Urine—a liquid containing waste products given off by the body and collected from the bloodstream by the kidneys—is stored in the urinary bladder.

18. Write the function of enzyme ‘renin’ produced by kidney

Ans: Angiotensinogen is converted to angiotensin by the enzyme renin.

19. Name the excretory product of (i) Reptiles and (ii) Prawns.

Ans: Excretory product of:

(i) Reptiles

Reptiles is Uric acid

(ii) Prawns

Prawns is Ammonia.

2 Marks

1. Differentiate between Rennin and Renin?

Ans: Differentiate between Rennin and Renin:-

	Rennin	**Renin**
1	Secreted by the stomach's peptic cells or gastric glands.	In the renal cortex of the kidney, it is secreted by the juxtaglomerular cells of the afferent renal artery.
2	Rennin is a protease that breaks down proteins.	Renin is a hormone that also functions as an enzyme.
3	Aids in the digestion of protein-rich milk.	Angiotensinogen is converted to angiotensin II.
4	Released in a dormant state.	Released in an active state.

2. What are the two intrinsic mechanisms that provide autoregulation of glomerular filtrate? Explain any one of these

Ans: Myogenic mechanism and Juxtaglomerular apparatus (JGA) are two intrinsic mechanisms that enable autoregulation in the kidney. JGA - A specific cellular apparatus located in the kidney where DCT travels near to Bowman's capsule between afferent and efferent arterioles. Rennin is secreted by JGA cells, which regulates renal flow and GFR and so modulates blood pressure.

3. How is the permeability of the distal convoluted tubule and the collecting tubule controlled for regulating the water content inside the body?

Ans:

1) When the body's water content is low, the osmoreceptors activate the adenohypophysis to release vasopressin / ADH.

2) Vasopressin and ADH make the DCT and collecting tubule water permeable. As a result, water is reabsorbed.

3) There is no release of ADH when the body's water content is normal.

4) Water cannot pass through the tubule, thus it is removed in the urine.

4. Kidneys do not play a major role in excretion in ammonotelic animals. Justify

Ans: Kidneys don't play a substantial part in ammonia removal –

Ammonia is a gas that is easily soluble in water and diffuses throughout the body.

Ammonia is expelled through the gill surface as ammonium ions.

5. Define glomerular filtration rate. What is its value in a healthy human?

Ans: The amount of filtrate generated by the kidneys each minute is known as the glomerular filtration rate. (GFR).The glomerular filtration rate (GFR) is a test that determines how well the kidneys function. It calculates the amount of blood that

goes through the glomeruli each minute. The microscopic filters in the kidneys that filter waste from the blood are known as glomeruli.

The usual range of GFR in a healthy individual is 100 to 130.

6. What is the significance of a frog's tadpole being ammonotelic and the adult frog being ureotelic?

Ans: Tadpoles are ammonotelic because ammonia excretion necessitates a considerable amount of water, which the tadpole has in its environment. Urea removal requires a considerable volume of water, which is substantially less than ammonia elimination, hence an adult frog is ureotelic.

7. Describe the blood vessels called vasa recta found in relation to uriniferous tubules. What is their function?

Ans: Vasa recta are capillaries with thin walls and a U shape that arise from the different arteriole and move parallel to Henle's loop.

They keep the reabsorbed ions in the medullary tissue fluid and keep its osmolarity high.

8. What is the chief nitrogenous waste product in birds? Give two advantages of this mode of excretion?

Ans: Uric acid is the most common nitrogenous waste product produced by birds.

Its advantages are

(i) Uric acid can be eliminated with very little or no water.

(ii) Uric acid is far less harmful and can be removed gradually.

9. Terrestrial animals are generally either ureotelic or uricotelic, Not ammonotelic. Why?

Ans: Animals on the ground are either ureotelic or uricotelic, not ammonotelic. The following are the two key causes behind this:

(a) In nature, ammonia is extremely harmful. As a result, it must be transformed into a less poisonous form like urea or uric acid.

