Excretion in Humans

Synopsis —

- **The substances which should be excreted are :**
  1. urea, uric acid
  2. Bile pigments
  3. water
  4. extra salts such as sodium
  5. chloride extra vitamins.

- The vitamins passed out into urine if in excess are **vitamin B and C.**
- The kidneys are situated towards the back of the abdomen at the level of last two ribs.
- Right kidney is located at slightly lower level than the left kidney.
- The ureters run from the kidney to the urinary bladder and urethra runs from urinaiy bladder to the exterior.
- **Accessory excretory organs are**
  1. skin
  2. lung
  3. liver

- The main function of the skin is to cool the body.
- Liver converts highly toxic ammonia produced in the body to less toxic urea.
- Liver eliminates cholesterol, bile pigments, extra vitamins, and many durgs.
- The amount of urine produced by the glomerular filtrate after reabsorption per day is **1.2 litre.**

(Review Questions)

MULTIPLE CHOICE QUESTIONS :

1. Put a tick mark (✓) against the most appropriate alternative in the following statements :

(i) The kidneys are made up of tiny tubular units called :
(a) glomerulus
(b) nephrons
(c) capillaries
(d) neurons

(ii) In human beings, urea is produced in :
(a) liver
(b) kidney

(c) spleen
(d) urinary bladder

(iii) Besides water, the urine mainly contains :
(a) urea
(b) nitric acid
(c) glucose
(d) bile pigments

(iv) Filtration of excretory wastes from the blood occurs in:
(a) collecting tubule
(b) ureter
(c) urinary bladder
(d) nephrons

Short Answer Questions
1. Fill in the blanks :

1. Nitrogenous wastes in the urine are in the form of urea and **uric acid.**
2. The unit of human kidney is called **nephron.**
3. Evaporation of sweat from skin surface has **cooling** effect.

2. Define the following:
(i) Excretion:
(ii) Excretory organs :
(iii) Dialysis :
(iv) Nephron:
Ans.
(i) Excretion : During different metabolic activities taking place in our body, the body produces many substances of which some are useful and some are useless.
The process of removal of useless and harmful metabolic waste substances is called excretion.
(ii) Excretory organs : During different metabolic activities taking place in our body, the body produces many substances of which some are useful and some are useless.
If retained in the body the unwanted substances may become poisonous and cause much harm and in severe cases, even death. The organs which remove these unwanted and toxic substances from the body are called excretory organs.
(iii) Dialysis : The artificial process which cleans and filters the blood in a person where one or both the kidney may stop working properly is called dialysis.
(iv) Nephron : Inside the kidney, there are millions of microscopic tubes called renal tubules or nephrons. It is the structural and functional unit of kidney.

3. Write True (T) or False (F) for the following statements in the spaces provided. Rewrite the false statements in correct form.

1. Removal of solid undigested food is excretion
   False
   Correct: Removal of solid undigested food is egestion.
2. Medulla of kidney passes urine into urinary bladder.
   False
   Correct: Medulla of kidney passes urine into funnel-like pelvis.
3. Excess sugar in blood is a symption ofdiabetes.
   True
4. Urine is devoid of blood cells.
   True

4. Name the blood vessel that brings blood to the kidneys.
Ans. Renal Artery

5. Where in the urinary system do the following processes take place ?
Ans.

1. Urine formation: **kidneys.**
2. Transport of urine away from kidney: **urethra.**
3. Temporary storage of urine : **urinary bladder.**

Long Answer Questions

Question 1.
Define excretion. Write the four organs of human urinary system in their correct sequence.
Answer:
The process of elimination of unwanted and toxic products from the body is called excretion.
The four organs of the urinary system from above to downward are:

