The Circulatory System

Multiple Choice Questions:

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

(a) Function of WBCs is to
(i) Transport oxygen
(ii) Help in clotting of blood
(iii) Provide immunity
(iv) Provide storage of food.

(b) Blood Capillary is a
(i) Broad tube
(ii) Artery with thick wall
(iii) Vein with large lumen
(iv) Narrow tube made up of endothelium only.

(c) Nucleus is absent in
(i) RBCs
(ii) VBCs
(iii) All blood cells
(iv) Liver cells.

(d) The only artery which carries deoxygenated blood is called,
(i) Hepatic artery
(ii) Pulmonary artery
(iii) Aorta
(iv) Renal artery

(e) Sphygmomanometer ni'sures
(i) Pulse rate
(ii) Heart beat
(iii) Blood pressure
(iv) Brain activity

(f) Pulmonary vein carries
(i) Oxygenated blood
(ii) Deoxygenated blood
(iii) Glucose-rich blood
(iv) C02 laden blood

(g) The blood tastes saltish due to the dissolved:
(i) Sodium chloride
(ii) Potassium chloride

(iii) Ammonium nitrate
(iv) Sodium nitrate

Short Answer Questions:

1. Differentiate between the following pair of terms:

Question 1(a)

Patelets and WBC

Answer:

Platelets

1. These are colourless, oval or round, cytoplasmic fragments found floating in the blood.
2. These play a major role in blood clotting.
3. Their life span is 3-5 days and it is called thrombocytes.

WBC

1. WBC are colourless and lack haemoglobin, larger in quantity, and have distinct oval and lobed nucleus.
2. They prevent body from disease causing germs by providing immunity
3. Their life span is short i.e. 5 to 20 days.

Question 1(b)

Pulmonary artery and pulmonary vein

Answer:

Pulmonary artery

1. This involves circulation of blood from the heart to the lungs.
2. It carries deoxygenated blood.

Pulmonary vein

1. This involves circulation of blood to the heart from the lungs.
2. It carries oxygenated blood.

Question 1(c)

Vena Cava and Aorta

Answer:

Vena Cava

1. Vena Cava is a large vein.
2. It carries deoxygenated blood from the upper and lower parts of the body i.e. head and shoulders.

Aorta

1. Aorta is the large artery.
2. It carries oxygenated blood to all parts of the body through its branches.

Question 1(d)
RBC and WBC
Answer:
RBC

1. They do not have nucleus at maturity.
2. They possess haemoglobin and are red.
3. They help in transport of respiratory gases.

WBC

1. They have a large characteristic nucleus.
2. They are colourless as they have no pigment.
3. They help in defence mechanism.

Question 2.
Give any three differences between an artery and a vein:
Answer:
Following are the differences between the artery and a vein:
Artery

1. Arteries carry blood from the heart to various body parts.
2. These carry oxygenated blood (except the pulmonary artery).
3. Blood flows with high speed and under high pressure.

Vein

1. Veins carry blood from different body parts to the heart.
2. These carry deoxygenatec blood (except the pulmonary vein).
3. Blood flows with low speech and under low pressure.

Question 3.
Blood consists of two parts — a liquid part and a cellular part. Name these parts and briefly write about them.
Answer:

1. **Plasma: The plasma is a light-yellow coloured, alkaline liquid which mainly consists of:**
    - Water- 90-92%

- Proteins – 7-8%
- Inorganic salts – 1%
- Other substances – traces

2. **Cellular elements : These elements are of three categories:**
   - Red blood cells (erythrocytes)
   - White blood cells (leukocytes)
   - Blood platelets (thrombocytes)

Question 4.
What is the role of haemoglobin in the blood ?
Answer:
The haemoglobin is the respiratory pigment which is formed of the iron containing part known as haemin and protein part known as globin. It helps to transport respiratory gases (oxygen).

5. Fill in the blanks with suitable words given below:

1. The colour of a red blood cell is due to **haemoglobin**.
2. The two lower chambers of the heart are called **ventricles.**
3. The blood plasma contains a dissolved substance such as nutrient, **proteins**, **waste products** and **harmones**.
4. The **pulmonary** artery takes the blood from the ventricles to the lungs.
5. The instrument used to find out the blood pressure is known as **sphygmomanometer**.
6. The blood loaded with carbon dioxide from the body comes into the **right auricle** of the heart.
7. The oxygen-rich blood from the lungs comes into the **left ventricle** of the heart.
8. The oxygen-rich blood is pumped into different parts of the body through **aorta**.
9. The carbon dioxide loaded blood from right ventricle is pumped into the lungs through pulmonary artery.
10. The liquid part of coagulated blood is known as **serum**.

