

Aim :- To identify the appendicular bones and axial bones with the help of human skeleton system model.

Reference :-

A practical book of "human anatomy and physiology" by Dr. Shilpa A. Deshpande, Dr. Niraj S. Vyawahare, 4th Edition of Nirali Prakashan, Page No.: 3-5.

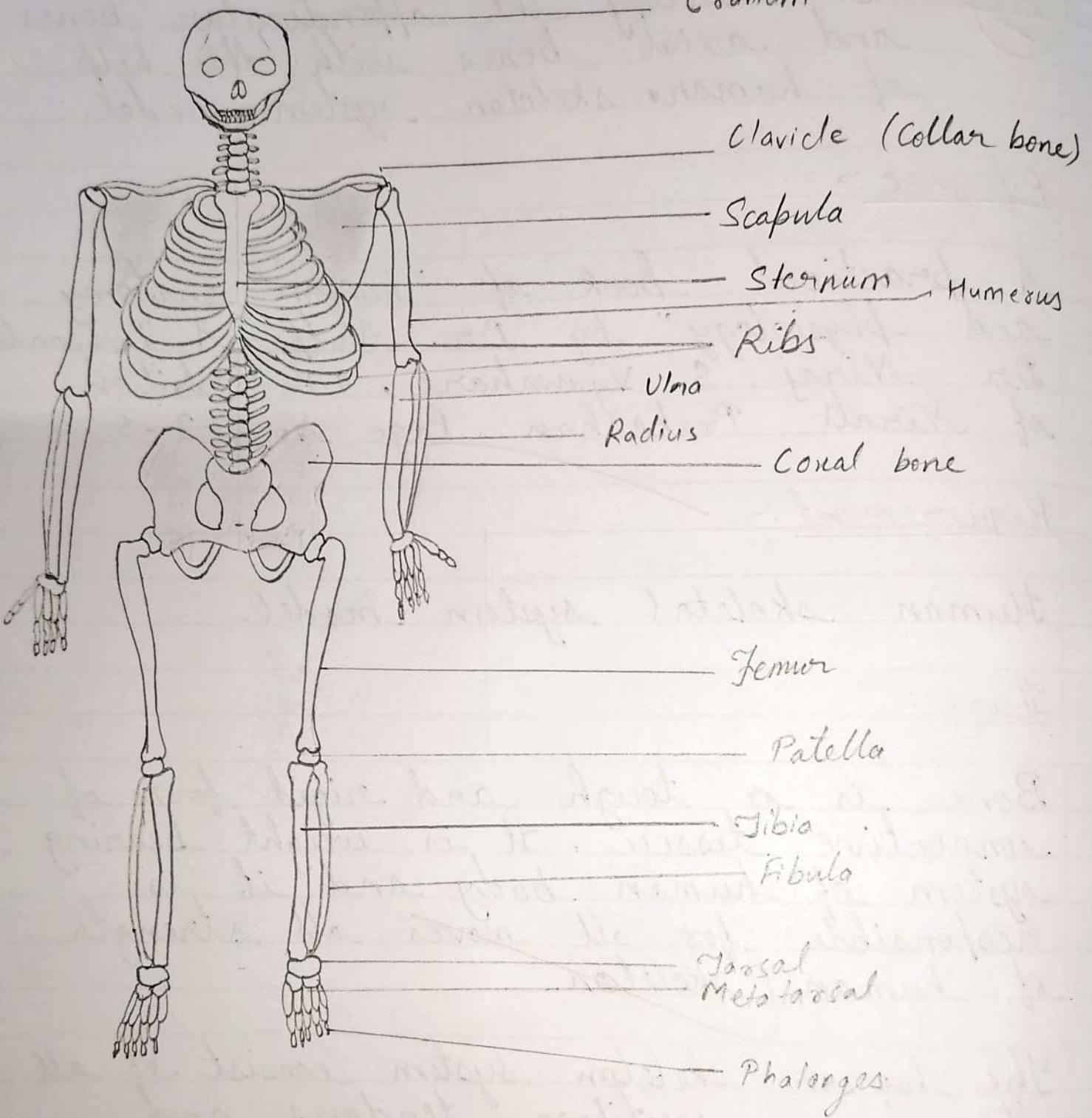
Requirement :-

Human skeletal system model.

