

REVIEW QUESTIONS

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A. MULTIPLE CHOICE TYPE

(Select the most appropriate option in each case)

1. Excretion primarily involves

- (a) removal of all byproducts during catabolism
- (b) removal of byproducts during anabolism
- (c) removal of nitrogenous wastes
- (d) throwing out excess of water

Solution:-

- (c) removal of nitrogenous wastes

2. Maximum amount of water from the glomerular filtrate is reabsorbed in

- (a) proximal convoluted tubule.
- (b) descending limb of loop of Henle.
- (c) ascending limb of loop of Henle.
- (d) distal convoluted tubule.

Solution:-

- (a) proximal convoluted tubule.

3. Which one of the following in real sense is not an excretory activity?

- (a) Giving out carbon dioxide
- (b) Passing out faecal matter
- (c) Sweating
- (d) Removal of urea

Solution:-

- (c) Sweating

4. In humans, urea is formed in

- (a) Ureter
- (b) Liver
- (c) Spleen
- (d) kidney

Solution:-

- (b) Liver

B. VERY SHORT ANSWER TYPE

1. Name the following:

- (a) The organ which produces urea.

Solution:-

The organ which produces urea is Liver.

(b) The outer region of kidney containing the Bowman's capsule.

Solution:-

Cortex is the outer region of kidney containing the Bowman's capsule.

(c) The tuft of capillaries inside the Bowman's capsule.

Solution:-

Glomerulus is the tuft of capillaries inside the Bowman's capsule.

(d) The part of kidney tubules where the term urine is first used for the fluid in it.

Solution:-

Collecting duct is the part of kidney tubules where the term urine is first used for the fluid in it.

(e) The vein in which urea concentration is maximum.

Solution:-

Hepatic vein in which urea concentration is maximum.

2. Given below are two sets (a and b) of five terms each. Rewrite the terms in their correct order so as to be in logical sequence.

(a) Afferent arteriole, renal vein, capillary network, glomerulus, efferent arteriole.

Solution:-

Afferent arteriole, glomerulus, efferent arteriole, capillary network, renal vein.

(b) Renal artery, urethra, ureter, kidney, urinary bladder

Solution:-

Renal artery, kidney, ureter, urinary bladder, urethra

3. In each of the following sets of body parts or substances or processes, pick out the one item which overall includes the remaining four

(a) Glomerular filtrate, Bowman's capsule, ultrafiltration, glomerulus, blood plasma.

Solution:-

Ultrafiltration

(b) Skin, liver, lungs, kidneys, excretion.

Solution:-

Excretion

(c) ADH, water, pituitary, osmoregulation, urine.

Solution:-

Osmoregulation

(d) CO₂, bile pigments, water, excretion, urea.

Solution:-

Excretion

C. SHORT ANSWER TYPE

1. Write down the functional activity of the following parts:

(a) Glomerulus

Solution:-

The glomerular filtrate consists of water, urea, glucose and other plasma solutes. The thicker part of the blood left behind in the glomerulus after ultrafiltration, namely two kinds of corpuscles, proteins, and other molecules are carried forward through efferent arteriole.

(b) Henle's loop

Solution:-

The function of henle's loop is involved in reabsorption of water and sodium ions.

(c) Ureter

Solution:-

The function of ureter is carries urine to the urinary bladder by ureteral peristalsis.

(d) Renal artery

Solution:-

The function of renal artery is supply blood to the kidney.

(e) Urethra

Solution:-

The function of urethra is involved in the process of micturition i.e. expelling urine out of the body.

2. Why is excretion necessary? Name the common excretory substances in our body.**Solution:-**

The process of removal of chemical wastes from the body is known as excretion. Excretion plays an important role in maintaining the homeostatic condition of the body. There are number of chemicals substances which are regularly formed in our body or which are absorbed through the food that must be eliminated – otherwise they become harmful. Some such substance are,

- (1) Carbon dioxide and water
- (2) Nitrogenous metabolic waste
- (3) Excess salts and vitamins
- (4) Water
- (5) Bile pigments.

3. What is a uriniferous tubule? How does it function?**Solution:-**

The kidney is composed of an enormous number of minute tubules called uriniferous tubules. These are the structural as well as functional units of the kidney. It takes in impure blood from the renal artery and removes wastes in the form of urine. It also provides a larger surface area for reabsorption of salts and water.