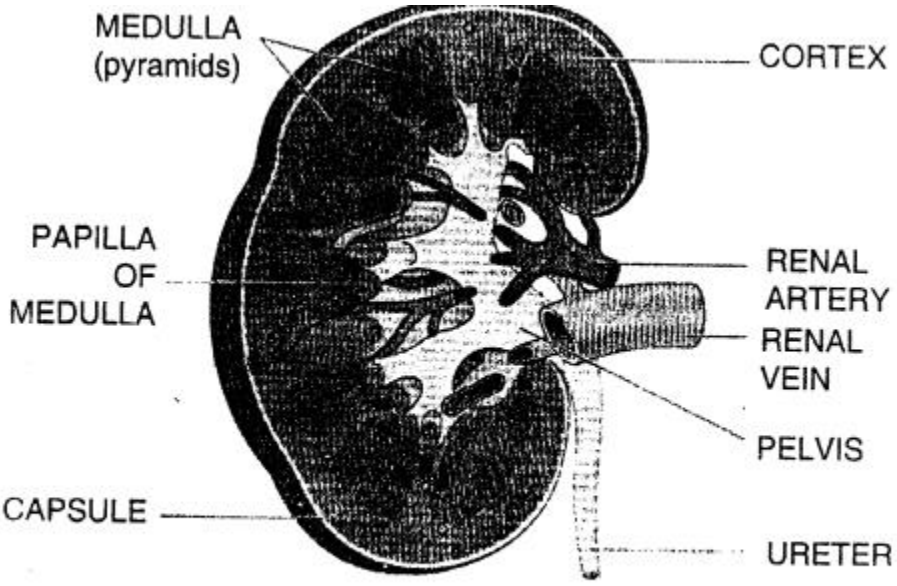
1. kidneys
2. ureter .
3. urinary bladder
4. urethera.

Question 2.
Why is excretion necessary in living beings ?
Answer:
The excretion is necessary because the toxic products if allowed to be retained in the

body act as poison and cause great harm to the body. If they exceed the threshold, they may even cause death.

Question 3.
What is meant by osmoregulation ?
Answer:
The process of maintaining accurate concentration of water and salts in the body is called osmoregulation.
This is done by the kidneys.

Question 4.
Describe the structure of kidney with the help of a labelled diagram.
Answer:



Section through the kidney to show different regions

Section through the kidney to show different regions The kidneys is composed of:

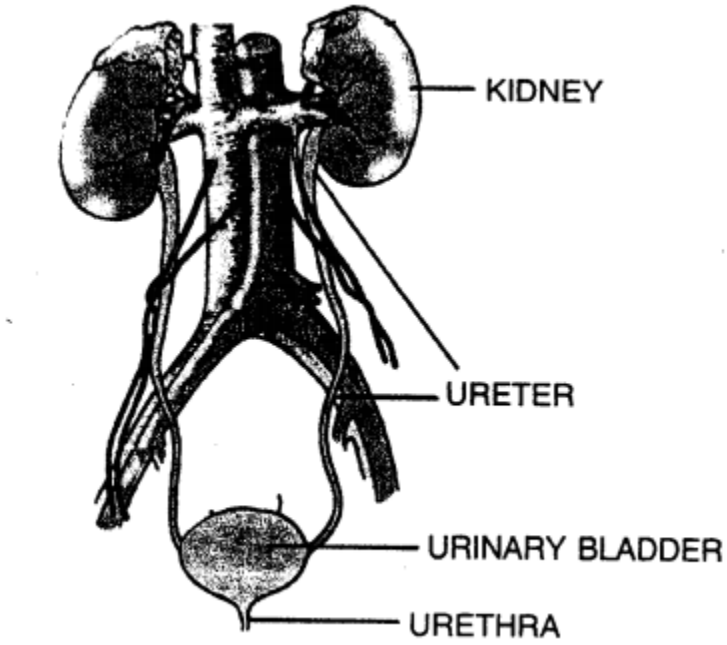
1. an outer darker area called **Cortex**
2. an inner lighter area called **Medulla.**

The microscopic structure of kidney is formed of millions of tubules called renal tubules or nephrons.