Theory :-

Bone is a tough and rigid form of connective tissue. It is weight bearing system of human body and it is responsible for all moves, all strength of human skeleton.

The human skeleton system consist of all the bones, cartilage, tendons and ligaments in the body.



Human Skeleton System

The human skeleton system is divided into two parts :-

- i) Axial skeleton
- ii) Appendicular skeleton

The axial skeleton consist of :-

- i) The skull.
- ii) The sternum.
- iii) The ribs.
- iv) The vertebral column.

The appendicular skeleton consist of :-

- (i) The upper extremities
- (ii) The lower extremities
- (iii) The shoulder girdle
- (iv) The pelvic girdle

Composition of bones :-

(a) Axial bone (80)

- Skull (22 bone)
- Cranial bone - (8 bone)
- Facial Bone - (14 bone)

(i) Cranial bone consist of :-

- Frontal bone (1)
- Parietal bone (2)
- Occipital bone (1)

- Temporal bone (2)
- Sphenoid bone (1)
- Ethmoid bone (1)

(ii) Facial bone consist of 14 bones:-

- Nasal bone (2)
- Zygomatic bone (2)
- Lacrimal bone (2)
- Vomer (1)
- Parietale bone (2)
- Inferior nasal conchae (2)
- Maxilla (2)
- Mandible (1)

(b) Middle ear bone

- Malleus (2)
- Incus (2)
- Stapes (2)

(c) Hyoid bone

(i) Thoracic cage (Rib cage) 25

- Ribs (24)
- Sternum (1)

(ii) Vertebral column (26)

- Cervical vertebrae (7)
- Thoracic vertebrae (12)
- Lumber vertebrae (5)
- Sacral vertebrae (5)
- Coccyx vertebrae (1)

(2) Appendicular skeleton : (126)

- (a) → Upper limb (30 + 30)
- Humerus (2)
 - Ulna (2)
 - Radius (2)
 - Carpals (16)
 - Metacarpals (10)
 - Phalanges (28)

(a) Lower limbs :-

- Femur (2)
- Tibia (2)
- Fibula (2)
- Patella (2)
- Tarsal (14)
- Metatarsal (10)
- Phalanges (28)

- Clavical (2)
- Scapula (2)
- Hip bone (2)

Conclusion:

The human skeleton was studied and discuss with help of model.

X

Aim :-

To study the different types of tissues with the help of models.

Reference :-

A book of "Human Anatomy and physiology".
N.N. Yalayyarswamy, C.B.S Publishers,
4th Edition, Page no - 8 to 19.

Requirement:

Different types of models of body tissues.

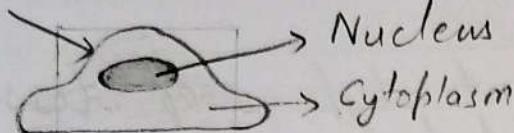
Theory :-

The tissues of the body consist of large numbers of cells, arranged in sheets, intercellular matrix is minimum and cells are situated on basement membrane.
e.g. skin. They are classified into four principal types according to their function and structure.

