BLOOD CLOTTING:

- As long as the blood is in blood vessels, it is in fluid state.
- When the blood is shed, it loses its liquid property in 3 - 6 minutes and sets as a semi solid jelly.
- This phenomenon is called blood clotting (blood coagulation or haemostasis).
- Coagulation prevents further loss of blood, seals the wound and prevents the entry of microbes.
- Blood clotting is a change in plasma. When the blood clot is allowed to stand for a longer time, it contracts and a light yellow fluid known as **serum** settles on it.
- Serum does not contain plasma proteins, prothrombin and fibrinogen. Hence serum is different from plasma.
- The blood clot is known as **thrombus.** A free floating blood clot of the blood stream in the blood vessel is called **embolus.**

Mechanism of blood clotting:

- Clotting is cascade of complex enzymatic reaction. Each factor activates the many molecules of the next reaction. Clotting involves three major steps.
- Step – I: Fromation of **prothrombinase.** It is formed in two pathways. One is the **intrinsic pathway** from platelets, and the other is the **extrinsic pathway** from damaged tissues. Intrinsic pathway is initiated by Hageman factor.
- Step – II: Prothrombinase converts prothrombin into **thrombin**.
- Step – III: Thrombin converts soluble fibrinogen into soluble **fibrin.** These fibres are stabilised by factor XIII as insoluble fibres.
- Once a clot is formed, it plugs the ruptured area of the blood vessel and stops the bleeding of the blood.
- **Clot reaction** occurs later. It tightens the fibrin clot. The fibrin thread attached to the damaged surface of blood vessels contract, pulling the damaged edges closer together.
- Platelets release factor-XIII, which stabilises and strengthens the clot.
- Blood clotting is a complicated process, which involves a series of reactions. About thirteen factors are involved in the process of blood clotting. VI factor is omitted now.

Blood clotting factor	Common name / Chemical name
Factor I	Fibrinogen of plasma
Factor II	Prothrombin of plasma
Factor III	Thromboplastin from tissues and platelets
Factor IV	Calcium ions of plasma
Factor V	Stable factor, or proconvertin
Factor VII	Anti haemophilic factor A(AHF-A)
Factor VIII	Christmas factor, Antihaemophilic factor B (AHF-B)
Factor IX	Stuart factor, Prower factor, or thrombokinase
Factor X	Antihaemophilic factor C(AHF-C)
Factor XI	Fibrin stabilising factor
Factor XII	
Factor XIII	

Role of calcium ions in blood clotting:

- Calcium ions are required in both extrinsic and intrinsic pathways. Hence calcium ion removers are used in storing the blood in blood banks.
- EDTA (ethylene diamine tetraacetic acid) or citrates and oxalates are used to remove calcium from the blood

Role of vitamin K in blood clotting

- Vitamin K is required of the synthesis of factors II, VII, IX and X. These factors are synthesised by hepatic cells of liver.

Haemostatic control mechanism:

- **Heparin** is an anticoagulant that is produced by mast cells and basophils
- It prevents the action of thrombin. Heparin increases the activity of antithrombin. **Coumadin** of plant origin is antagonistic to Vitamin-K.

- Narrowing blockage of coronary artery leads to **coronary artery disease**. (CAD)
- The blood vessel from another part of the body is grafted to a coronary artery to bypass an area of blockage in **Bypass surgery**
- Inflating the balloon to stretch the arterial wall and to squash the artherio sclerotic playque is done in **coronary angioplasty**
- Blood flow to myocardium is partially abstracted in **myocardial ischemia**
- Severe pain accompanying myocardial ischemia is known as **angina pectoris**