Question 5.
What are the two ways by which a person can get relief in case of kidney failure ?
Answer:
The two ways by which a person can get relief in case of kidney failure are:

1. Dialysis: this is a method in which an artificial machine cleans and filters the blood.
2. The patient can undergo kidney transplant.

Question 6.
Draw a diagram of human excretory system and label the following parts : Kidney, ureter, urinary bladder and urethra.
Answer:



Question 7.
How are kidney stones formed ?
Answer:
Kidney stones are formed when crystal forming substances such as calcium oxalate, calcium phosphate and uric acid are
more than the fluid in the urine. When these chemicals start sticking together, they from crystals, commonly called kidney stones. They may be formed and cause severe plain.

Question 8.
What are the symptoms of an urinary tract infection ?
Answer:
Common symptoms include a strong and frequent urge to urinate, and a painful and burning sensation while urinating.

Additional Questions

CHECK YOUR PROGRESS

1 State if the following statements are true or false. Correct the statemenet if it is false.

1. The organs that help our body to get rid of waste are called respiratory organs.
False. The organs that help our body to get rid of waste are called excretory organs.
2. Each kidney contains millions of microscopic filtering units called ureters.
False. Each kidney contains millions of microscopic filtering units called nephrons.
3. The Bowman's capsule and glomerulus together form the Malpighian body.
True
4. Liver produces bile pigments from the haemoglobin of broken RBCs.
True

EXERCISES

A.Tick the most appropriate answer.

1. The process of removing waste from the body is called
a. respiration
b. excretion
c. inspiration
d. expiration

2. The opening of the urinary bladder is called
a. nephron
b. uriniferous tubule
c. urethra
d. nephridia ‘

3. A network of capillaries present in the Bowman's capsule is called
a. Malphigian body
b. glomerulus
c. Uriniferous tubule
d. ureter

4. The blood vessel that supplies impure blood to a kidney is the
a. renal artery
b. renal vein
c. portal artery
d. portal vein

5. The Bowman's capsule and glomerulus together form the
a. urinary body
b. Malpighian tubule
c. Malpighian body
d. urinary tubule

6. Quinine is used in the treatment of
a. filaria
b. dengue
c. malaria
d. paralysis

7. Plants maintain the concentration of sap inside their body with
a. respiration
b. transpiration
c. osmosis
d. absorption

8. Transpiration is affected by
a. light and temperature
b. humidity and wind
c. wind and temperature
d. all of these .

B. Fill in the blanks.

1. **Kidneys** are a pair of reddish-brown, bean-shaped structures that lie on the either side of the backbone.
2. Urine contains **urea**, **ammonia** and **uric acid** as nitrogenous waste.
3. **Ureter** carries urine from the kidney to the urinary bladder.
4. Malpighian body consists of Bowman's capsule and **glomerulus**.
5. **Liver** produces bile pigments from the haemoglobin of broken RBCs.
6. **Resins** are present in the stem of pine tree that make the pinewood strong and durable.
7. **Morphine** is found in the seeds of poppy plants.
8. When air is humid, the rate of transpiration is **low.**

C. Differentiate between
1. ureter and urethra.
Answer:
Ureter

1. It is a tube that leads out from each kidney.
2. 2. These tubes carry urine from the kidneys of the urinary bladder.

3. There are two ureters.

Urethra

1. It is a canal like opening at the bottom of the urinary bladder.
2. This opening excretes urine out of the body.
3. There is only one urethra.

2. bowman's capsule and glomerulus.
Answer:
Bowman's capsule

1. Each nephron of kidney consists of a cup-shaped structure at one end called the Bowman's capsule.

Glomerulus

1. Glomerulus is a network of blood capillaries present inside the Bowman's capsule.

3. tannins and resins
Answer:
Tannins

1. These are group of complex compounds found in the bark and leaves.
2. Its presence in tea leaves makes tea taste bitter.

Resins

1. These are the secretions of many plants like coniferous trees.
2. It is used in the production of varnishes and adhesives and perfumes and incense.

