

**MULTIPLE CHOICE QUESTIONS**

**1. Which of the following cells does not exhibit phagocytosis activity?**

- a. Monocyte
- b. Neutrophil
- c. Basophil
- d. Macrophage

**Solution:**

Option (c) is the answer.

**2. One of the common symptoms observed in people infected with Dengue fever is**

- a. Significant decrease in RBC count
- b. Significant decrease in WBC count
- c. Significant decrease in platelets count
- d. Significant increase in platelets count

**Solution:**

Option (c) is the answer.

**3. Which among the followings is correct during each cardiac cycle?**

- a. The volume of blood pumped out by the Rt and Lt ventricles is same.
- b. The volume of blood pumped out by the Rt and Lt ventricles is different
- c. The volume of blood received by each atrium is different
- d. The volume of blood received by the aorta and pulmonary artery is different

**Solution:**

Option (a) is the answer.

**4. The cardiac activity could be moderated by the autonomous neural system.**

**Tick the correct answer:**

- a. The parasympathetic system stimulates the heart rate and stroke volume
- b. The sympathetic system stimulates the heart rate and stroke volume
- c. The parasympathetic system decreases the heart rate but increases stroke volume
- d. The sympathetic system decreases the heart rate but increases stroke volume

**Solution:**

Option (b) is the answer.

**5. Mark the pair of substances among the following which is essential for coagulation of blood.**

- a. Heparin and calcium ions
- b. Calcium ions and platelet factors
- c. Oxalates and citrates
- d. Platelet factors and heparin

**Solution:**

Option (b) is the answer.

**6. ECG depicts the depolarisation and repolarisation processes during the cardiac cycle. In the ECG of a normal healthy individual one of the following waves is not represented.**

- a. Depolarisation of atria

- b. Repolarisation of atria**
- c. Depolarisation of ventricles**
- d. Repolarisation of ventricles**

**Solution:**

Option (b) is the answer.

**7. Which one of the following types of cells lacks nucleus in humans?**

- a. Erythrocytes**
- b. Neutrophils**
- c. Eosinophils**
- d. Monocytes**

**Solution:**

Option (a) and (d) are the answers.

**8. Which one of the following blood cells are involved in antibody production?**

- a. B-Lymphocytes**
- b. T-Lymphocytes**
- c. RBC**
- d. Neutrophils**

**Solution:**

Option (a) is the answer.

**9. The cardiac impulse is initiated and conducted further up to ventricle.**

**The correct sequence of conduction of impulse is**

- a. S A Node A V Node Purkinje fibre A V Bundle**
- b. S A Node Purkinje fibre A V Node A V Bundle**
- c. S A Node A V Node A V Bundle Purkinje fibre**
- d. S A Node Purkinje fibre A V Bundle A V Node**

**Solution:**

Option (c) is the answer.

**10. The cells involved in inflammatory reactions are**

- a. Basophils**
- b. Neutrophils**
- c. Eosinophils**
- d. Lymphocytes**

**Solution:**

Option (d) is the answer.

**11. The second heart sound (dubb) is associated with the closure of**

- a. Tricuspid valve**
- b. Semilunar valves**
- c. Bicuspid valve**
- d. Tricuspid and bicuspid valves.**

**Solution:**

Option (b) is the answer.

**12. Which of the following correctly explains a phase/ event in the cardiac cycle in a standard electrocardiogram?**

- QRS complex indicates atrial contraction.
- QRS complex indicates ventricular contraction.
- The time between S and T represents atrial systole.
- P-wave indicates the beginning of ventricular contraction.

**Solution:**

Option (b) is the answer.

**13. Which of the following statements is incorrect?**

- A person of 'O' blood group has anti 'A' and anti 'B' antibodies in his blood plasma.
- A person of 'B' blood group can't donate blood to a person of 'A' blood group.
- Blood group is designated based on the presence of antibodies in the blood plasma.
- A person of the AB blood group is a universal recipient.

**Solution:**

Option (c) is the answer.

**14. What would be the cardiac output of a person having 72 heartbeats per minute and a stroke volume of 50 ml?**

- 360 mL
- 3600 mL
- 7200 mL
- 5000 mL

**Solution:**

Option (b) is the answer.