(a) Terrestrial animals require water conservation. Ammonia cannot be constantly cleared since it is soluble in water. As a result, it is transformed into urea or uric acid. These variants are both less poisonous and water insoluble. This aids the conservation of water by terrestrial animals.

10. Name two metabolic disorders which can be diagnosed by the analysis of urine.

Ans: Glycosuria, Ketonuria are two metabolic disorders which can be diagnosed by the analysis of urine.

3 Marks

1. Person suffering from very low blood pressure passes no urine why? What suggestion would you offer for the removal of waste products from the blood in such a situation.

Ans: The blood must have a certain level of pressure to travel through the glomerulus of the nephron, in this case. If the pressure is insufficient, the urine will not flow past the glomerulus, and filtration will not occur, resulting in no urine formation. This is extremely detrimental to the individual since waste products continue to accumulate in the body.

To avoid this, a person should be urged to drink plenty of water and take medicine to keep their blood pressure at a healthy range.

2. Explain briefly how micturition is a reflex process; but is also under some voluntary control.

Ans: The act of avoiding urine is known as micturition. It's done by contracting the smooth muscles of the urine bladder wall while relaxing the skeletal muscular sphincters around the bladder entrance at the same time. The stretch receptors in the bladder wall create nerve impulses that are transmitted to sensory neurons in the spinal cord and brain to cause the sensation of fullness as the bladder membrane becomes stretched due to the collection of urine. However, the sphincter muscles can be relaxed voluntarily, allowing the smooth muscles of the bladder to contract under autonomic control, allowing the bladder to be emptied.

3. Describe urea cycle.

Ans: It's also known as Krebs Ornithine Cycle. Carbamoyl phosphate synthetase, ornithine transcarbamylase, argininosuccinate synthetase, argininosuccinase, and arginase, respectively, catalyse five enzymatically regulated stages in the urea cycle. In the liver of terrestrial vertebrates, the whole cycle is present in physiologically significant quantities, and in humans, it is the sole route for ammonia removal. Under healthy conditions, carbamoyl phosphate production and argininosuccinate synthesis are possible rate-limiting processes in urea biosynthesis, although substrate levels, not enzyme levels, are rate-limiting. The urea cycle enzymes change as a group in adults, and the amount of protein in the diet has a big impact. Because one of its nitrogens is acquired via transamination of oxaloacetate to make aspartate, and fumarate is transferred to the citric acid cycle, the urea cycle is tightly linked to it. Urea production necessitates the expenditure of energy, yet only around 20% of the energy obtained from gluconeogenic amino acid metabolism is necessary for ureogenesis. The urea cycle develops embryologically in the tadpole and in the foetal liver of mammals, allowing amino acids to be used as fresh sources of energy to meet oxidative demands for further growth.

4. What is a dialysis machine? When is it needed?

Ans: Artificial kidney is another name for a dialysis machine. When the kidneys fail, it filters the blood. Small solute molecules permeate across a semipermeable membrane to replace the glomerulus in dialysis. It has a cellophane membrane through which a patient's blood can flow on one side and the surrounding fluid on the other. The wastes from the blood move into the surrounding fluid though the cellophane membrane. It is needed when the kidney fails to work and urine is not formed.

5. Suppose the kidneys of a person are damaged, can you predict what is going to happen to him?

Ans: The kidneys are recognised as the master chemists of the body. If they are injured, the normal functioning of life processes would be disrupted. Because of

toxins produced by some bacteria the fillers of tiny uriniferous tubules are damaged. During the filtration of blood in the formation of urine, they get perforated with larger holes, allowing blood cells, proteins, urea, and water to flow through. As a result, urine contains blood proteins and other substances. It's a dangerous illness.

6. How does the liver serve both as a digestive as well as an excretory organ?

Ans: The liver is a digestive organ that secretes bile, which aids in fat digestion.