4.excretion and transpiration
Answer:
Excretion

1. It is the process of removing or getting rid of waste matter from the body.
2. Excretion rate is independent of time of the day.
3. All living beings have special organs called excretory organs to get red of their harmful wastes.
4. It occurs both in plants and animals.

Transpiration

1. It is the process of losing excess water from aerial plant parts in the form of water vapour. •
2. Rate of transpiration is more during the day.
3. Plants lose water through stomata and lenticels.
4. It occurs only in plants.

D. Find the odd one out. Give reasons for your choice.

1. ureter, kidney, urinary bladder, lung, urethra
Ans. lung, because all others are organs of excretory system and it is a respiratory organ.
2. skin, heart, lung, liver, kidney
Ans. Heart because it helps to pump blood in our body and the rests help in excretion.
3. tannin, urine, latex, resin
Ans. urine, because it is excretory product of animals and rests are excretory products of plants.

E. Answer the following in short.

1. What is excretion ?
Ans. The process of removing waste, formed as a result of chemical reactions in the body is called excretion.

2. What are the main organs involved in the human excretory system ?
Ans. The main organs involved in the human excretory system are a pair of bean shaped kidneys, ureters from each kidney, urinaiy bladder, urethra.

3. What is urethra ?
Ans. Urethra is a canal like opening at the bottom of the urinary bladder through which urine is passed out from the body.

4. List five waste products of plants.
Ans. Tannins, resins, latex, gums, essential oils, caffeine, qiunine, morphine, etc.

5. Define transpiration in plants.
Ans. The process of losing excess water in the form of water vapour from a living plant is known as transpiration.

F. Answer the following in detail.

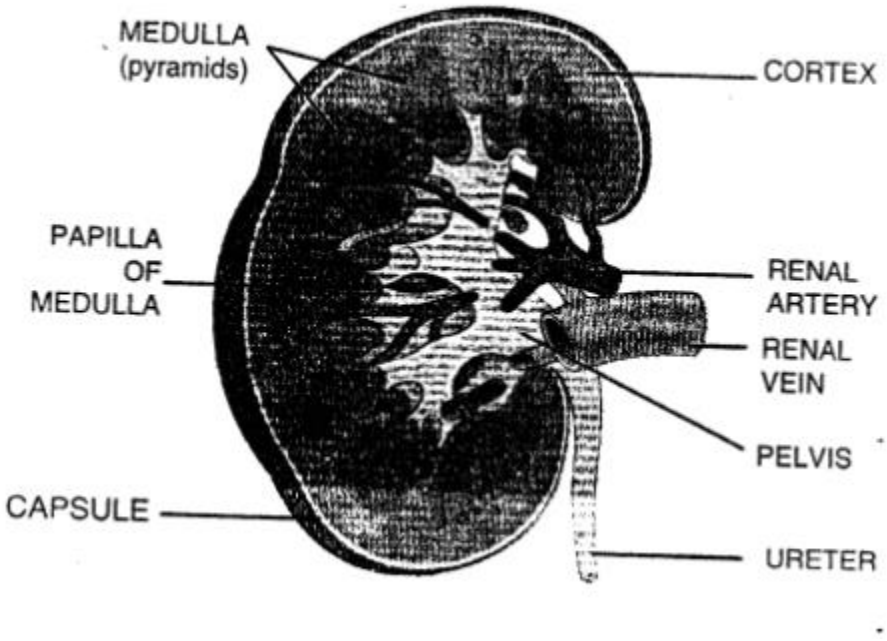
Question 1.

Draw a labelled diagram of the urinary system in human beings and describe each part.

