

<p>Plasma</p>	<p>55% of blood</p> <p>Contains- water (90-92%), Proteins (fibrinogen, albumins, globulins), minerals, glucose, lipids, amino acids, blood clotting factor</p>
<p>Serum</p>	<p>Plasma without the clotting factors</p>
<p>Formed elements</p>	<p>45% of blood</p> <p>Includes- Erythrocytes (RBC), Leucocytes (WBC) and Platelets</p>

RBC

Biconcave and without a nucleus, 5-5.5 million per cubic metre of blood

Hb- 12-16 g/dl of blood

Average lifespan 120 days

Graveyard of RBC- spleen

WBC

Have nucleus, 6000-8000 per cubic metre of blood

Granulocytes and agranulocytes

Granulocytes

Neutrophils (60-65%)- phagocytic

Eosinophils (2-3%)- allergic reactions

Basophils (0.5-1%)- secrete histamine, serotonin, heparin, involved in inflammatory reactions

Agranulocytes

Monocytes (6-8%)-
phagocytic

Lymphocytes (20-25%)- B
and T, involved in the
immune response

Thrombocytes

Platelets, 1,500,00-3,500,00
per cubic metre of blood

Involved in blood clotting

Lymph

Tissue fluid and contains
lymphocytes

Fat is absorbed through
lacteals

Transports, nutrients,
hormones and involved in
immune response.

Open circulatory system

Blood flows through open spaces called sinuses

E.g. Arthropods, Molluscs

Closed circulatory system

Blood flows through a closed network of blood vessels

E.g. Annelids, Vertebrates

Circulation in fishes

Single circulation

Two chambered heart,
1-atrium, 1-ventricle

Incomplete double circulation

In amphibians and reptiles, except crocodiles

Three chambered heart, 2-atria, 1-ventricle

Double circulation

In crocodiles, aves and mammals

Four chambered heart, 2-atria, 2-ventricles

Human heart

Origin- mesodermal

Four chambered and enclosed in the pericardium

Left atrium and ventricle- oxygenated blood

Right atrium and ventricle- deoxygenated blood

Tricuspid valve

Between right atrium and right ventricle

Produces 'lub' sound at the time of closure

Bicuspid valve

Mitral valve

Present between left atrium and left ventricle

Produces 'lub' sound at the time of closure

Semilunar valve

Present between- right ventricle and pulmonary artery, left ventricle and aorta

Produces 'dub' sound at the time of closure

SA node

Sino-atrial node

Present in the right atrium at the upper right corner

Pacemaker of heart, generates action potential or impulses (70-75/min)

AV node

Atrio-ventricular node

Present in the right atrium at the lower left corner

Cardiac output

The volume of blood pumped by each ventricle- 5 l/min (70 ml in each cardiac cycle)

P-wave in ECG

Excitation or depolarisation of atria

Leads to the initiation of contraction of atria

QRS complex in ECG

Excitation or depolarisation of ventricles

Leads to the initiation of contraction of ventricles

Number of QRS complex help in determining the heartbeats per minute

T-wave in ECG

Repolarisation of ventricles and end of systole

Tunica externa

Outer layer of arteries and veins, made up of fibrous connective tissues and collagen fibres

Tunica media

Middle layer of arteries and veins, made up of smooth muscles and elastic fibres

Thin in veins

Tunica intima

Inner lining of arteries and veins, made up of squamous endothelium

Pulmonary circulation

Deoxygenated blood from right ventricle goes to lungs by pulmonary artery and then oxygenated blood from lungs comes to left atrium by pulmonary vein

Systemic circulation

Oxygenated blood from left ventricle goes to aorta and to tissues by arteries and then deoxygenated blood from tissues are brought back to right atrium by veins and vena cava

Hepatic portal system

Hepatic portal vein carries blood from digestive tract to liver before going to systemic circulation

Myogenic heart

Autoregulation of normal heart activities, i.e. rhythmic contractions originate intrinsically

Neural regulation of cardiac activity

Under autonomic nervous system (ANS) control

Cardiac centres in medulla oblongata moderate heart activity

Sympathetic nerves-increase heartbeat and cardiac output

Parasympathetic nerves-decrease heartbeat and cardiac output

Hormonal regulation of cardiac activity

Adrenal medullary hormones epinephrine and norepinephrine increase the heartbeat