**15. Match the terms given under Column 'A' with their functions given under Column 'B' and select the answer from the options given below:**

Column I	Column II
A. Lymphatic System	i. Carries oxygenated blood
B. Pulmonary vein	ii. Immune Response
C. Thrombocytes	iii. To drain back the tissue fluid to the circulatory system
D. Lymphocytes	iv. Coagulation of blood

**Options:**

- A-ii, B-i, C-iii, D-iv
- A-iii, B-i, C-iv, D-ii
- A-iii, B-i, C-iii, D-iv
- A-ii, B-i, C-iii, D-iv

**Solution:**

Option (b) is the answer.

**16. Read the following statements and choose the correct option**

**Statement 1:** Atria receive blood from all parts of the body which subsequently flows to ventricles.

**Statement 2:** Action potential generated at the sino-atrial node passes from atria to ventricles.

- a. Action mentioned in Statement 1 is dependent on action mentioned in Statement 2
- b. Action mentioned in Statement 2 is dependent on action mentioned in Statement 1
- c. Action mentioned in Statements 1 and 2 is independent of each other.
- d. Action mentioned in Statements 1 and 2 is synchronous.

**Solution:**

Option (b) is the answer.

### VERY SHORT ANSWER TYPE QUESTIONS

**1. Name the blood component which is viscous and straw-coloured fluid.**

**Solution:**

The blood component which is viscous and straw-coloured fluid is Plasma which makes up 55 % of the blood.

**2. Complete the missing word in the statement given below:**

- a. Plasma without \_\_\_\_\_ factors is called serum.
- b. \_\_\_\_\_ and monocytes are phagocytic cells.
- c. Eosinophils are associated with \_\_\_\_\_ reactions.
- d. \_\_\_\_\_ ions play a significant role in clotting.
- e. One can determine the heartbeat rate by counting the number of \_\_\_\_\_ in an ECG.

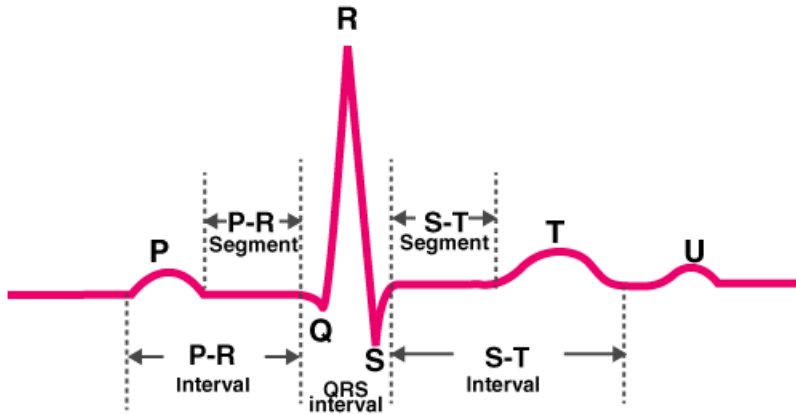
**Solution:**

- a. Plasma without blood clotting factors is called serum.
- b. Neutrophils and monocytes are phagocytic cells.
- c. Eosinophils are associated with allergic reactions.
- d. Calcium ions play a significant role in clotting.
- e. One can determine the heartbeat rate by counting the number of QRS complex in an ECG.

**3. Given below is the diagrammatic representation of a standard ECG. Label its different peaks.**



**Solution**



**4. Name the vascular connection that exists between the digestive tract and liver.**

**Solution:**

The vascular connection that exists between the digestive tract and liver is known as Hepatic Portal System.

**5. Given below are the abnormal conditions related to blood circulation. Name the disorders.**

**a. Acute chest pain due to failure of O<sub>2</sub> supply to heart muscles**

**b. Increased systolic pressure**

**Solution:**

a. The disorder caused due to acute chest pain due to failure of O<sub>2</sub> supply to heart muscles is known as **angina pectoris**.

b. Increased systolic pressure causes **hypertension**.

**6. Which coronary artery disease is caused due to narrowing of the lumen of arteries?**

**Solution:**

Atherosclerosis is the coronary artery disease is caused due to narrowing of the lumen of arteries.

**7. Define the following terms and give their location?****a. Purkinje fibre****b. Bundle of His****Solution:**

- a. Purkinje fibre: It is present in the Myocardium of the ventricle and is formed by the branching of the right and left bundle. It carries impulses from S.A node
- b. Bundle of His: These are fibres which originate from the AV node present in the wall of the right atrium.

**8. State the functions of the following in blood****a. Fibrinogen****b. Globulin****c. Neutrophils****d. Lymphocytes****Solution:**

- a. Fibrinogen is involved in the clotting of blood.
- b. Globulin functions in the immune responses.
- c. Neutrophils are phagocytic and these are the first cell which reaches the site and engulf the microbes when an infection occurs
- d. Lymphocytes are involved in the immune response in the blood.