1. Epithelial tissues
2. Connective tissues
3. Muscle tissues
4. Nervous tissue.

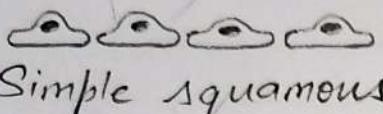
Epithelial Tissue

Cell membrane



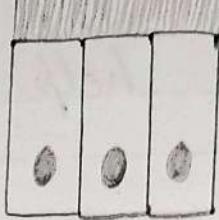
Nucleus

Cytoplasm

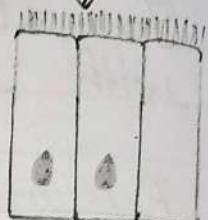


Simple squamous

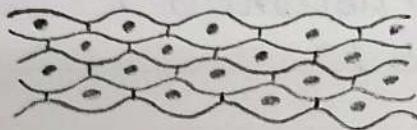
Cilia



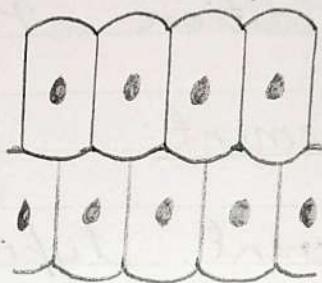
Microvilli



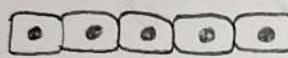
Simple columnar



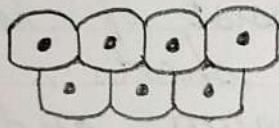
Stratified squamous



Stratified columnar



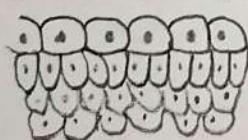
Simple cuboidal



Stratified cuboidal



Pseudostriatified
columnar



Transitional

Epithelial Tissue

- Epithelial tissues are widespread throughout the body.
- They form the covering of all body surfaces, line body cavities and hollow organs, and are the major tissue in glands.
- They perform a variety of functions that include protection, secretion, absorption, excretion, filtration, diffusion, and sensory reception.
- The cells in epithelial tissue are tightly packed together with very little intercellular matrix.
- Because the tissue ~~are~~ tightly form coverings and linings, the cells have one free ~~structures~~ surface that is not in contact with other cells.
- This membrane is a mixture of carbohydrate and proteins secreted by the epithelial and connective tissue cells.

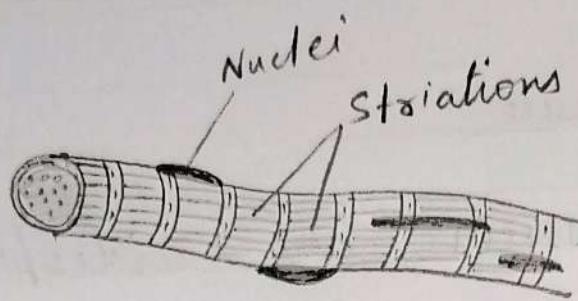


Fig :-(a) Striated muscles.

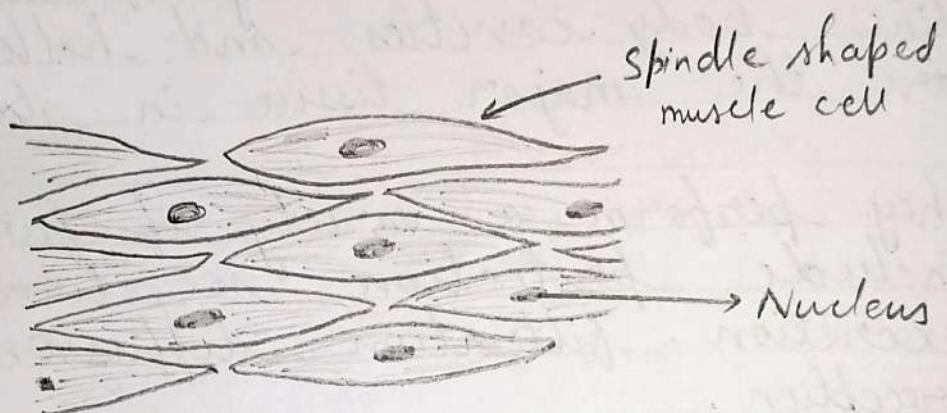


Fig :-(b) Smooth muscle

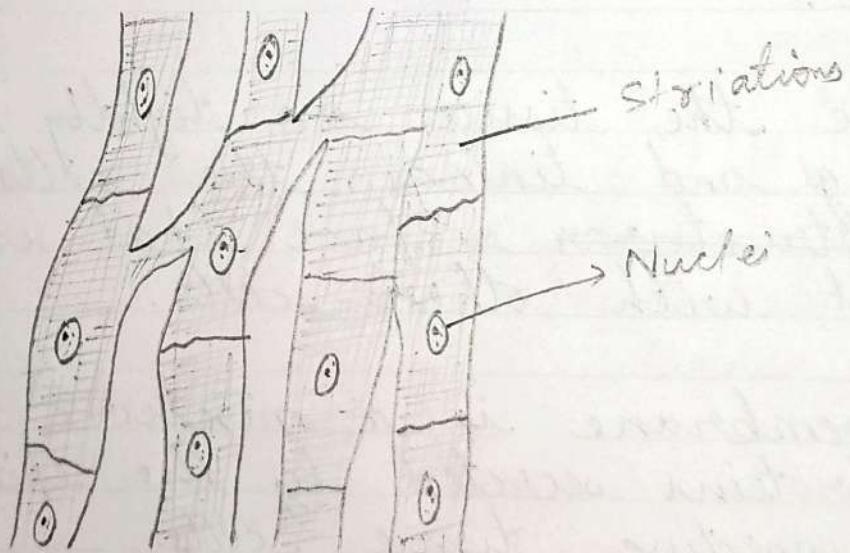


Fig :-(c) Cardiac muscle :

• Epithelial cells may be squamous, cuboidal, or columnar in shape and may be arranged in single or multiple layers.

