	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**Department: SCIENCE 2026 – 2027** **SUBJECT: BIOLOGY**	**Date: 22/07/2026**
Worksheet: 05 With answers	**UNIT- V- Human Physiology** **CHAPTER:15- Body fluids and circulation**	**Note:** **A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

I. MULTIPLE CHOICE QUESTIONS (1M)

1. Which of the following statements correctly details the properties of plasma proteins?
   A. Globulins are primarily required for the clotting or coagulation of blood.
   B. Albumins are primarily involved in the defense mechanisms of the body.
   C. Fibrinogens are major plasma proteins responsible for maintaining osmotic balance.
   D. Serum is plasma that lacks its clotting factors.

2. What is the average lifespan of an erythrocyte and where are they ultimately destroyed?
   A. 100 days; Red bone marrow
   B. 120 days; Spleen (the graveyard of RBCs)
   C. 7 days; Lymph nodes
   D. 120 days; Liver sinuses

3. An individual with Blood Group 'O' can receive blood only from a Type O donor because their plasma strictly contains which specific antibodies?
   A. Only anti-A antibodies
   B. Only anti-B antibodies
   C. Both anti-A and anti-B antibodies
   D. No antibodies are present in their plasma

4. If a healthy individual has a recorded heart beat rate of 72 beats per minute and a standard stroke volume of 70 mL, what is their exact calculated Cardiac Output?
   A. 5040 mL (approx. 5 Litres)
   B. 3600 mL (approx. 3.6 Litres)
   C. 7200 mL (approx. 7.2 Litres)
   D. 4900 mL (approx. 4.9 Litres)

5. In a standard electrocardiogram (ECG), which wave pattern is directly responsible for representing the depolarisation of the ventricles?
   A. P-wave
   B. T-wave
   C. QRS complex

D. S-T segment

6. Match the circulatory disorder with its clinical description:
   1. Hypertension - i. Acute chest pain when not enough oxygen reaches heart muscle
   2. Angina - ii. Blood pressure higher than normal (140/90 mmHg or above)
   3. Atherosclerosis - iii. Lumen of arteries becomes narrower due to calcium/fat deposits

   A.1-ii, 2-i, 3-iii
   B. 1-i, 2-ii, 3-iii
   C. 1-ii, 2-iii, 3-i
   D. 1-iii, 2-i, 3-ii

Two statements are given - one labelled as **Assertion (A)** and the other labelled as **Reason (R)**. Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C. Assertion (A) is true, but Reason (R) is false.
D. Assertion (A) is false, but Reason (R) is true.

7. Assertion(A): In Erythroblastosis foetalis, the mother is Rh-negative and the foetus is Rh-positive.
   Reason(R): In such cases, the mother prepares antibodies against the Rh antigen.

8. Assertion(A): The sinoatrial node is designated as the natural pacemaker responsible for regulating the human cardiac cycle.
   Reason(R): The sinoatrial node is capable of auto-excitation and generates the highest frequency of action potentials relative to any other nodal tissue in the heart.

9. Assertion(A): In the lymphatic system, lymph is known as tissue fluid.
   Reason (R): It comprises plasma proteins, RBCs and WBCs.

10. Assertion(A): The human heart is called myogenic because its rhythmic contractions are triggered by external impulses sent from the central nervous system.
    Reason(R): The autonomic nervous system can modulate the heart rate through the actions of the sympathetic and parasympathetic nerves.

II. VERY SHORT ANSWER TYPE QUESTIONS(2M)

11. What is the importance of plasma proteins?
12. Explain heart sounds
13. Why do we consider blood as a connective tissue?
14. What is the role of Megakaryocytes? Mention the location where these are present.

III. SHORT ANSWER TYPE QUESTIONS (3M)

15. Define the cardiac cycle and the cardiac output.
16. Draw a well-labelled diagram of the human heart and label the following parts:
    (i)Right ventricle

(ii) Vena cava
(iii) vein which carries oxygenated blood from lungs
(iv) Aorta
(v) AVN
(vi) bundle of his
(vii) Pacemaker
(viii) cardiac tendineae
(ix) Part which collects deoxygenated blood from various organ parts
(x) part which collects oxygenated blood from the right atrium.

17. Describe the mechanism of blood clotting after trauma where blood vessel injury is involved.

IV. CASE STUDY BASED QUESTIONS (4M)

18. A 60-year-old retired bank manager is admitted to the emergency ward after experiencing a sudden, crushing pain behind his breastbone during a morning walk. He describes the sensation as an intense squeezing that radiates down his left arm and up toward his neck. He mentions that he has had milder episodes of this chest pain over the past year, usually occurring during physical exertion and disappearing with rest. His medical history shows a long-standing history of consuming a high-fat diet, and a coronary angiogram reveals extensive calcium and cholesterol plaque deposits that have severely narrowed the inner channels of his heart arteries.
A. Identify the specific clinical condition characterized by the symptom of acute chest pain when insufficient oxygen reaches the heart muscle.
B. Name the structural circulatory disorder caused by the deposition of calcium, fat, cholesterol, and fibrous tissue in the arteries supplying the heart muscle.
C. State what happens to the lumen of the coronary arteries as a direct result of these tissue and fat deposits.
D. Name the condition that arises when the heart is not pumping blood effectively enough to meet the needs of the body, often resulting in lung congestion.