4. Why is it necessary to maintain a normal osmotic concentration of the blood?**Solution:-**

The kidney while removing wastes like urea from the blood also regulates its composition, i.e., the percentage of water and salts. This function is called osmoregulation – it implies the regulation of osmotic pressure of the blood.

5. If you donate one kidney to a needy patient, would it cause any harm to you? Give reason.**Solution:-**

If one kidney is donate to a needy patient, the other kidney alone is sufficient for excretory needs and the person can lead a normal life.

6. In summer the urine is slightly thicker than in winter. Explain the reason.**Solution:-**

In tropical climate, as in our own country, we drink a lot of water during summer. Yet we urinate fewer times in summer than in winter and the urine passed is generally thicker. The reason is that in summer, we lose a considerable part of water through perspiration

and the kidneys have to reabsorb more water from the urine making it more concentrated.

7. Differentiate between the following pairs of terms:

(a) Bowman's capsule and malpighian capsule.

Solution:-

Bowman's capsule	Malpighian capsule
Bowman's capsule is a thin-walled cup, something like a hollow ball pressed deep on one side. Its hollow internal space continues into the tubule. The outer concavity of the cup lodges a knot-like mass of blood capillaries, called glomerulus.	The Bowman's capsule and the glomerulus together are called malpighian capsule.

(b) Renal cortex and renal medulla

Solution:-

Renal cortex	Renal medulla
Renal cortex is an in outer dark region of the kidney.	Renal medulla is an inner lighter region. The medulla is composed of finely striped substance arranged in several conical pyramids.

(c) Renal pelvis and renal papilla

Solution:-

Renal pelvis	Renal papilla
The front end of the ureter is somewhat expanded into the kidney and is called renal pelvis.	The apex of each pyramid projects into the kidney.

(d) Urea and urine

Solution:-

Urea	Urine
Urea is the chief excretory product which is excreted in the form of urine.	The filtrate left after reabsorption and tubular secretion is called urine.

(e) Excretion and secretion

Solution:-

Excretion	Secretion
Excretion is the passing out of substances that have no further use in the body or are harmful.	Secretion is giving out by a cell or a gland some substance that has some utility for the body.

8. Name the main nitrogenous metabolic waste excreted out by mammals including humans.

Solution:-

The main nitrogenous metabolic waste excreted out by mammals including humans are urea, creatinine, and uric acid.

9. Match the items in Column I with those in Column II and write down the matching pairs.

Column I

- (a) Bowman's capsule
- (b) Contains more CO₂ and less urea
- (c) Antidiuretic hormone
- (d) Contains more urea

Column II

- (i) Renal artery
- (ii) Regulates amount of water excreted
- (iii) Renal vein
- (iv) Glomerulus

Solution:-

Column I

- (a) Bowman's capsule
- (b) Contains more CO₂ and less urea
- (c) Antidiuretic hormone
- (d) Contains more urea

Column II

- (iv) Glomerulus
- (iii) Renal vein
- (ii) Regulates amount of water excreted
- (i) Renal artery

10. Fill in the blanks in the following passage to make it a meaningful description.

In a nephron, the _____ flows through the _____ under great pressure. The reason for this great pressure is that the _____ (outgoing) _____ is narrower than the _____ (incoming). This high pressure causes the _____ part of the blood to filter out from the _____ into the _____ capsule.

Solution:-

In a nephron, the blood flows through the glomerulus under great pressure. The reason for this great pressure is that the efferent (outgoing) arteriole is narrower than the afferent arteriole (incoming). This high pressure causes the liquid part of the blood to

filter out from the glomerulus into the renal capsule.

D. LONG ANSWER TYPE

1. Define the following terms:

(a) Ultrafiltration

Solution:-

The blood flows through the glomerulus under great pressure which is much greater than in the capillaries elsewhere. The reason for this greater pressure is that the efferent arteriole is narrower than afferent arteriole. This high pressure causes the liquid part of the blood to filter out from the glomerulus into the renal tubule. This filtration under extraordinary force is called ultrafiltration.

(b) Micturition

Solution:-

Urine is expelled from the urinary bladder through the urethra by relaxation of the sphincter muscles located at the opening of the urinary bladder into the urethra under impulse from the nervous system such a process is called micturition.

(c) Renal pelvis

Solution:-

The front end of the ureter is somewhat expanded into the kidney and is called renal pelvis.