★ Muscle tissue: is a specialized tissue found in animals which functions by contracting, thereby applying forces to different parts of the body.

Function of Muscle Tissue :

Muscle tissue functions as a single unit, and is often connected to the same nerve bundles.

A nerve impulse travelling from the brain or another outside signal tells the muscle to contract.

At the cellular level, each muscle cell has a complex of proteins containing actin and myosin.

Muscle tissue can be used to move bones, compress chambers, or squeeze various organs.

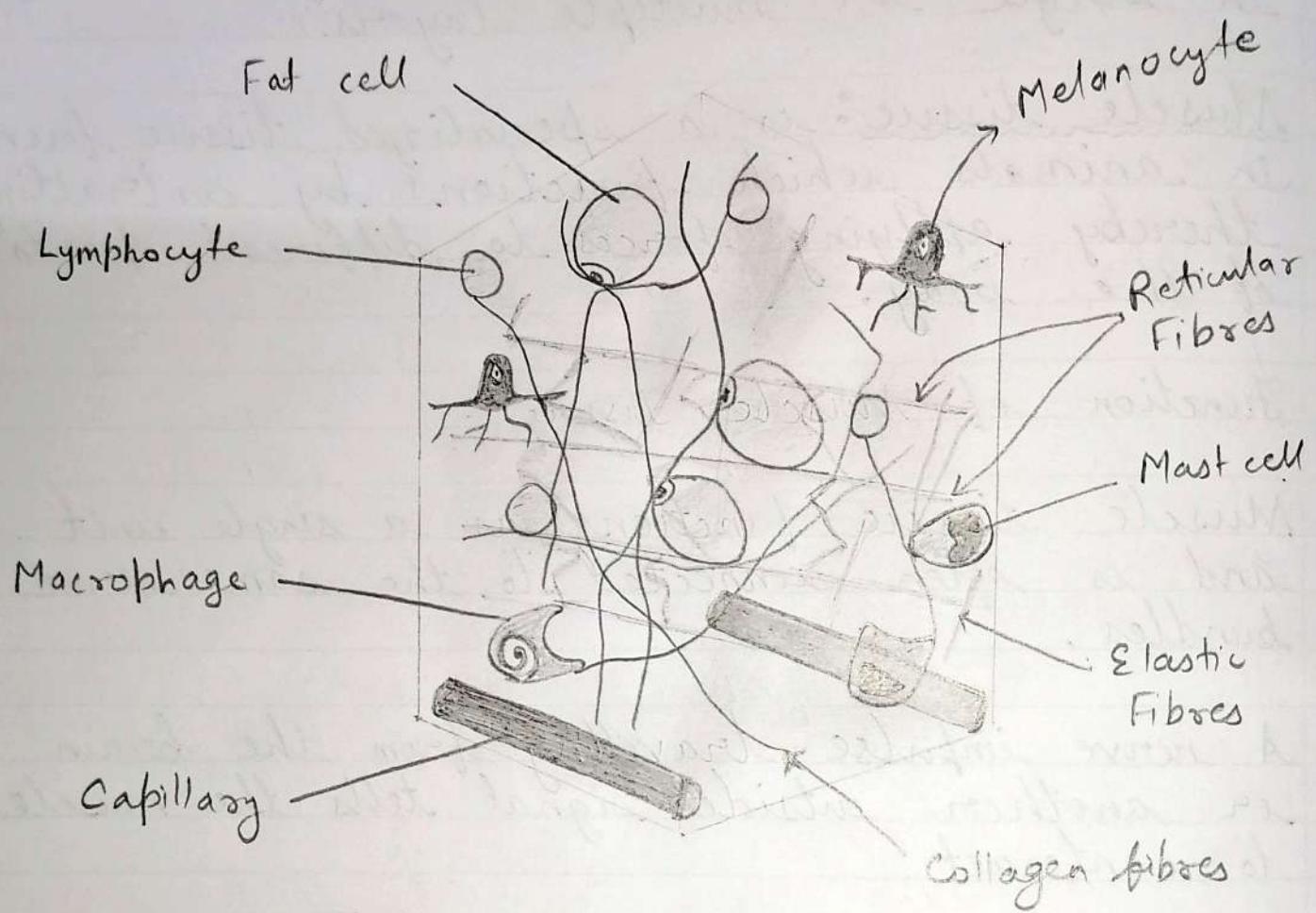


Fig :> Connective Tissue

Connective Tissue:

Connective tissue, as the name implies, support and connect different tissues.

The elasticity, flexibility and strength of the connective tissues are due to fibres.

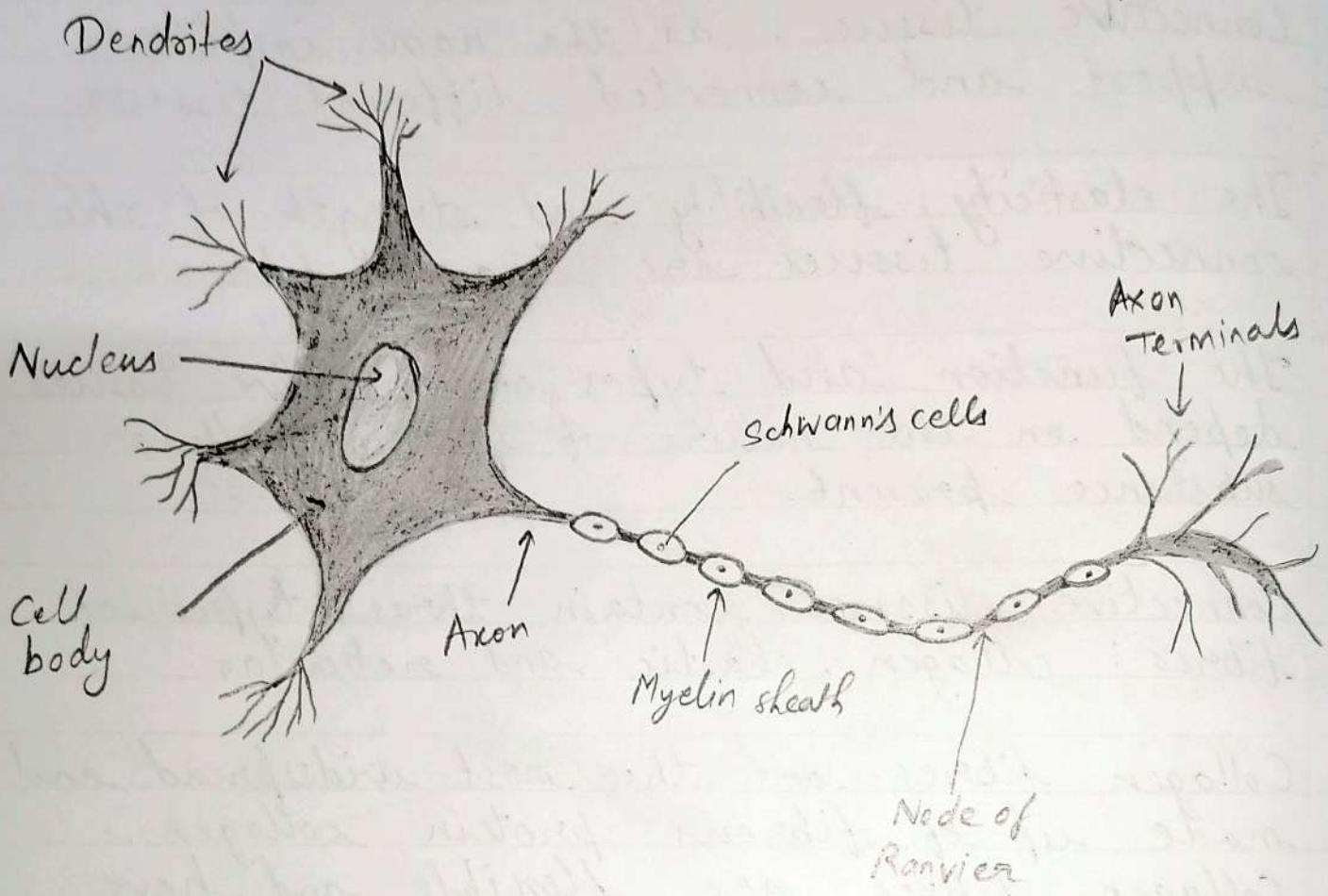
The function and types of connective tissues depend on the nature of the intercellular substance present.