**9. What physiological circumstances lead to erythroblastosis foetal?****Solution:**

Erythroblastosis foetalis occurs due to Rh incompatibility between the mother and the foetus during pregnancy which may lead to the death of the foetus or severe Anaemia.

**10. Explain the consequences of a situation in which blood does not coagulate.****Solution:**

If blood clotting does not take place excessive bleeding would take place which might lead to death.

**11. What is the significance of the time gap in the passage of action potential from the sino-atrial node to the ventricle?****Solution:**

It allows relaxation to the ventricles. This causes ventricular pressure to fall leading to the closure of semilunar valves which prevents the backflow of blood into the ventricles.

**12. How will you interpret an electrocardiogram (ECG) in which time taken in the QRS complex is higher?****Solution:**

The normal duration of the QRS complex is less than or equal to 0.10 seconds. If the QRS complex is longer than 0.10 seconds and the wave is enlarged it indicates the person is having Myocardial Infarction or Heart Attack.

**SHORT ANSWER TYPE QUESTIONS.**

**1. The walls of ventricles are much thicker than atria. Explain.****Solution:**

Ventricles function as a pumping agent of blood to all organs so that they have to exert more pressure. The atria receive blood so they have fewer loads to take, hence thinner walls.

**2. Differentiate between****a. Blood and Lymph****b. Basophils and Eosinophils****c. Tricuspid and bicuspid valve****Solution:**

a. Blood is a part of our circulatory system which is red due to the presence of haemoglobin whereas lymph is a part of our lymphatic system which is colourless due to the absence of haemoglobin.

b. Basophils are bean-shaped nucleus stained with basic dye whereas the eosinophil is two-lobed nuclei which are stained with acidic dyes.

c. The tricuspid valve is formed by three flaps and it guards the opening between atrium and right ventricle whereas the bicuspid valve is formed by two flaps which it opens between the left atrium and left ventricle.

**3. Briefly describe the followings:****a. Anaemia****b. Angina Pectoris****c. Atherosclerosis****d. Hypertension****e. Heart failure****f. Erythroblastosis foetal****Solution:**

a. Anaemia is a disorder that occurs due to the lesser count of RBC or a reduced amount of haemoglobin than the normal value.

b. Angina Pectoris is caused when adequate oxygen does not reach the heart muscles leading to chest pain and discomfort.

c. Atherosclerosis is the cause of disease when the fat takes place at the walls of the artery.

d. Hypertension is the condition in which there is a constant increase in normal blood pressure, which is 120/80 mm Hg.

e. Heart failure is a serious condition when the heart fails to pump enough blood to meet the requirements.

f. Erythroblastosis foetal is a condition there is a destruction of foetal RBC's due to an incompatibility between the mother and foetus's Rh factor

**4. Explain the advantage of the complete partition of ventricle among birds and mammals and hence leading to double circulation.****Solution:**

In birds and animals, the two ventricles are separated by the inter-ventricular septum. Oxygenated blood received by the left atria passes to the left ventricle and Deoxygenated blood received by the right atria passes to the right ventricle without getting mixed. Deoxygenated and oxygenated blood remains separated and do not mix.

**5. What is the significance of the hepatic portal system in the circulatory system?****Solution:**

The hepatic portal system directs deoxygenated blood from the parts of the gastrointestinal tract to the liver and finally taking it to the heart. This provides the liver with metabolic substrates.

**6. Explain the functional significance of the lymphatic system?****Solution:**

The fluid lymph carries hormones and nutrients and also maintains a fluid balance between blood and tissues. The fat absorption takes place through the lymph.

**7. Write the features that distinguish between the two****a. Plasma and Serum****b. Open and closed circulatory system****c. Sino-atrial node and atrioventricular node****Solution:**

a. Plasma is a liquid form of blood which does not have cells and is treated with EDTA like anticoagulant whereas serum is a liquid form of blood after coagulation

b. In an open circulatory system, the blood flows through large vessels into sinuses whereas in the closed circulatory system the blood flows through a closed network of blood vessels.

c. Sino-atrial node is present in the right atrium near the opening of superior vena cava whereas the atria-ventricular node is present in the right atrium near the base of the interatrial septum.

**8. Thrombocytes are essential for the coagulation of blood. Comment.****Solution:**

They are also known as platelets which are found in the blood. Thrombocytes are formed in the bone marrow. For example, when an injury occurs, the bleeding starts and platelets will disintegrate. They release clotting factor III known as thromboplastin. Thromboplastin in the presence of calcium ions activates prothrombokinase and leads to a series of reactions causing a blood clot.