(d) Urea

Solution:-

Urea is the chief excretory product which is excreted in the form of urine.

(e) Osmoregulation

Solution:-

The kidney while removing wastes like urea from the blood also regulates its composition, i.e., the percentage of water and salts. This function is called osmoregulation – it implies the regulation of osmotic pressure of the blood.

2. Explain the terms ultrafiltration and selective absorption.

Solution:-

Ultrafiltration

The blood flows through the glomerulus under great pressure which is much greater

than in the capillaries elsewhere. The reason for this greater pressure is that the efferent (outgoing) arteriole is narrower than the afferent (incoming) arteriole. This high pressure causes the liquid part of the blood to filter out from the glomerulus into the renal tubule. This filtration under extraordinary force is called ultrafiltration. During ultrafiltration almost all the liquid part of the blood comes out of the glomerulus and passes into the funnel-shaped cavity of the Bowman's capsule. The fluid entering the renal tubule is called the glomerular filtrate. The glomerular filtrate consists of water, urea, salts, glucose and other plasma solutes. The thicker part of the blood left behind in the glomerulus after ultrafiltration.

Selective absorption

The glomerular filtrate entering the renal tubule is not urine. It is an extremely dilute solution containing a lot of useful materials including glucose and some salts such as those of sodium. As the filtrate passes down the tubule, much of the water is reabsorbed together with the useful substances. But their reabsorption is only to the extent that the normal concentration of the blood is not disturbed.

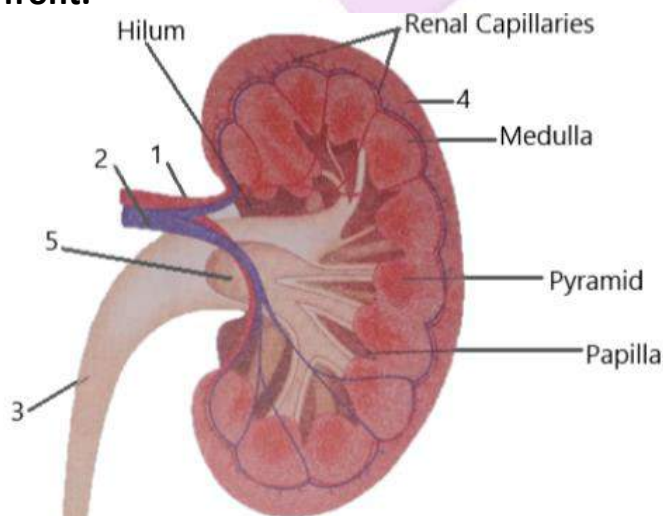
3. What is dialysis? Under what conditions is it carried out?

Solution:-

Artificial kidney is a dialysis machine. The patient's blood is led from the radial artery in his arm through the machine where the urea and excess salts are removed and the purified blood is returned to a vein in the same arm. In case of permanent damage to the kidneys, dialysis is to be repeated for about twelve hours a week.

E. STRUCTURED/APPLICATION/SKILL TYPE

1. Look at the figure given below. It is a section of human kidney as seen from the front.



(a) Is it a longitudinal section or a cross-section?

Solution:-

It is a longitudinal section of the human kidney.

(b) Name the parts numbered 1-5.

Solution:-

1 represents renal artery

2 represents renal vein

3 represents ureter

4 represents cortex

5 represents pelvis

(c) Which area/part (give its name and number given on the diagram) which contains the following:

Solution:-

(i) Malpighian capsule

Number 4 cortex contains the Malpighian capsule.

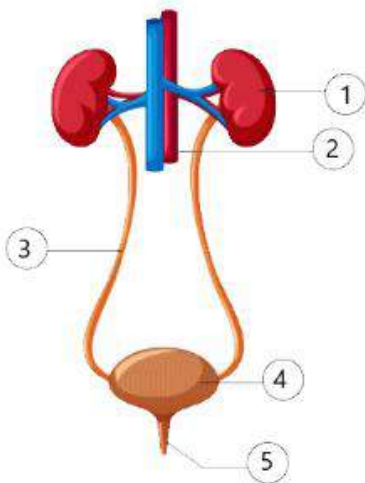
(ii) The pyramids

Medulla

(iii) Freshly collected urine

Number 5 pelvis contains freshly collected urine.