Question 6.
In which organ of our body does blood get oxygenated?
Answer:
Blood becomes oxygenated in the lungs. The oxygenated blood is returned to left verticles by the pulmonary vein.

Question 7.
Which side of the heart (left or right) contains oxygenated blood?
Answer:
The left side of the heart contains oxygenated blood.

Question 8.
Name the disease in which the number of platelets reduces to 25,000 – 30,000 per

cubic mm of blood. State its major symptoms.

Answer:

Dengue fever is one such disease in which the number of platelets get reduced to as low as 25-30 thousands per cubic mm of blood. The major symptoms of dengue are high fever, rashes or red spots on body, nausea or vomiting, pain in abdomen, back, or back of the eyes and muscles.

Long answer Questions

Question 1.

Name the three kinds of blood vessels found in human beings. With the help of suitable diagrams, differentiate between them.

Answer:

The three kind of blood vessels found in human beings are arteries, veins and capillaries.

1. Arteries are the blood vessels that carry blood from the heart to the various parts of the body.
2. Veins are the blood vessels that carry blood from the body parts to the heart.

Capillaries: These are the terminal branches of an artery, which rejoin to form a vein. A capillary is a very narrow tube whose walls have a single layer of cells with no muscles. Although the wall of a capillary is very thin, yet an exchange of nutrients, waste products and gases take place between the b 1 ood and the body flu ids.

Differences:

Arteries

1. Carry blood away from the heart.
2. Have thick and more muscular walls.
3. Carry oxygenated blood (except pulmonary artery which carries deoxygenated blood).
4. The blood flows with j erks and under great force.

Veins

1. Carry blood towards the heart.
2. Have thin and less muscular walls.
3. Carry deoxygenated blood (except pulmonary vein which carries oxygenated blood).
4. The blood flows smoothly and under little pressure.

Capillaries :

1. Arteries after entering an organ divide into number of smaller branches called arterioles which further divide repeatedly to form a network of fine branches called capillaries.
2. The walls of the capillaries are very thin and are one cell deep.
3. The Capillaries after the metabolic exchange unite to form larger vessels called venules, which again unite to form a vein.

PQ. During surgical operations or during accidents, the patient may be given blood from outside to save his life. What is the technical name of this process ? Briefly explain the precautions to be taken in this process.

Answer:

During surgical operation or an accident when excess of bleeding takes place, the patient may be given blood from outside to save his life.
The transfer of blood from the donor to the recipient is called blood transfusion.
The following precautions are taken before the blood is given to the needy person:

1. Matching of the donor's blood with that of the recipient should be done.
2. It should be made sure clinically that blood of donor is free from any infection.
3. Sterilization of all the instruments to be used during the operation is must.

Question 2.

State briefly, the difference between white blood cells and the red blood cells.
Difference between white blood cells and the red blood cells

Answer:

RBC

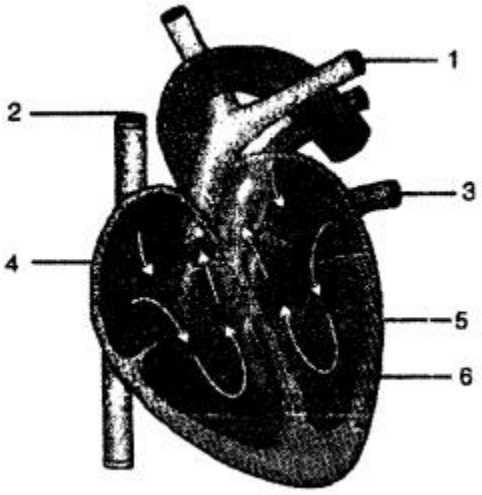
1. They do not have nucleus atmaturity.
2. They possess haemoglobin and are red.
3. They help in transport of respiratory gases.
4. Life span is 120 days.
5. They are about 5 million/$mm^3$of blood.
6. In the embryonic stage the RBC are formed in the liver and spleen. But after birth, they are formed in the red bone marrow.

WBC

1. They have a large characteristic nucleus.
2. They are colourless as they have no pigment.
3. They help in defence mechanism.
4. WBC have a short life.span of 5 to 20 days.
5. They are about 7000/mm^3 of blood.
6. WBC are formed in the red bone marrow.