The liver acts as an excretory organ, secreting bilirubin, biliverdin (degradation products of haemoglobin), cholesterol, inactivated steroid hormones, medications, and other wastes into the bile, which are then excreted together with the digestive wastes or faecal matter.

5 Marks

1. Briefly describe the structure and function of the renal corpuscle.

Ans: Renal Corpuscle - The renal corpuscle is the kidney's principal excretory organ. The functional units of the kidney of the renal corpuscle are called nephrons. Each kidney in a man has roughly 102 million nephrons.

The nephron is a tubular structure that is thin, long, and twisted. The tubule of the search nephron begins as an upturned capsule known as Bowman's capsule. In the cup's hollow, there is a globular tuft of capillaries. The Bowman's capsule and the glomerulus combine to produce the renal corpuscle, a globular body. An afferent arteriole brings blood into the glomerular capillaries, and an afferent arteriole returns blood to the glomerulus. Urine is made when a protein-free fluid is filtered through the glomerulus and into the Bowman's capsule lumen.

There are 3 parts of a nephron –

(i) proximal nephron

(ii) hoop of Henle and

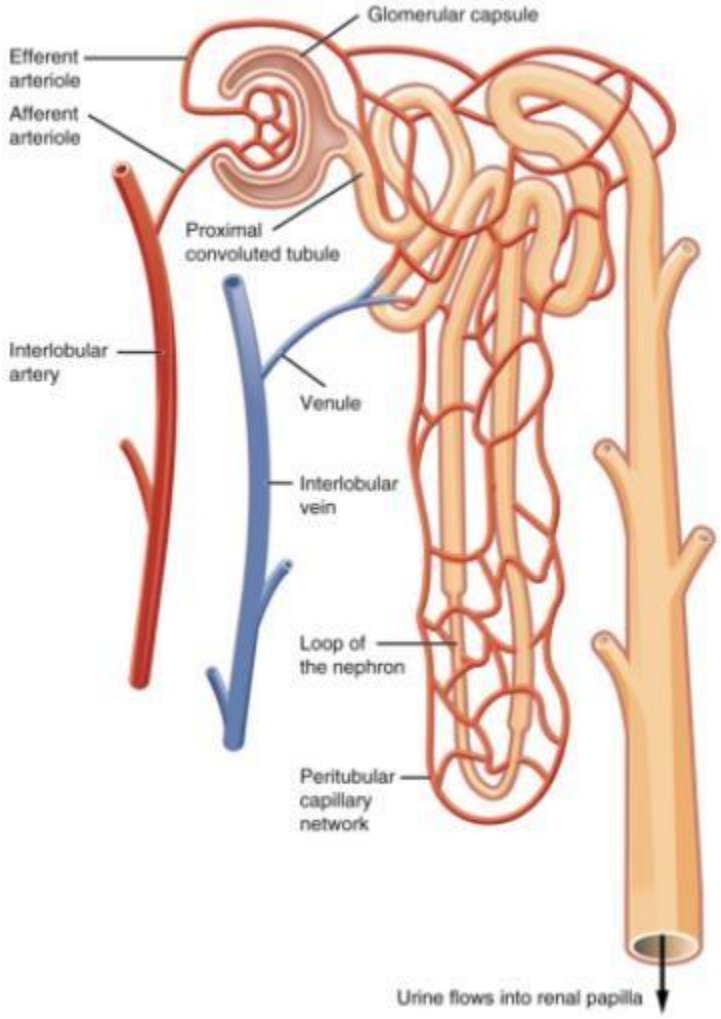
(iii) distal nephron.

From the Bowman's capsule's neck, a long, densely coiled, tubule-like structure emerges. It's termed as the PCT (Proximal Convoluted tubule). It continues into a thin–walled straight tubule, then loops like a Henle's loop portion of the tubule. The ascending limb is thin, whereas the descending limb is narrow. DCT, another coiled and twisted tubule section, follows Henle's loop (Distal convoluted tubule). The collecting duct is a tiny, straight tubule near the DCT's terminus. The collecting duct descends to the medulla once more conducting the collected urine towards the medulla.