2. Given below is the figure of certain organs and associated parts in the human body. Study the same and answer the questions that follow:



(a) Name all the organ-systems shown completely or even partially.

Solution:-

Excretory system and Circulatory system.

(b) Name the parts numbered 1 to 5.

Solution:-

Number 1 represents Kidney

Number 2 represents Renal artery

Number 3 represents Ureter

Number 4 represents Urinary bladder

Number 5 represents Urethra

(c) Name the structural and functional unit of the part marked '1'.

Solution:-

Nephron is the structural and functional unit of the part 1 kidney.

(d) Name the two main organic constituents of the fluid that flows down the part labeled '3'.

Solution:-

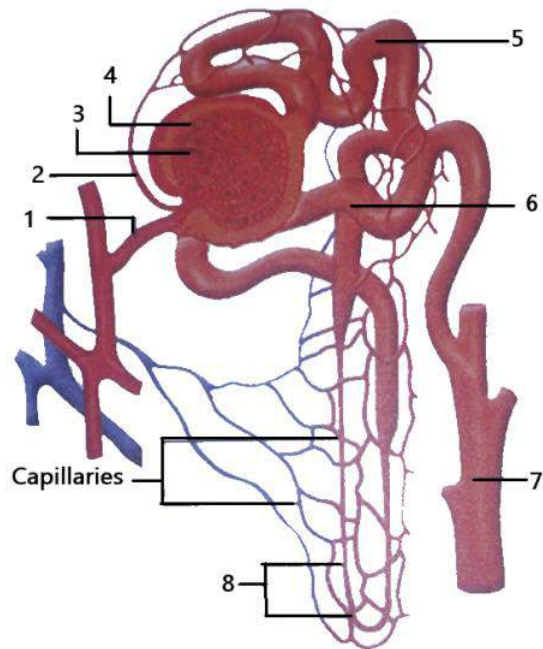
Urea and ammonia are the two main organic constituents of the fluid that flows down the part 3 ureter.

(e) Name the two major steps involved in the formation of the fluid that passes down the part labeled '3'.

Solution:-

Ultrafiltration and selective reabsorption are the two major steps involved in the formation of the fluid that passes down the part 3 ureter.

3. The following diagram represents a mammalian kidney tubule (nephron) and its blood supply.



Parts indicated by the guidelines 1 to 8 are as follows:

1. Afferent arteriole from renal artery;
2. Efferent arteriole
3. Bowman's capsule,
4. Glomerulus;
5. Proximal convoluted tubule with blood capillaries;
6. Distal convoluted tubule with blood capillaries;
7. Collecting tubule;
8. U-shaped loop of Henle.

Study the diagram and answer the questions that follow:

(a) Where does ultrafiltration take place?

Solution:-

Ultrafiltration take place in Glomerulus (4).

(b) Which structure contains the lowest concentration of urea?

Solution:-

Efferent arteriole (2) contains the lowest concentration of urea.

(c) Which structure contains the highest concentration of urea?

Solution:-

Afferent arteriole from renal artery (1) contains the highest concentration of urea.

(d) Which structure (normally) contains the lowest concentration of glucose?

Solution:-

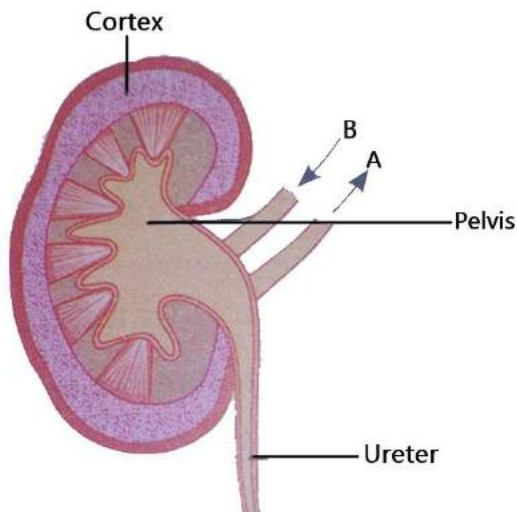
Structure (normally) contains the lowest concentration of glucose is Collecting tubule (7).

(e) Where is most water reabsorbed?

Solution:-

The most water reabsorbed in the proximal convoluted tubule with blood capillaries (5).