Question 3.
You can see some blood vessels on the outside of the hands specially in older people. Are those veins or arteries ? How can you confirm your answer ?
Answer:
In older persons the skin becomes loose as the fat below becomes less with age and the vessels passing through these areas especially on the outside of the hands become prominent. These are veins as they flow superficially. The veins are thin and less muscular. These carry the blood to the heart veins are placed superficially so they are easily visible to the eye and are prominent.
The blood in the veins will be carrying CO_2 and will have many substances like sugar, amino acids, chemicals and bacteria.

Question 4.
Given alongside is a diagram of human heart showing its internal structures. Label the parts marked 1 to 6, and answer the following questions.



(a) Which types of blood is carried by the blood vessel marked 2?
(b) Name the main artery which takes the blood from heart to different parts of the body?
(c) Which chamber of the heart receives deoxygenated blood from the body?
(d) Which chamber of the heart receives oxygenated blood from the lungs ?

Answer:

1. Left pulmonary artery
2. superior vena cava
3. Left pulmonary vein
4. Right auricle
5. Left auricle
6. Left ventricle

(a) Deoxygentated blood.
(b) Aortic arch (Aorta).
(c) Right Atrium.
(d) Left Atrium

ADDITIONAL QUESTIONS

I. Multiple choice questions. Tick (✓) the correct choice:

1. Human heart has
(a) one auricle and one ventricle.
(b) two auricles and one ventricle.
(c) two auricles and two ventricles.
(d) one auricle and two ventricles.
.

2. The blood vessels in which blood goes away from the heart to different body parts are
(a) arteries
(b) capillaries
(c) veins
(d) both arteries and veins.

3. The heartbeat is measured by an instrument called
(a) thermometer
(b) sphygmomanometer
(c) stethoscope
(d) none of the above

4. The blood cells which protect the body from infection are
(a) RBCs
(b) platelets
(c) WBCs
(d) all the above

5. The four blood groups in humans are
(a) A, B, C and D
(b) A, B, AB and C

(c) A, B, AB and O
(d) A, B, AB and OO

II. Fill in the blanks.

1. In human body, heart is located on the **left** side of the chest cavity.
2. The blood vessels which carry blood from the heart to different parts of the body are called **arteries**.
3. **Arteries** carry pure blood.
4. The red-coloured pigment present in RBCs is called **Haemoglobin.**
5. The fluid part of blood is called **plasma**.

III. Which of the following statements are true (T) and which ones are false (F)? Mark T or F:

1. Platelets help in clotting of blood.
   True.
2. The four blood groups in human beings are A, B, AB and AO.
   False. The four blood groups in human beings are A, B, AB and O.
3. People with blood group 'O' are called universal recipients.
   False. People with blood group 'O' are called universal donors.
4. Blood group A has antigen A.
   True.
5. Impure blood is received by the right auricle.
   True.

IV. Match the statements in Column A with those in Column B:

Column A	Column B
1. Heart	(a) Movement of materials
2. Food and oxygen	(b) Channels for transport in man
3. Carrier of oxygen	(c) A living pump
4. Circulation	(d) Materials needed by every living being
5. Arteries and veins	(e) Red blood cells

Answer:

Column A	Column B

1. Heart	(c) A living pump
2. Food and oxygen	(d) Materials needed by every living being
3. Carrier of oxygen	(e) Red blood cells
4. Circulation	(a) Movement of materials
5. Arteries and veins	(b) Channels for transport in man

V. Describe the functions of the:

1. Heart
2. Blood vessels
3. Red blood cells
4. White blood cells
5. Platelets
6. Blood

Answer:

1. **Heart:** The heart is a muscular organ that pumps blood to all the cells in our body through a network of blood vessels. It pumps the blood and hence helps in circulating oxygen and nutrients to all body parts. The heart pumps deoxygenated blood to the lungs and oxygenated blood to the rest of the body.
2. **Blood vessels:** Blood vessels are a necessaiy part of the body's circulatory system. The blood vessels carry blood throughout the body.
   Three types of blood vessels are :
   1. **Arteries:** They carry oxygenated blood from the heart to all parts of the body.
   2. **Veins:** They carry deoxygenated blood from the body cells to the heart.
   3. **Capillaries:** They form the connection between the arteries and the veins where exchange of substances takes place.
3. **Red blood cells:** Red blood cells (RBCs) contain haemoglobin which carries oxygen throughout the body. It also transports nutrients to cells.
4. **White blood cells:** White blood cells (WBCs) help in fighting infection as they destroy the germs.
5. **Platelets:** The platelets help in clotting of blood, whenever there is a blood flow due to some injury.
6. **Blood:** Blood circulates throughout the body and performs the following functions
   1. It carries or transports food and oxygen to each body cell.
   2. It carries away waste products to organs (like kidneys, lungs and intestine) from where they are excreted out of the body.
   3. It protects the body against infection by destroying germs.
   4. It helps in blood clotting, thereby preventing excessive blood loss.
   5. It regulates body temperature

VI. Define the:
1. Circulatory system
2. Arteries
3. Veins

Answer:

1. **Circulatory system:** Circulatory system is a transport system moving substances throughout our body with the help of blood.
2. **Arteries:** Arteries are the blood vessels in which oxygenated blood is going away from the heart to all parts of the body.
3. **Veins:** Veins are the blood vessels which carry deoxygenated (impure) blood from the body cells to the heart.

VII. Answer the following questions:

Question 1.
Name the main parts of the circulatory system.
Answer:
The main parts of the circulatory system are:

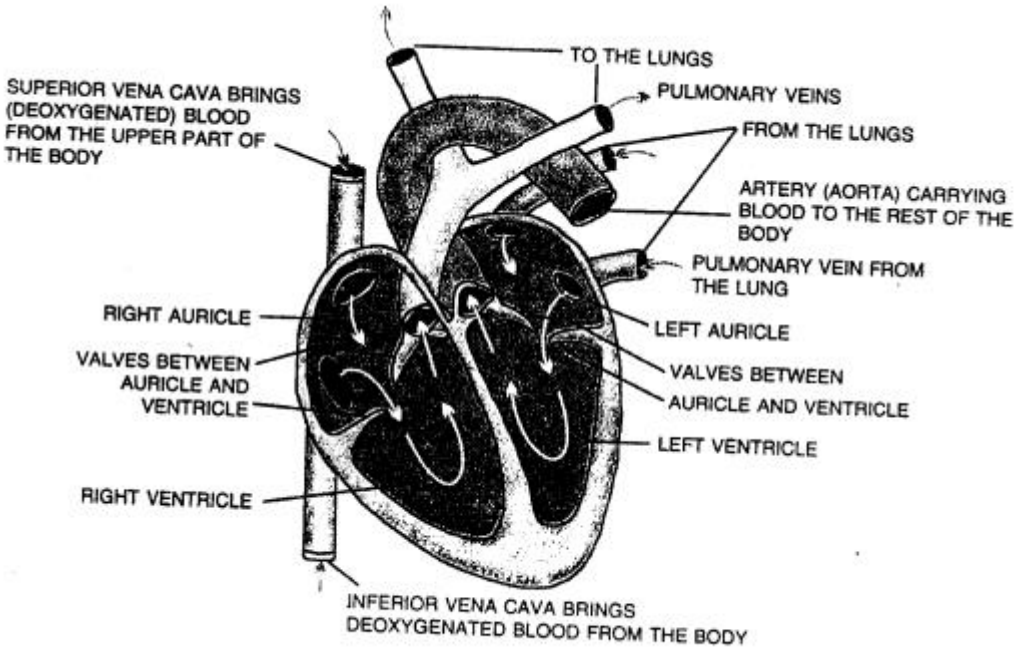
1. Heart
2. Blood vessels and
3. Blood.

Question 2.
Name the organ from which oxygenated blood goes into the heart.
Answer:
Lungs.

Question 3.
Describe, in brief, the circulatory system in human beings.
Answer:
The circulatory system in human beings consists of heart, blood vessels (arteries, veins and capillaries) and blood. Blood circulates throughout the body in blood vessels by the pumping action of the heart. The impure blood is carried by veins from all parts of the body to the heart. The heart pumps it into the lungs where blood is oxygenated and carried back to the heart. From heart, the oxygenated (pure) blood is pumped to all parts of the body through arteries.
Thus, the circulatory system forms the transport system carrying food, oxygen, waste products, nutrients etc. throughout the body.

Question 4.
Draw the structure of human heart and label its parts

Answer:



Question 5.

Why is a person having blood group AB called universal recipient and a person with blood group O called a universal donor?