Connective tissues contain three types of fibres: collagen, elastic and reticular.

Collagen fibres are the most widespread and made up of fibrous protein, collagen.

Collagen fibres are flexible and have high tensile strength (comparable to steel).

Elastic fibres form a network and can be stretched like a rubber band. They are made up of protein elastin. They retain their original shape and size once the force is removed.



Reticulate fibres consist of collagen and glycoproteins. They are thin and form a delicate network. They join connective tissues to neighbouring tissues.

Fibroblasts are found in developing tissues and play an important part in wound-healing. They are spindle-shaped and present between collagen fibres. They secret tropocollagen and other substances found in the matrix.

Macrophages are also known as scavenger cells. They wander through connective tissues, clear up debris and remove bacteria and other antigens by phagocytosis.

Nervous Tissue :

Nervous tissue is the term for groups of organized cells in the nervous system, which is the organ system that controls the body's movements, sends and carries signals to and from the different parts of the body, and has a role in controlling bodily function such as digestion.

Nervous tissue is grouped into two main categories : neurons and neuroglia.

Function of Nervous Tissue :

Nervous tissue makes up the nervous system.

The central nervous system (CNS) is composed of the brain and spinal cord, which coordinates information from all areas of the body and sends nerve impulses that control all bodily movements.

The peripheral nervous system (PNS) consists of peripheral nerves that branch all throughout the body. It connects the CNS to the rest of the body and is directly responsible for controlling movements of specific parts of the body.

Conclusion :-

The study of different types of tissues with the help of models was done successfully.

Aim :-

To study the different body system with the help of charts and models.

Reference :-

Waugh Anne, Grant Alison "Anatomy and physiology in health and illness" Elsevier publication. 13th edition page no. 48 - 55.

Requirement :-

Chart and models → The different type of system which are present in human body are as follow.

Theory :-

- 1 Nervous system: The nervous system consists of the central nervous system (which are brain and spinal cord) and peripheral nervous system. The brain is the organ of thought, emotion and sensory processing and serve many aspect of the communication and controls various other system and function.