**9. Answer the following****a. Name the major site where RBCs are formed.****b. Which part of the heart is responsible for initiating and maintaining its rhythmic activity?****c. What is specific in the heart of crocodiles among reptilians?****Solution:**

a. In the early embryonic stage, RBC's are produced in Yolk Sac

In later embryonic stage RBC's are produced in Liver and Spleen

In mature adults, RBC's are produced in Bone Marrow

b. SA node or Sino Atrial Node is responsible for the rhythmic activity.

c. Reptilians have a three-chambered heart (2 atria and 1 ventricle) whereas crocodiles have a four-chambered heart (2 atria and 2 ventricles) in which the mixing of oxygenated and deoxygenated blood does not take place.

**LONG ANSWER TYPE QUESTIONS****1. Explain Rh-incompatibility in humans.****Solution:**



There are many blood groups which are known mainly. There is another type of blood group known as Rh factor or Rhesus monkey factor which is an inherited factor. People who do not have Rh factor are called Rh-negative people (Rh-ve). Rh-incompatibility in humans may lead to a disorder called as Erythroblastosis foetal at the time of pregnancy if the foetus is Rh+ve and the mother is Rh-ve and if the blood from foetus enters the mother's bloodstream, antibodies against the foetus blood are created. This is not affected at the first pregnancy but in subsequent if the baby is RH+ve the antibodies formed against Rh+ve blood during first pregnancy may enter the foetus through the placenta. This leads to death due to the destruction of foetus RBC's.

## 2. Describe the events in the cardiac cycle. Explain "double circulation".

### Solution:

1. Atrial Systole (0.7 sec): In this event atria contracts due to the wave of contraction initiated by the SA node. The blood flow takes place in ventricles as the two valves are open.
2. Ventricle Systole (0.5 sec): After this, contraction of ventricles starts taking place due to the wave of contraction initiated by the AV node. Thus closing of the two valves occur and first heart sound is produced 'club'.
3. Complete Ventricular Systole: After ventricular contraction, the blood flows into the pulmonary trunk and aorta as the semilunar valves are opened.
4. Ventricular Diastole: In this event, the ventricles relax and the semilunar valves close and the second heart sound is made 'dub'
5. Complete Ventricular Diastole: The opening of bicuspid and tricuspid valves take place as the pressure of ventricles lowers down and blood flows from atria to the ventricles. 0.8seconds will take for the cycle to occur.

In double circulation, deoxygenated and oxygenated blood remains separated and do not mix.

## 3. Explain different types of blood groups and donor compatibility by making a table.

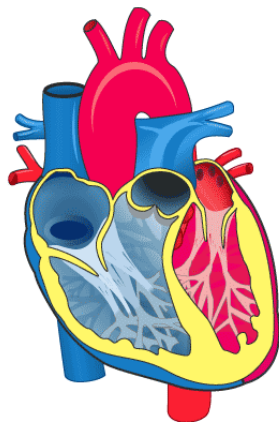
### Solution:

Blood group	Alleles	Antigenon RBC surface	Antibodies against	Donate blood to	Recieved blood from
A	$I^A I^A$ or $I^A I^O$	A	B	A & AB	A & O
B	$I^B I^B$ or $I^B I^O$	B	A	B & AB	B & O
AB	$I^A I^B$	A&B	None	AB	AB,A,B & O
O	$I^O I^O$	None	A & B	A,B & AB	O

**4. Write a short note on the following**
**a. Hypertension:**
**b. Coronary Artery Disease:**
**Solution:**

a. Hypertension is the condition in which there is a constant increase in normal blood pressure (120/80mm Hg). Blood pressure equal to or above 140/90 mm Hg is considered hypertension. There are two types of hypertension. One is primary hypertension and the other one is secondary hypertension. Former is the Idiopathic Hypertension because the specific cause of the increased blood pressure is not known and the latter is the type of hypertension with a known cause

b. Coronary Artery Disease in which the arterial lumen get narrowed due to the buildup of fats and cholesterol which decreases the supply of oxygen to the body organs. It may also lead to the damaging of heart muscles. It is caused by smoking, obesity or can be hereditary. It can be prevented by regular exercise, eating healthy.

**5. In the diagrammatic presentation of heart given below, mark and label, SAN, AVN, AV bundles, a bundle of His and Purkinje fibres**

**Solution:**