The collecting ducts join in the medulla to produce the Ducts of Bellini, which are bigger ducts. These ducts run through the renal pyramids and into the renal pelvis, where they open.

Around the tubule in the brain, the different arterioles form a capillary network. It also gives birth to vasa recta, which are parallel-walled, thin-walled straight capillaries. They aid in the retention of reabsorbed ions and urea in the intestinal fluid, as well as the maintenance of renal osmotic pressure.

Functions — Different parts of the nephron have different functions, but the major purpose is to remove metabolic waste from the body and maintain osmotic pressure in the body.



2. Describe the mechanism of urine formation.

Ans: Urine is made up of three primary processes:

(i) Glomerular filtration — A protein-free fluid is filtered from the blood of glomerular capillaries and injected into Bowman's capsule's lumen.

Filtration takes place through three layers that make up the filtration membrane:

- Glomerular capillary endothelium.
- Bowman's capsule epithelium .

- Between the two layers, there is a basement membrane

Bowman's capsule epithelial cells or podocytes are arranged in an intricate pattern to leave some filtration apertures.

Except for plasma proteins, the blood is filtered so finely that the filtrate has a very similar composition to plasma.

The rate of glomerular filtrate production is approximately (25ml/min).

(ii) Reabsorption –

Nearly 90% of the filtrate is reabsorbed in the epithelial cells of the renal tubule lining.

Certain molecules, including as glucose, amino acids, Na^+ ions, K^+ ions, and Ca^+ ions are aggressively reabsorbed.

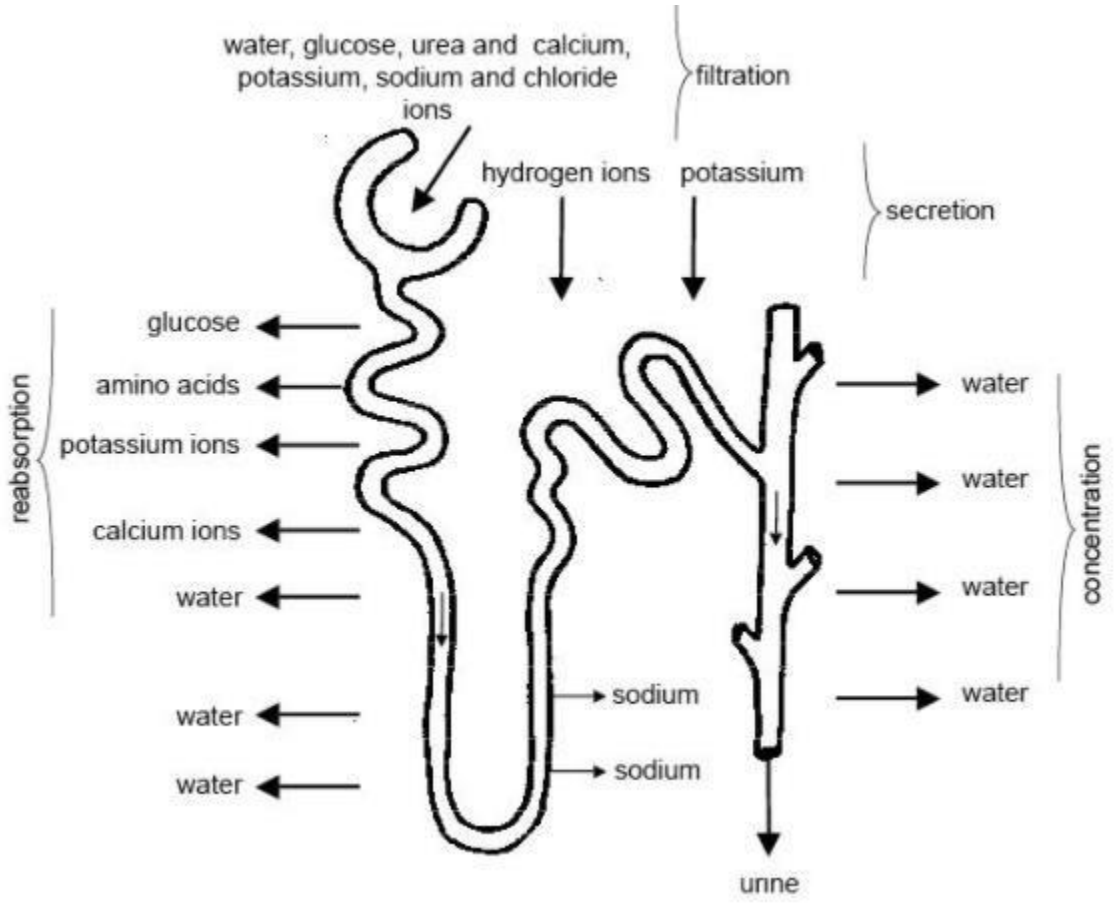
By osmosis, water is passively reabsorbed.

