Study Guide Heart

1. **Heart** is a pumping organ that lies beneath sternum in mediastinum. Apex of the heart is tilted to the left side. The left side ventricle beats stronger and aorta passes from the left side; we feel the heart on left side of chest.

2. **Pericardium** – It is a serous membrane; outer parietal pericardium and inner visceral pericardium, cavity filled with pericardial fluid makes the frictionless movements of heart. Outer pericardium is fixed to diaphragm.

3. **Histology of Heart**: 3-layers of heart wall = Epicardium – visceral epithelium and connective tissue, Myocardium – is the thickest middle layer of cardiac muscles and inner Endocardium – Connective tissue and endothelium.

4. Myocardium has cardiac muscle fibers with striations, intercalated discs and branched muscle fibers.

5. **Systemic and pulmonary circuits** – Pulmonary Circulation: RV → pulmonary trunk → pulmonary arteries → capillary beds in lungs → pulmonary veins → LA
   
   Systemic Circulation: LV → Aorta → arteries → capillary beds in organs/tissues → veins → Superior/ Inferior vena cava → RA

6. **Flow of Blood** through heart and records Pulmonary and Systemic circuits. Superior and Inferior Vena cava → Right Atrium → Tricuspid valve → right ventricle → semi-lunar valve → pulmonary trunk → pulmonary artery → Capillary bed in Lungs → pulmonary veins → left atrium → bicuspid valve → left ventricle → semi-lunar valve → aorta → capillary beds in tissues of body → superior and inferior vena cava.

7. **Heart Sounds**: Lubb – 1st sound of heart caused due to closure of AV valves; Dupp – is the 2nd sound of heart caused due to closure of Semi-lunar valves. Lubb-Dupp ………………………. Lubb-Dupp ………………………. Lubb-Dupp ………………………

8. **Bicuspid valve = Mitral’s valve** is formed of 2 cusps and **tricuspid valve** is formed of 3 cusps.

9. **Chordae Tendinae** – White collagenic cords are attached to cusps of valves at one end and fixed to muscles of ventricles at the other end. These help in keeping the cusps in position and prevent back-flow of blood into atria.

10. **Coronary circulation**: left and right coronary arteries supply blood to the muscles of heart. This blood is returned through coronary veins and coronary sinus to right atrium.

11. Contraction of heart = **Systole**, Relaxation of heart = **diastole**

12. **Conduction system** is formed of special cardiac muscle fibers and has 5 parts: SA node, AV node, AV bundle, Bundle branches, and Purkinje fibers.

   a. **SA Node** is sino-atrial node. It lies in RA near the base of superior vena cava. It acts as the pace maker of heart because it possesses a spontaneous rhythmic contraction. It stimulates the atria for contraction. SA node also stimulates AV node.

   b. **AV node** is present in interatrial septum. It receives the impulse from SA node and passes the action potential to AV bundle

13. **Cardiac Cycle**

   a. **Ventricular Filling**: AV valves = open, SL valves = closed Atria and ventricles filling with blood

   b. **Atrial contraction** and Ventricular Filling – ventricles filling with blood
c. **Isovolumetric Ventricular Contraction:** Both AV and SL valves closed – it is to raise Blood pressure above than that of main arteries.

d. **Ventricular Ejection:** AV valve = closed but SL valve open

e. **Isovolumetric Ventricular Relaxation:** Both AV and SL valves closed – it is to lower Blood pressure than that of atria.

14. **Flow of blood** is Superior and Inferior Vena cava → Atria → Ventricles → Pulmonary and Aortic trunks. The part receiving blood always has lower blood pressure than part passing blood into it.

15. **Hormonal Regulation** – Epinephrine and Norepinephrine increase both heart beat and stroke volume. Thyroid hormone and Glucagon increase force of contraction = stroke volume.

16. **Sympathetic NS** – post ganglionic nerve fibers release Norepinephrine and increase both heart beat and stroke volume. Stimulant.

17. **Parasympathetic NS** – post ganglionic nerve fibers release Acetylcholine and decrease force of contraction. Inhibitor.

Recap Heart

1. Heart lies _________ of chest.
2. Heart feels on the left side because its _______ lies on left side and ________, major artery also passes on left side.
3. Heart is covered by a double serous membrane, the ____________.
4. Cardiac muscle fibers form the thicker middle layer ________.
5. _________ and __________ vena cava open into ______________ ________________ of heart.
6. Right atrium opens into right ventricle through ______________ _______.
7. RV passes blood to pulmonary trunk through ______________ valve.
8. Pulmonary arteries carry oxygen- ___________ blood to lungs.
9. Pulmonary veins carry oxygen - ____________ blood to ___________ of heart.
10. Closure of AV valves produces 1st sound of heart ____________.
11. Closure of semi-lunar valves produces the 2nd sound of heart ____________.
12. AV valve on left side is ______________ and on right side is ______________.
13. White thin long stiff structures present in ventricles are ___________ ____________.
14. ____________ arteries supply blood to walls of heart and arise from aorta.
15. ____________ veins collect blood from walls of heart and open into ______________ _______ that open into right atrium.
16. ____________ is the pace maker of heart.
17. Contraction of ventricles is caused due to depolarization of ____________.
18. Pulmonary circulation carries oxygen poor blood from __________ of heart to lungs through ____________ and brings oxygen rich blood to ____________ of heart through ____________.
19. Contraction of heart is ____________ and its relaxation is ____________.  
20. Systolic pressure of a young healthy adult is _________mm/Hg and diastolic pressure is _________mm/Hg.
21. When blood is passing from ventricles to main arteries __________ valve is open and blood pressure in ventricles is _________ than blood pressure in main arteries.
22. Sympathetic NS releases Epinephrine which _________ heart beat and stroke volume.
23. Parasympathetic NS releases Acetylcholine which _________ heart beat.