



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore – 35

DEPARTMENT OF BIOMEDICAL ENGINEERING



Blood is a vital fluid in the human body that performs several essential functions.

1. Composition of Blood:

Blood is composed of plasma and formed elements. Plasma is the liquid portion, and formed elements include red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (thrombocytes).

2. Plasma:

Plasma makes up about 55% of total blood volume.

It is a yellowish fluid that consists of water, electrolytes, proteins, hormones, waste products, and gases.

The major proteins in plasma include albumin, globulins, and fibrinogen.

3. Red Blood Cells (Erythrocytes):

Erythrocytes are the most abundant cells in blood.

They contain hemoglobin, a protein that binds and carries oxygen.

The shape of red blood cells is biconcave, providing a large surface area for gas exchange.

4. White Blood Cells (Leukocytes):

Leukocytes are involved in the immune response and defense against infections.

There are different types of white blood cells, including neutrophils, lymphocytes, monocytes, eosinophils, and basophils.

5. Platelets (Thrombocytes):

Platelets are small cell fragments involved in blood clotting (hemostasis).

They help in the formation of a platelet plug and release clotting factors to initiate the coagulation cascade.

6. Hemostasis:

Hemostasis is the process that prevents and stops bleeding.

It involves three main steps: vascular spasm, platelet plug formation, and coagulation (blood clotting).



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7. Blood Clotting Cascade:

The coagulation cascade involves a series of enzymatic reactions that lead to the formation of fibrin, which reinforces the platelet plug and stabilizes the blood clot.

Factors involved in the clotting cascade include fibrinogen, prothrombin, and various clotting factors.

8. Blood Typing:

Blood types are determined by the presence or absence of specific antigens (A and B antigens) on the surface of red blood cells.

The ABO blood group system classifies blood into four main types: A, B, AB, and O.

9. Rh Factor:

The Rh factor is another antigen present on the surface of red blood cells.

Individuals can be Rh-positive (+) or Rh-negative (-).

10. Blood Gas Exchange:

Blood plays a crucial role in transporting oxygen from the lungs to tissues and carbon dioxide from tissues to the lungs.

Hemoglobin binds with oxygen in the lungs and releases it in the peripheral tissues.

11. Blood pH Regulation:

The bicarbonate ion (HCO_3^-) system in the blood helps regulate pH and maintain acid-base balance.

Buffers in the blood help prevent rapid changes in pH.

12. Transport of Nutrients and Waste Products:

Blood carries nutrients absorbed from the digestive system to cells for energy production.

Waste products generated by cells, such as carbon dioxide and urea, are transported by blood to organs for elimination.