EXPERIMENT NO.: 14. a **DATE:**

AIM: STUDY OF CARDIOVASCULAR SYSTEM WITH THE HELP OF CHART AND MODELS.

REQUIREMENTS: Models, charts and specimens of cardiovascular system

THEORY:

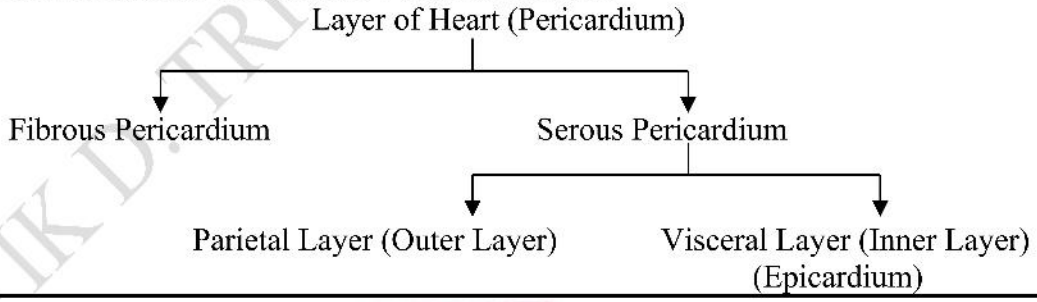
Cardiovascular is the system which includes the study of the heart, blood vessels and blood. These system is some time known as circularly system because it circulate or transport the nutrients, oxygen, carbon dioxide and essential molecules from environment to cells and cells to environment. It is involuntary in nature and gives continuous work. The heart propelling or impelling blood around 100,000 km of blood vessels and it pumps 7200 to 7500 liters blood in day and 2.5 to 2.6 million liters in year.

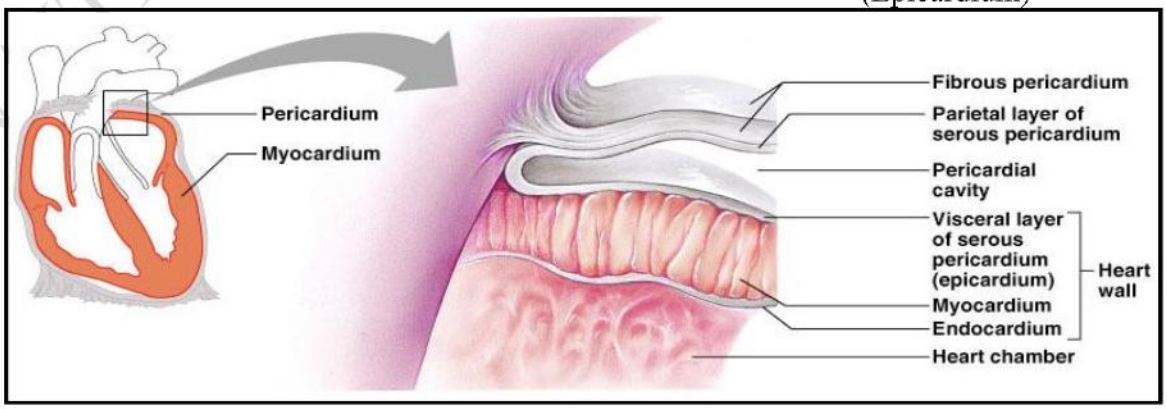
LOCATION OF HEART:

- Cone shaped heart is relatively small, about the same size of closed fist of person.
- It is 12 cm (5 in.) long, 9 cm (3.5 in.) wide and 6 cm (2.5 in.) thick.
- In an adult, average weight of heart is 300gm.
- The heart consist four chambers:
  - **a)** Two atria or atrium
  - **b)** Two ventricles
- It is located near to the middle of thoracic cavity in the mediastinum (the space between the lungs) and it rest on to the diaphragm.
- About two third of the mass of the heart lies to the left of the body's midline.
- Pointed end portion which is formed by the tip of left ventricle is known as apex and opposite to apex the wide superior and posterior margin is known as base.