Answer:

People with blood group O are called universal donors because they can donate blood to all the blood groups. Their red blood cells (RBCs) have no antigens and so cannot be stuck by blood of any other group. People with blood group AB are called universal recipients because they can receive blood from all 4 blood groups. The red cells in them have no antibodies and therefore it does not stick with blood from other groups.

Question 6.

Name the instruments used for measuring

1. pulse and
2. blood pressure.

Answer:

1. Stethoscope.
2. Sphygmomanometer

Question 7.

Name the following:

1. Components of blood
2. Different blood groups

Answer:

1. **Components of blood are:**
   - liquid part called plasma
   - **The cells or corpuscles which are further of three types:**
   - RBC (red blood cell)
   - WBC (white blood cell)
   - platelets.
2. The four blood groups in humans are A, B, AB and O.

Question 8.
Differentiate between arteries and veins.
Answer:
Arteries

1. They carry blood away from the heart to all parts of the body.
2. They carry oxygenated blood (except pulmonary artery).
3. They are usually deep seated in the tissues.
4. Blood flows with jerks and under high pressure.
5. Valves are absent.
6. Thick elastic walls present.

Veins

1. They carry blood into the heart from all parts of the body.
2. They carry deoxygenated blood (except pulmonary vein).
3. They lie closer to skin surface.
4. Blood flows smoothly and under low pressure.
5. Valves are present.
6. Walls thinner than arteries present

Question 9.
Write in brief about the following

1. Blood groups and
2. Blood transfusion

Answer:

1. The four types of blood in humans are called blood groups.
   These are A, B, AB and O. The blood is determined by the antigens present on the RBCs. RBCs also contain antibodies in the plasma.

Blood group	Antigen in RBCs	Antibody in plasma
A	A	Anti-B
B	B	Anti-A
AB	A and B	None
O	None	Anti-A and Anti-B

2. Transfer of blood from one person to another is called blood transfusion. Ill or seriously injured people may need it. But compatibility of the blood groups is checked first. People with blood group AB are called universal recipients and people with blood group O are called universal donors.

Blood group	Can donate blood to	Can receive blood from
A	A and AB	A and O
B	B and AB	B and O
AB	AB	All groups
O	All groups	O

10. Find the odd one out, giving reason:

1. Arteries, capillaries, blood, veins
   Ans. Blood.
   Reason: Arteries, veins and capillaries are types of blood vessels whereas blood is a constituent of circulatory system.
2. RBC, platelets, anti-A, WBC
   Ans. Anti-A.
   Reason: RBC, platelets and WBC are three types of blood cells whereas anti-A is a type of antibody present in the blood plasma.

Question 11.
What is the rate of heartbeat in normal adult human being?
Answer:
70-72 per minute.

Question 12.
Name the main artery which carries blood to different parts of the body.
Answer:
Aorta.

Question 13.
What is the difference between pulmonary circulation and systemic circulation?
Answer:
Pulmonary circulation

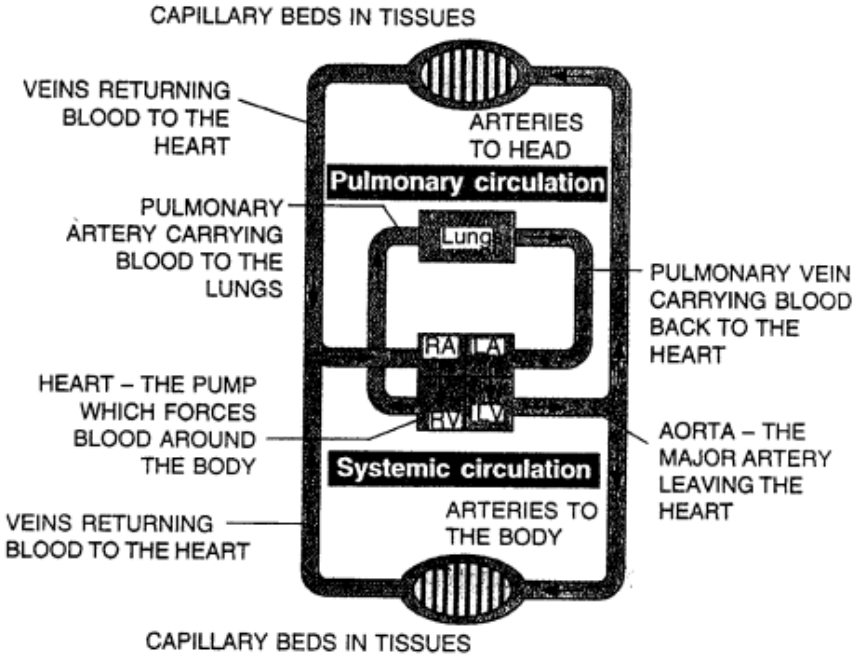
1. This involves circulation of blood between the heart and the lungs.
2. It is the function of the right side of the heart.
3. It carries deoxygenated blood to the lungs to receive oxygen.
4. It begins on the right ventricle and ends on left auricle.
5. It returns oxygenated blood back to the heart.
6. **Blood flows as:**
   ↓ Right ventricle
   deoxygenated blood Lungs
   ↓ oxygenated blood
   Left auricle