Answer:

Human beings have urinary system to eliminate nitrogenous waste products. It consists of –

1. **Kidneys –** These are a pair of reddish-brown, bean-shaped structures that lie on either side of the backbone. They filter the impure blood and produce urine.
2. **Ureters –** A pair of ureters are tubes that lead out from each kidney. These tubes carry urine from the kidneys to the urinary bladder.
3. **Urinary bladder –** It is a pouch-like muscular structure in which urine is stored temporarily.
4. **Urethra –** It is a canal like opening at the bottom of the urinary bladder through which urine is passed out.



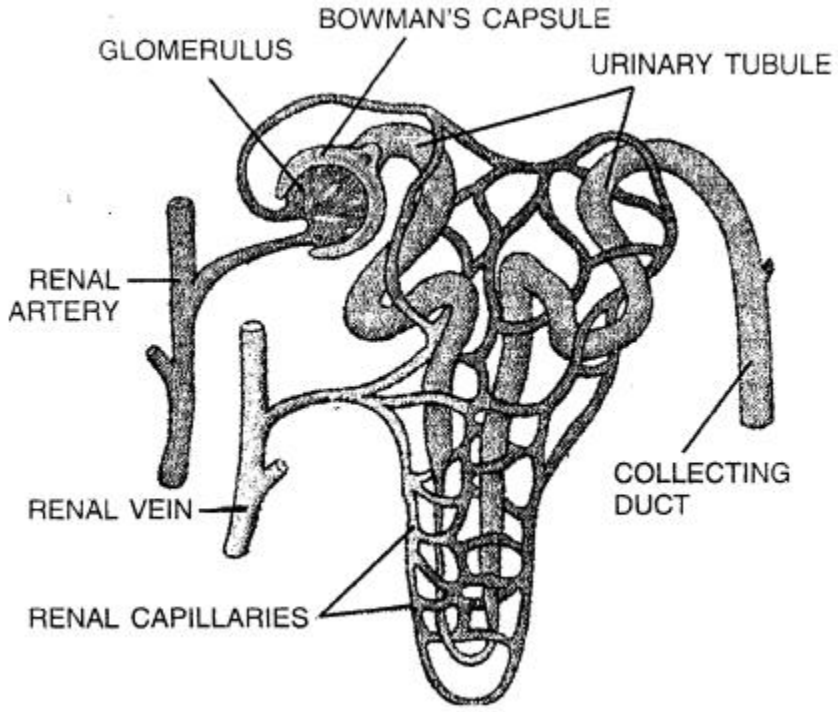
Question 2.

Explain the structure of a nephron with the help of a diagram.

Answer:

The microscopic filtering unit of kidney is called nephron or uriniferous tubule. Each nephron consists of a cup-shaped structure at one end called Bowman's capsule. Inside the cup is a network of blood capillaries called glomerulus. The Bowman's capsule and the glomerulus together form the Malpighian body. The Bowman's capsule extends into a long tubule. These tubules are surrounded by a network of renal capillaries. The urinary tubules of the nephrons in each kidney joins to form a common tube called

ureter.



Question 3.
Describe the process of urine formation.
Answer:
The process of urine formation takes place in the following steps :

1. **Glomerular Alteration –** Blood containing waste material enters the kidneys through the renal artery. It then enters the glomerulus under high pressure. Water and small solutes are filtered in the Bowman's capsule.
2. **Tubular reabsorption –** Filterate passes through the thin walls of the Bowman's capsule into the urinary or renal tubule. As it passes through the tubule, water and many useful substances are reabsorbed by the renal blood capillaries.
3. **Tubular secretion –** The remaining liquid, along with wastes such as urea, uric acid, etc is called urine and is collected in the urinary bladder.
4. **Excretion –** Urine leaves the kidneys and passes into the urinary bladder through the ureters. When the urinary bladder is full, urine is passed out through the urethra.