LAYER OF THE HEART:

- Heart layer is formed by pericardium ("around the heart") which is triple-layered fluid-filled sac that surrounds and protects the heart.
- The pericardium consist of two principle portion



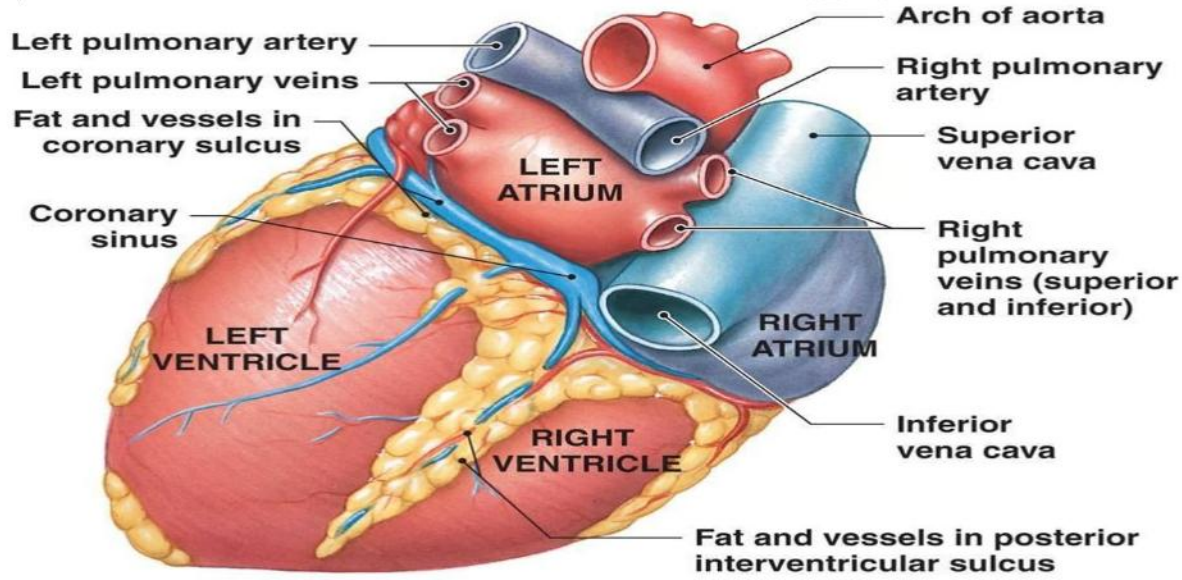


WALL OF THE HEART:

- The wall of the heart is formed by three layers:
  - **a) Epicardium (External layer):**
    - It is also known as the visceral layer of the serous pericardium.
    - It is composed of mesothelium and delicated connective tissue.
    - It is the outer or external wall of the heart.
  - **b) Myocardium (Middle layer):**
    - Myo means muscles so it is made up by cardiac muscles tissue.
    - It provides the bulkiness to the heart and it is responsible for the pumping action of heart.
  - **c) Endocardium (Inner layer):**
    - The endocardium is an innermost, thin, smooth layer of epithelial tissue that lines the inner surface of the heart chambers and valves.

INTERIOR OF THE HEART:

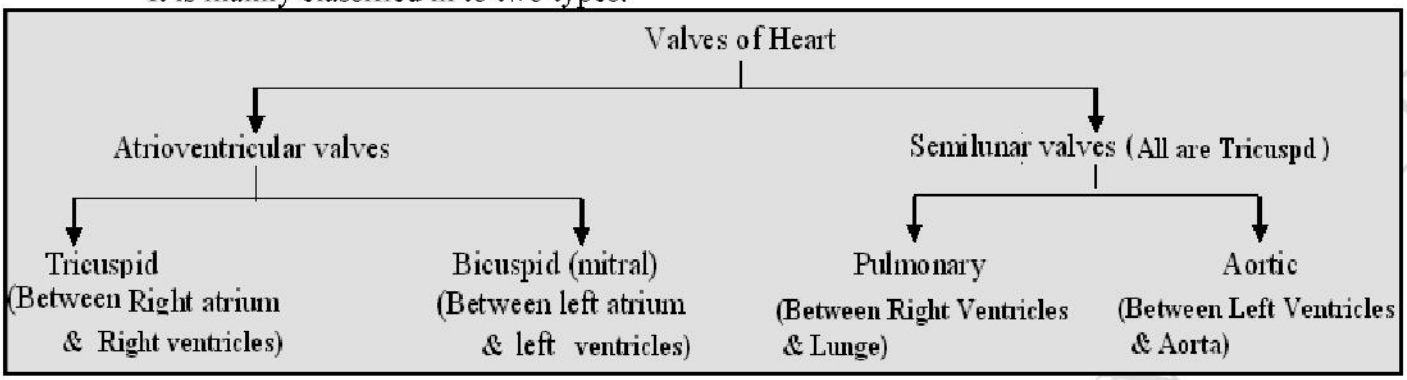
- The heart is divided in to right and left side by partition known as the septum which is made up by myocardium covered by epithelium
- **a) Chamber of heart:**