Systemic circulation

1. This involves circulation of blood between the heart and body organs (except lungs).
2. It is the function of the left side of the heart.
3. It carries oxygenated blood to the body organs.
4. It starts at left ventricle and ends at the right auricle.
5. It returns deoxygenated blood back to the heart.
6. **Blood flows as:**
   Left ventricle
   ↓ oxygenated blood
   Body organs
   ↓ deoxygenated blood
   Right auricle

Question 14.
Blood in the human body circulates twice for making one complete round through the body. Explain.
Answer:
The circulation of blood through the human heart takes place twice making one complete round through the body. This is called double circulation. The impure blood (deoxygenated blood) is collected from different body organs through two major veins (vena cava). The two veins empty blood into the right auricle. From here, it enters the right ventricle and is carried to lungs by pulmonary artery. Exchange of gases takes place in the lungs. Pulmonary vein then carries the pure (oxygenated) blood to the left auricle. From here, it enters the left ventricle and is then carried by an artery called aorta to all parts of the body.
Double circulation can be summarised as:

1. Circulation of blood between the heart and the lungs is called pulmonary circulation.
   In this, the blood flows as follows:
   Right ventricle → lungs → left auricle (through pulmonary veins)
2. Circulation of blood between the heart and body organs (except lung) is called systemic (body) **circulation. Blood flows as following:**
   Left ventricle →body organs → right auricle (through vena cava)



Question 15.
How many litres of blood does an adult human body have?
Answer:
5.5 litres of blood.

Question 16.
Write a short note on human heart.
Answer:
The heart is a pump that circulates blood to all parts of the body. It is about the size of a human fist and located to the left in chest cavity. It has four chambers – two upper chambers called auricles or atria and two lower chambers called ventricles. The auricles receive blood from different body parts and ventricles pump the blood out of the heart. The valves between auricle and ventricle on each side allow blood to flow in one direction only. Heart acts as a double pump. The right side of the heart carries deoxygenated blood to the lungs to be oxygenated. The left side of the heart pump oxygenated blood to the body.

Question 17.
What are seen as greenish blue lines in our hands and legs?
Answer:
Veins.

Question 18.
Name the iron containing protein present in RBC of blood.
Answer:
Haemoglobin.

Question 19.
Define pulse.
Answer:
Pulse is the throbbing of the arteries due to the movement of blood in them.

Question 20.
Define heartbeat.
Answer:
The sound or movement of the heart as it sends blood around the body is called heartbeat. Every heartbeat causes a pulse in the arteries.

Question 21.
What is stethoscope? Explain.
Answer:
The pulse in humans can be measured by using an instrument called stethoscope. It is a device that amplifies the sound of a heartbeat and is used to hear heartbeats in the chest.
It consists of three parts:

1. A chest piece, which is sensitive to heartbeats.
2. Two earpieces.
3. A tube joining the chest piece and the earpieces.

Question 22.
What is a stroke? What causes it?
Answer:
A disabling attack or loss of consciousness by an interruption in the flow of blood to the brain is called a stroke. Constant high blood pressure puts a strain on the heart and can also cause an artery to burst open. If this happens in the brain, it causes stroke.

Question 23.
What is blood pressure? When does it rise?
Answer:
The pressure of the blood in the arteries caused by pumping of heart is called blood

pressure. It rises if we do activities like running, cycling etc. or if the arteries become narrower.

Question 24.
What are antigens and antibodies?
Answer:
Antigens are foreign substances in the body which stimulate the production of antibodies.
Antibodies are chemical substances made by the body in response to foreign substances (antigens). They destroy antigens