Question 4.
How do skin and lungs help in excretion ?
Answer:

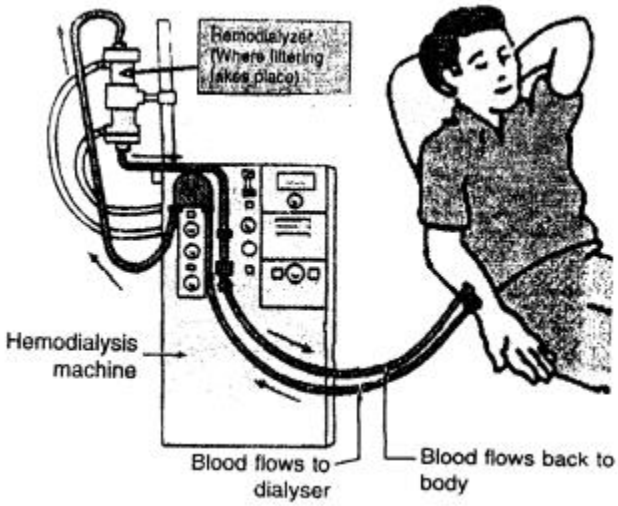
1. **Skin –** excretes excess water, urea, salts and other metabolic wastes in the form of sweat. These waste products are carried by the blood from all body parts to sweat glands in the skin.

2. **Lungs –** Eliminate carbon dioxide produced as a result of respiration through the nose.

Question 5.
Explain the process of transpiration. Describe some factors that effect it.
Answer:
Large quantities of water are absorbed by plants for photosynthesis and other processes. Excess of water is lost in the form of water vapour through the stomata and lenticels from the aerial parts of the plant by transpiration. It helps plants to maintain the concentration of sap inside the plant body. If plants do not remove excess water through transpiration, the dilute sap will prevent further absorption of water and minerals from the soil.
Factors affecting rate of transpiration are :

1. **Sunlight –** Rate of transpiration is more during the day as stomata are open. Stomata remain closed at night and thus no transpiration takes at night.
2. **Temperature –** Transpiration is more on hot days than on cold days.
3. **Wind –** Blowing wind removes water vapour faster from the leaves and hence transpiration rate increases.
4. **Humidity – I**f the air is humid, rate of transpiration is low.
   In the rainy season, transpiration is less since humidity is more.

Question 6.
Write a short note on artificial kidneys.
Answer:
Artificial kidneys : Kidneys play an important role not only by filtering the blood and getting rid of waste products, but also by balancing salt levels in the body.



controlling blood pressure, and stimulating the production of red blood cells.
A person can lead a normal life with one kidney but when both of them stop functioning it could prove fatal if no treatment is provided. An artificial kidney or a dialyser is a machine used to filter the blood of a patient whose kidneys are damaged. This process is called dialysis.

G. Correct the sequence of the following steps to explain the process of urine formation.

1. Blood enters the glomerulus under high pressure.
2. The filtrate passes through the thin walls of the Bowman's capsule into the renal tubule
3. As the filtrate it passes through the tubule, water and many useful substances are reabsorbed by the walls of the blood capillaries.
4. Water and small solutes are filtered in the Bowman's capsule.
5. The remaining liquid, along with waste is called urine and is collected in the urinary bladder.
6. Blood containing waste material enters the kidneys through the renal artery.

Answer:

1. Blood containing waste material enters the kidneys through the renal artery.
2. Blood enters the glomerulus under high pressure.
3. Water and small solutes are filtered in the Bowman's capsule.
4. The filtrate passes through the thin walls of the Bowman's capsule into the renal tubule
5. As the filtrate it passes through the tubule, water and many useful substances are reabsorbed by the walls of the blood capillaries.
6. The remaining liquid, along with waste is called urine and is collected in the urinary bladder.

H. One of Harry's organs is not functioning properly. There is extra fluid build up in his body causing swelling in his ankles and feet.

What should Harry do? Tick the correct answer.

I. Which of Harry's organs is not working properly ? (brain/heart/kidneys)
Ans. Kidneys
2. He should see a (nephrologist/cardiologist/neurologist)
Ans. nephrologist
3. Harry most probably needs a (placemaker/dialysis/skin graft)
Ans. dialysis