Other substances, such as Cl^- ions are passively absorbed.

(iii) Tubular secretion –

It is the process by which specific chemicals / ions, such as K^+ and ammonia, are directly secreted into the nephron lumen.

The process is vital in the generation of urine because it helps to maintain the ionic balance and PH of the bodily fluids.



3. Describe the renal excretory system of man.

Ans: The urinary system is made up of the organs listed below.

(a) A pair of kidneys

(b) A pair of ureters

(c) Urinary bladder

(d) Urethra

The kidneys are placed in the abdomen, one on each side of the spinal column, just below the diaphragm, which is covered by the final two pairs of ribs. The left kidney

is usually placed higher than the right one. Each kidney is approximately 10cm in length, 4cm in thickness, and 5 cm in breadth. Each kidney is somewhat bean shaped with concavity along the inner border. Blood vessels, lymph ducts, nerves, and ureters enter the kidney at this point. In the gross anatomy of the kidney, two regions can be clearly marked out. There are the outer cortex and inner medulla.

Internal structure of the kidney - Each kidney is made up of numerous microscopic units known as nephrons or uriniferous tubules, which are all similar in structure and function.

Each nephron consists of a vascular component, a glomerulus, and a tubular component, all of which are surrounded by a network of capillaries. The tubule is composed of a single layer of epithelial cells which differ in structure and function in different parts of the tubule. Bowman's capsule is a blind sac that is lined by a single layer of thin epithelial cells. Bowman's capsule is eventually associated with vascular glomerulus, which protrudes into Bowman's capsule and is completely covered by the lining of the capsule. Different and different arteries produce the glomerulus. Blood is brought to the tubule by afferent arterioles, and blood is taken away by efferent arterioles. As a result, only a thin layer of tissue formed of the single-celled capillary lining separates the blood in the glomerulus from the space within the capsule.

The single celled lining of Bowman's capsule is made up of

(a) a layer of material called basement membrane, and

(b) the single celled lining of Bowman's capsule.

The fluid from the capillaries can be filtered into Bowman's capsule through this exceedingly thin barrier. Different arterioles are formed when glomerular capillaries join to generate different arterioles, which then divide into numerous capillaries scattered around the tubule's surface. Capillaries are the name given to these capillaries. The venous channels, which carry blood away from the kidney, are formed when these capillaries link together. Bowman's capsule opens in the proximal convoluted section of the tubule, which is divided into three parts. The following section is Henle's loop, and the last section is the distal convoluted section, which eventually becomes a collecting duct.

The ureters are two tubes, each about 30 cm long, that come out of each kidney. They open into the urine bladder and run downwards.

The urinary bladder is a bag-like structure that stores pee. There are three openings in the bladder: two for the ureters and one for the urethra.