# CLASS X /BIOLOGY/ PERIOD 4

## TRANSPORTATION IN HUMANS

**In multicellular organism nutrients and oxygen are transported to various body cells and nitrogenous wastes and Carbondioxide are removed from these cells by extracellular fluid. This fluid flows throughout the body partially contacting each body cell. The flow of their extracellular fluid through the body is known as circulation and the organs associated with circulation form the circulatory system.**

**In vertebrates the circulatory system utilize two fluids :**

1. **Blood**
2. **Lymph**

**These constantly circulate in two separate pipeline systems. Each system comprises an extensive network of branched tubes, called vessels, spread into all parts or tissue of the body.**

**The two systems are called :**

1. **Blood circulatory system or vascular system**
2. **Lymphatic system**

**Blood vascular System :**

**This system has the following components :**

1. **Blood**
2. **Blood vessels (arteries, veins and capillaries)**
3. **Heart (central pumping organ)**

**Blood:** It is a fluid connective tissue circulating in the body within blood vessels. It constitutes about 7 to 8% of the body weight. The oxygenated blood is bright red where the deoxygenated blood is purple in colour.

## Components of Blood:

1. Plasma
2. Blood cells or corpuscles

**Plasma : It is a straw colored fluid and makes up about 60% of the total blood volume or about 5% of the body weight.**

**It contains:**

a) Water
b) Plasma proteins(serum albumin, globulin, fibrinogen
c) Mineral Salts(sodium chloride and sodium bicarbonate)
d) Digested nutrient materials ( carbohydrates proteins and fats)
e) Waste products of protein metabolism from the liver (urea, Uric acid, creatinine),
f) Hormones
g) Enzymes
h) Antibodies

## Blood Cells or Corpuscles :

1) Erythrocytes or Red Blood Corpuscles (carry Oxygen)
2) Leucocytes or White Blood Corpuscles (which provide immunity)
3) Blood platelets (it helps in the clotting of blood)

## Erythrocytes (RBC):

1) Erythrocytes are circular , biconcave and non-nucleated measuring in 7.5 mm in diameter.
2) Its number varies in males and females. In males its number is 5 to 5.5 million per mL and 4 to 4.5 million per mL in females
3) In erythrocytes respiratory pigment haemoglobin is found. It gives red color to the blood. It carries Oxygen from lungs to various parts of the body and brings carbondioxide to the lungs.

## Erythrocytes (RBC):

4) RBC are not true cell because they don't have nuclei.
5) The life span of red blood cells is about 120 days.
6) About 3 million of RBC dies daily whereas 4 times i.e. about 12 million per second are produced in the red bone marrow to replace destroyed RBCs.

   Therefore donation of blood is not harmful as it is replenished within 24 hours.

## Leucocytes (WBC):

1) Leucocytes are nucleated and show an amoeboid shape.
2) They are colourless.
3) They are larger in size than erythrocytes and fewer in number.
4) In children their number are more than the adults.
5) WBC squeeze out of capillaries and reach the site of infection to destroy foreign bodies.
6) WBC produce antibodies that provides immunity
7) They are called soldiers of the body.
8) They survive for 1-4 days and the worn out cells are destroyed in the blood.

**Platelets:**

1) These are small, oval, biconvex, disc like bodies
2) They appear spindle shaped.
3) These are colourless having granular cytoplasm but no nucleus.
4) It contains contractile protein called thromboplastin.
5) They play an important role in blood coagulation.
6) The platelets are formed in the red bone marrow
7) They survive for 3-7 days.

## Blood Vessels :

1) **ARTERIES : a)They carry oxygenated blood away from the heart. All the artery carry oxygenated blood except pulmonary artery.**

b) **Pulmonary artery carry deoxygenated blood.**

c) **Arteries have thick elastic muscular walls.**

d) **Arteries are deeply situated and carry blood under high pressure.**

e) **Blood flows in jerk with them.**

f) **Arterioles are the smallest tubule of the arterial system. They serve as distributors carrying blood from arteries to capillaries.**

g) **They act as resistance vessels and helps in maintaining blood pressure.**

**VEINS : a)Veins carry deoxygenated blood towards the heart.**

**b) All the veins carry deoxygenated blood except pulmonary vein.**

**c) Veins have thin and less muscular walls.**

**d) Small veins are called venules. These are formed from capillaries and join to form many veins.**

**e) They collect blood from various parts of the body and empty it in the heart**

**f) These are superficially situated and can be seen from the surface of the skin.**

**g) Blood flows smoothly and at low pressure through them.**

**h) The veins have internal valves and prevents backflow of blood.**

**CAPILLARIES : a)Capillaries are microscopic vessels that carry blood from arterioles to small veins.**

**b) The wall of capillaries are formed of a single layer of endothelial cells.**

**c) They lie in contact with the body tissues.**

**d)They supply food and oxygen to the tissue and cells and remove wastes.**

**e) The leucocytes squeeze out through the capillary walls into the surrounding tissue to attack the invading bacteria.**