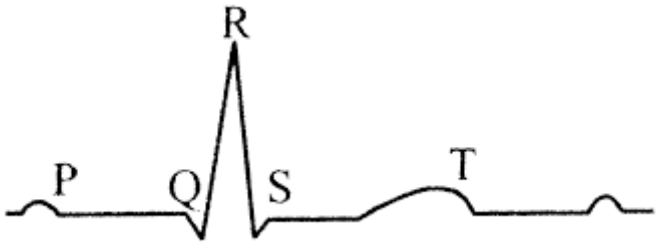
V. LONG ANSWER TYPE QUESTIONS (5M)

19. Describe electrocardiograph. Explain the importance of various peaks observed during this process.
20. Explain the cardiac cycle in humans. Also, provide a schematic plan of blood circulation in humans.

Answer Key

Q. No.	Answer
1	D. Serum is plasma that lacks its clotting factors
2	B. 120 days; Spleen (the graveyard of RBCs)
3	C. Both anti-A and anti-B antibodies
4	A. 5040 mL (approx. 5 Litres)
5	C. QRS complex
6..	A.1-ii, 2-i, 3-iii
	ASSERTION & REASONING
7.	A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of the Assertion (A).
8.	A. Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of

	the Assertion (A).
9.	C. Assertion (A) is true, but Reason (R) is false.
10.	D. Assertion (A) is false, but Reason (R) is true.
II	**VERY SHORT ANSWER TYPE QUESTIONS(2M)**
11.	Globulins – They are involved in the defence mechanism of the body and are also referred to as immunoglobulins. Albumins –They aid in maintaining the osmotic balance of the body. Fibrinogens – It plays a significant role in blood coagulation.
12.	Every cardiac cycle produces the two noises that a heartbeat produces: lub and dub. Every heartbeat is synchronised with the sound's sequential production. The initial low-pitched sound is "lub." It results from the closure of both the tricuspid and bicuspid valves. The second sound that is produced when the semi-lunar valve closes is called "dub." This is a high-pitched sound. When diagnosing any heart condition, both sounds are important.
13.	Blood is mesodermally generated and contains plasma, an extracellular matrix, it is a connective tissue. It is a tissue that is extensively dispersed and plentiful in the body. By joining and binding, connective tissues assist the body's other organs, supplying oxygen and other nutrients, removing waste from the body, and facilitating blood flow throughout the body. It is therefore regarded as a connective tissue.
14.	Megakaryocytes are specialized precursor cells responsible for producing blood platelets (thrombocytes). These platelets release a variety of substances that are essential for the initiation of blood coagulation (clotting) to prevent excessive blood loss during an injury. Megakaryocytes are strictly located inside the bone marrow.
III	**SHORT ANSWER TYPE QUESTIONS (3M)**
15.	Cardiac cycle • The alternate contraction and relaxation of the chambers of the heart cause the blood to circulate in the heart. • The relaxation or expansion phase is also referred to as diastole, whereas contraction is also referred to as systole. • Every systole is followed by a diastole. • The cardiac cycle is the series of events that take place in one complete heartbeat. It lasts for about 0.8 seconds. Cardiac output • It is the amount of blood that is pumped by each of the ventricles in a minute. • It is given by Cardiac output = Stroke volume x Number of heartbeats per minute
16.	Refer 15.2 Section of human heart from pg-198, NCERT
17.	➢ An injury or trauma stimulates platelets and damaged tissues at the wound site to release specific clotting factors. ➢ These released factors trigger a series of linked enzymatic reactions known as the cascade process. ➢ The cascade process culminates in the formation of an active macromolecular enzyme complex called thrombokinase. ➢ The thrombokinase complex converts the inactive plasma protein prothrombin into the active enzyme thrombin, a step that heavily requires Calcium ions (Ca^{2+}). ➢ Active thrombin converts the soluble plasma protein fibrinogen into insoluble fibrin

	strands. ➢ The fibrin strands form a network that traps dead and damaged formed elements, forming a dark reddish-brown clot or coagulum to stop bleeding.
IV	**CASE STUDY BASED QUESTIONS (4M)**
18.	A. Angina Pectoris. This is a symptom of acute chest pain that appears when not enough oxygen is reaching the heart muscle tissue.
	B**.** Atherosclerosis (also known as Coronary Artery Disease or CAD). This disorder is caused by the deposition of calcium, fat, cholesterol, and fibrous tissues inside the vessels that supply blood to the heart muscle.
	C. The lumen (or inner channel) of the coronary arteries becomes narrower**,** which severely restricts and reduces the volume of blood flow to the heart musculature.
	D. Heart Failure. This occurs when the heart is not pumping blood effectively enough to meet the metabolic needs of the body, and it is often characterized by fluid congestion in the lungs.
V	**LONG ANSWER TYPE QUESTIONS (5M)**
19.	ECG stands for electrocardiograph. It is a record of electrical events (depolarization and ventricles) during a cardiac cycle. ECG provide the following information in the form of waves/ peaks: P-wave: electrical excitation (or depolarisation) of the atria, which leads to the contraction of both atria. QRS complex: depolarisation of the ventricles, which initiates the ventricular contraction. T-wave: the return of the ventricles from excited to the normal state (repolarisation). The end of the T-wave marks the end of systole. 
20.	**Joint Diastole**: All four chambers are relaxed; the tricuspid and bicuspid valves are open, allowing blood into the ventricles, while semilunar valves are closed. **Atrial Systole**: The SAN generates an action potential, causing both atria to contract simultaneously, which increases blood flow into the ventricles by about 30 per cent. **Ventricular Systole**: Ventricles contract and atria relax; rising ventricular pressure closes the tricuspid and bicuspid valves, then forces open the semilunar valves to eject blood. **Ventricular Diastole**: Ventricles relax and pressure falls, causing the immediate closure of semilunar valves to prevent backflow of blood into the ventricles. **Cycle Completion**: Declining ventricular pressure allows the tricuspid and bicuspid valves to push open again; the chambers return to joint diastole, completing a 0.8-second cycle. (b) Figure 15.4, Page 202, NCERT

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