4. Given below is a highly simplified diagram of the human kidney cut open longitudinally. Answer the questions that follow:



(a) Define excretion.

Solution:-

Excretion is the passing out of substances that have no further use in the body or are harmful.

(b) Name the functional units of the kidneys.

Solution:-

Nephrons is the functional units of the kidneys.

(c) Why does the cortex of the kidney show a dotted appearance?

Solution:-

The cortex of the kidney show a dotted appearance because, cortex region contains numerous nephrons or kidney tubules.

(d) Mention two functions of the kidney.

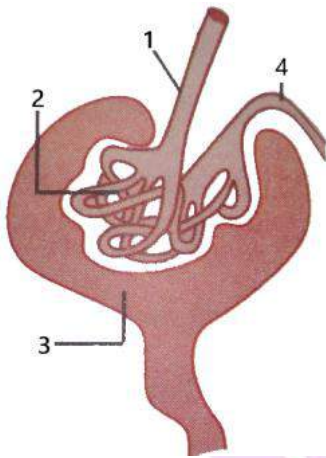
Solution:-

The two functions of kidney are help in removing of wastes and osmoregulation.

(e) Write two differences in composition of the blood flowing through the blood vessels, 'A' and 'B'.

The blood vessel 'A' represents renal vein and 'B' represents renal artery. Hence the blood vessel 'A' contains deoxygenated blood with low concentration of urea and glucose as compared to renal artery. Then blood vessel 'B' contains oxygenated blood with high concentration of urea and glucose.

5. Study the diagram given below and then answer the questions that follow:



a. Name the region in the kidney where the above structure is present?

Solution:-

The above structure is present in Bowman's capsules.

b. Name the parts labelled 1, 2, 3, and 4.

Solution:-

Part 1 represents afferent arteriole.

Part 2 represents Glomerulus.

Part 3 represents Bowman's capsule.

Part 4 represents Efferent arteriole.

c. Name the stages involved in the formation of urine.

Solution:-

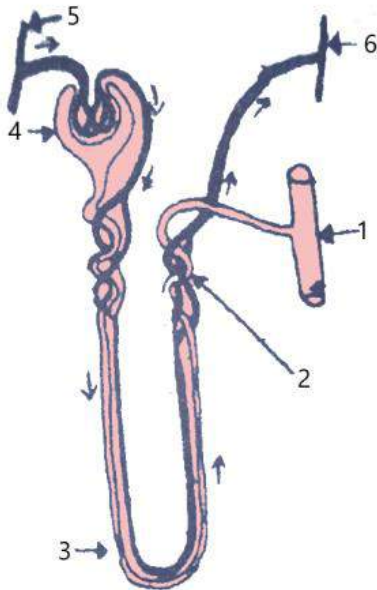
The stages involved in the formation of urine ultrafiltration and reabsorption.

d. What is the technical term given to the process occurring in 2 and 3? Briefly describe the process.

Solution:-

Ultrafiltration is the technical term given to the process occurring in 2 and 3. The blood flows through the glomerulus under great pressure which is much greater than in the capillaries elsewhere. The reason for this greater pressure is that the efferent arteriole is narrower than afferent arteriole. This high pressure causes the liquid part of the blood to filter out from the glomerulus into the renal tubule. This filtration under extraordinary force is called ultrafiltration.

6. The given diagram represents a nephron and its blood supply. Study the diagram and answer the following questions:



(a) Label parts 1, 2, 3 and 4.

Solution:-

- Part 1 represents Collecting duct.
- Part 2 represents Distal convoluted tubule.
- Part 3 represents Descending limb of loop of henle.
- Part 4 represents Bowman's capsule.

(b) State the reason for the high hydrostatic pressure in the glomerulus.

Solution:-

The reason for this greater pressure is that the efferent (outgoing) arteriole is narrower

than the afferent (incoming) arteriole. This high pressure causes the liquid part of blood to filter out from the glomerulus into the renal tube.

(c) Name the blood vessel which contains the least amount of urea in this diagram.

Solution:-

Efferent arteriole is the blood vessel which contains the least amount of urea in this diagram.

(d) Name the two main stages of urine formation.

Solution:-

Ultrafiltration and reabsorption are the two main stages of urine formation.

(e) Name the part of the nephron which lies in the renal medulla.

Solution:-

Henle's loop and collecting tubules is the part of the nephron which lies in the renal medulla.