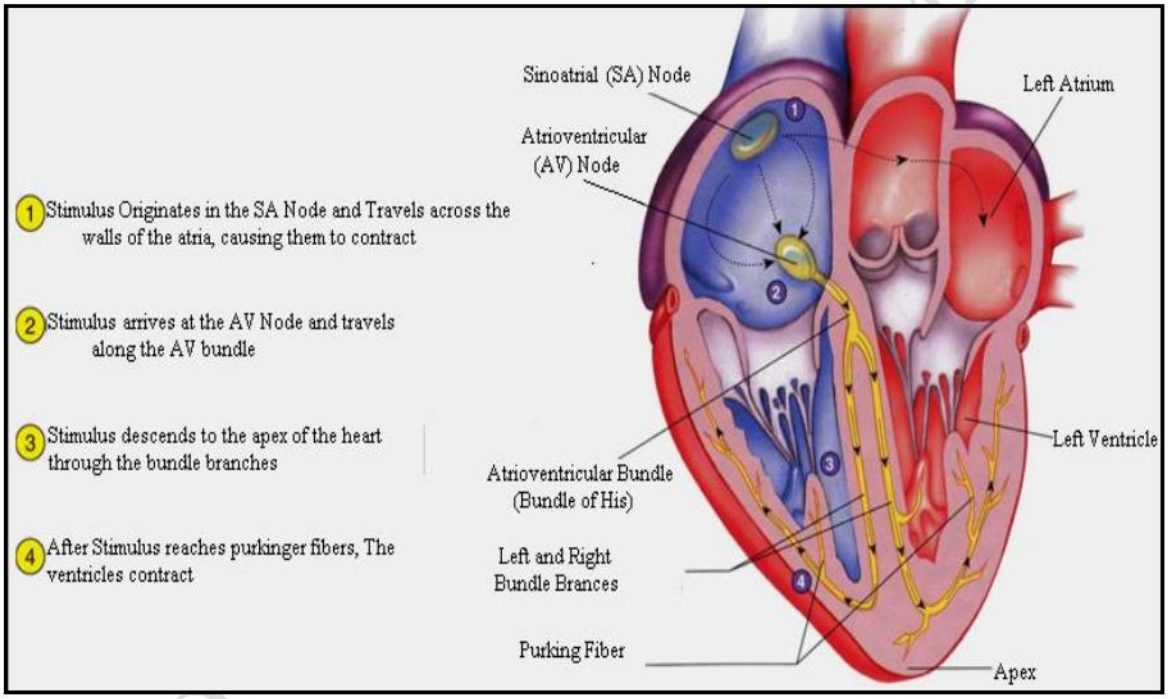
  - Heart consists of four chambers;
  - **i) Two atria:**
    - The two superior chambers are known as right atrium and left atrium.
    - The posterior wall of the atrium is smooth surface while the anterior wall of the atrium is rough surface.
    - On the surface of the atrium is wrinkle pouch like structure is known as auricle because it resemble like dog ear.
  - **ii) Two ventricles**
    - The two inferior are known as right ventricle and left ventricles.
- On the surface of heart grooves like structures known as coronary sulcus which separate the atria to ventricle.
- The thickness of the wall of the four chambers varies according to their function.
- **Example:** The wall of the atria is thin and it pumps blood in to ventricles & the ventricle wall is thick in which right ventricle pumps blood in to lungs and left ventricle pumps blood in to aorta so the work load on left ventricle is high because of that the wall of left ventricle is two to four times thicker than right ventricle.

b) Valve of the heart:

It is mainly classified in to two types:



HEART CONDUCTION SYSTEM:



SA-node➔ AV-node➔ AV bundle➔ Right & Left Bundle braches➔ Purkinje fibers

CARDIAC CYCLES:

"A cardiac cycle include all the events associated within one heart beat"

- The normal heart beats in healthy adult is 75 beats/min and cardiac cycle last for 0.8 sec.
- Cardiac cycle is described by the following phase:
  1. Atrial systole
  2. Ventricular systole:
  3. Ventricular Diastole or Relaxation period:

Time	*Atria*	*Ventricles*	*Atrioventricular Valves (tricuspid, bicuspid)*	*Semilunar Valves (pulmonary, aortic)*
0.15 sec	Systole	Diastole	open	closed
0.30 sec	Diastole	Systole	closed	open
0.40 sec	Diastole	Diastole	open	closed

CARDIAC OUTPUT:

- Cardiac output is the amount of blood ejected from the left ventricle (or the right ventricle) in to the aorta (or pulmonary trunk) each minute and it is equal to the product of stroke volume and heart rate.

Thus,

Cardiac Output = Stroke volume (ml/beat) * Heart rate (beats/min)
= 70 ml/beat * 75 beats/min
= 5250 ml/min or 5.25 liters/min.

Note: Stroke volume = EDV – ESV = 130 ml/beat – 60 ml/beat = 70 ml/beat

SIGNATURE OF TEACHER