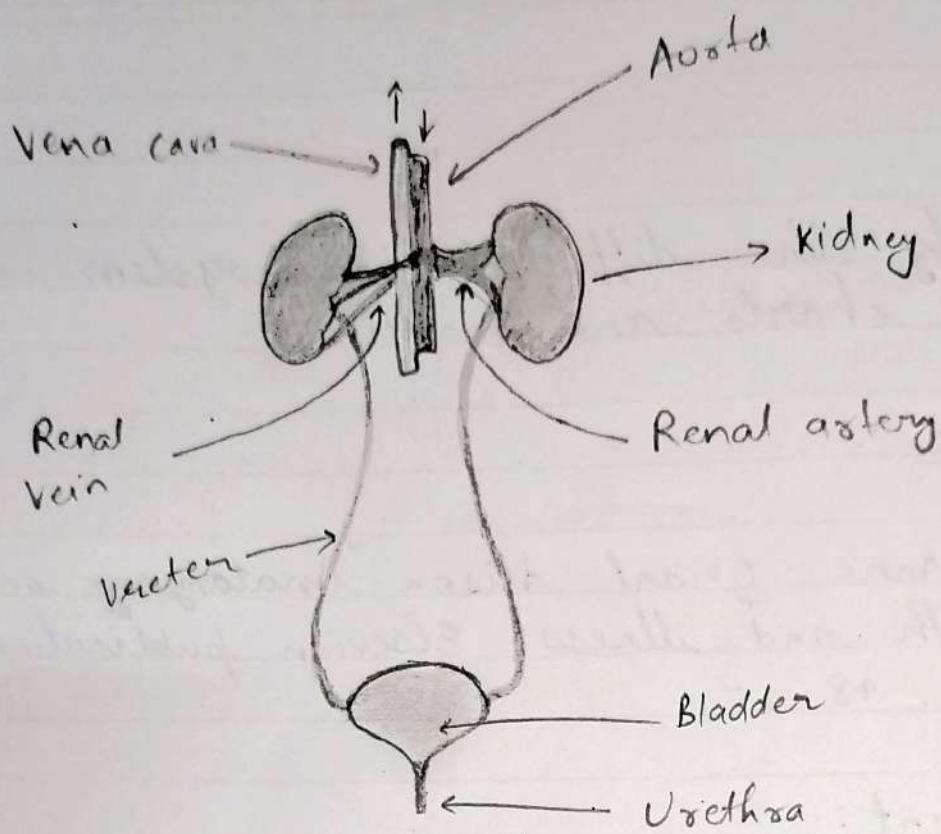


Fig :- The human Excretory

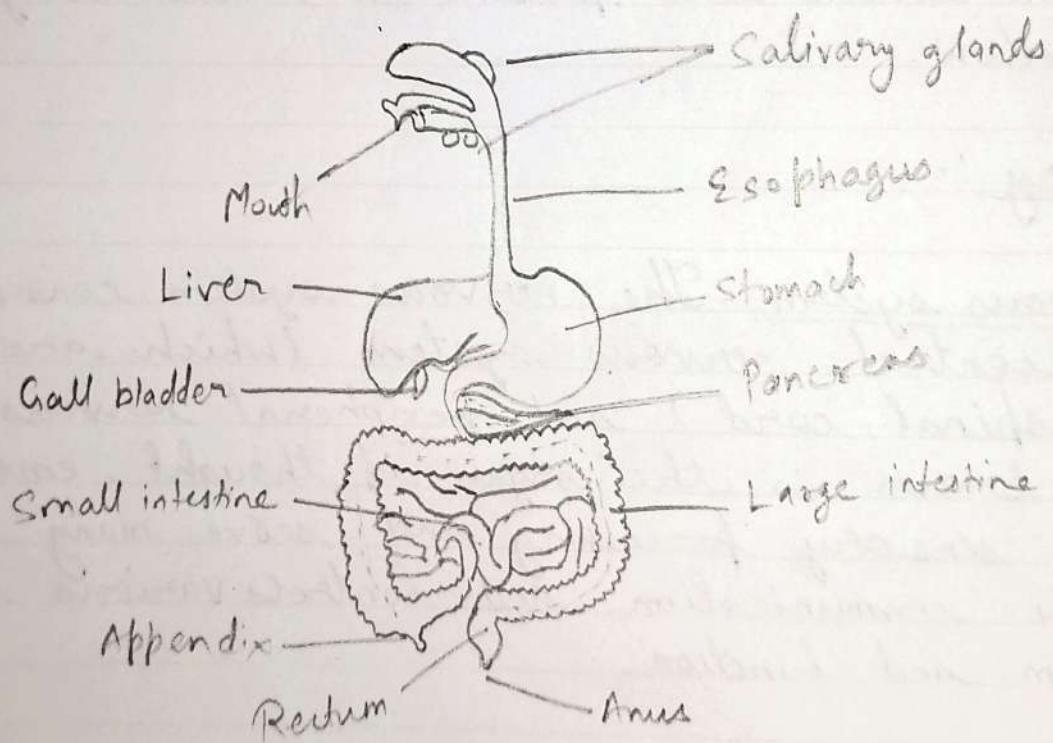


Fig :- G I T

2. Musculoskeletal system :- It includes your bones, cartilage, ligaments, tendons and connective tissues. Skeleton provides a framework for muscles and other soft tissues. They support the body's weight, maintain your posture and help in movement.

3. Circulatory system :-

It is a system of organs that includes the heart, blood vessels, and blood which is circulated throughout the entire body of a human or other vertebrate.

4. The Gastrointestinal tract :-

The gastrointestinal tract is the tract or passageway of the digestive system that leads from the mouth to the anus.

5. Urinary system :

The urinary system, also known as the urinary tract or renal system, consists of the kidneys, ureters, bladder, and the urethra. The purpose of the urinary system is to eliminate waste from the body, regulate blood volume and blood pressure, control levels of electrolyte and metabolites and regulate blood pH.

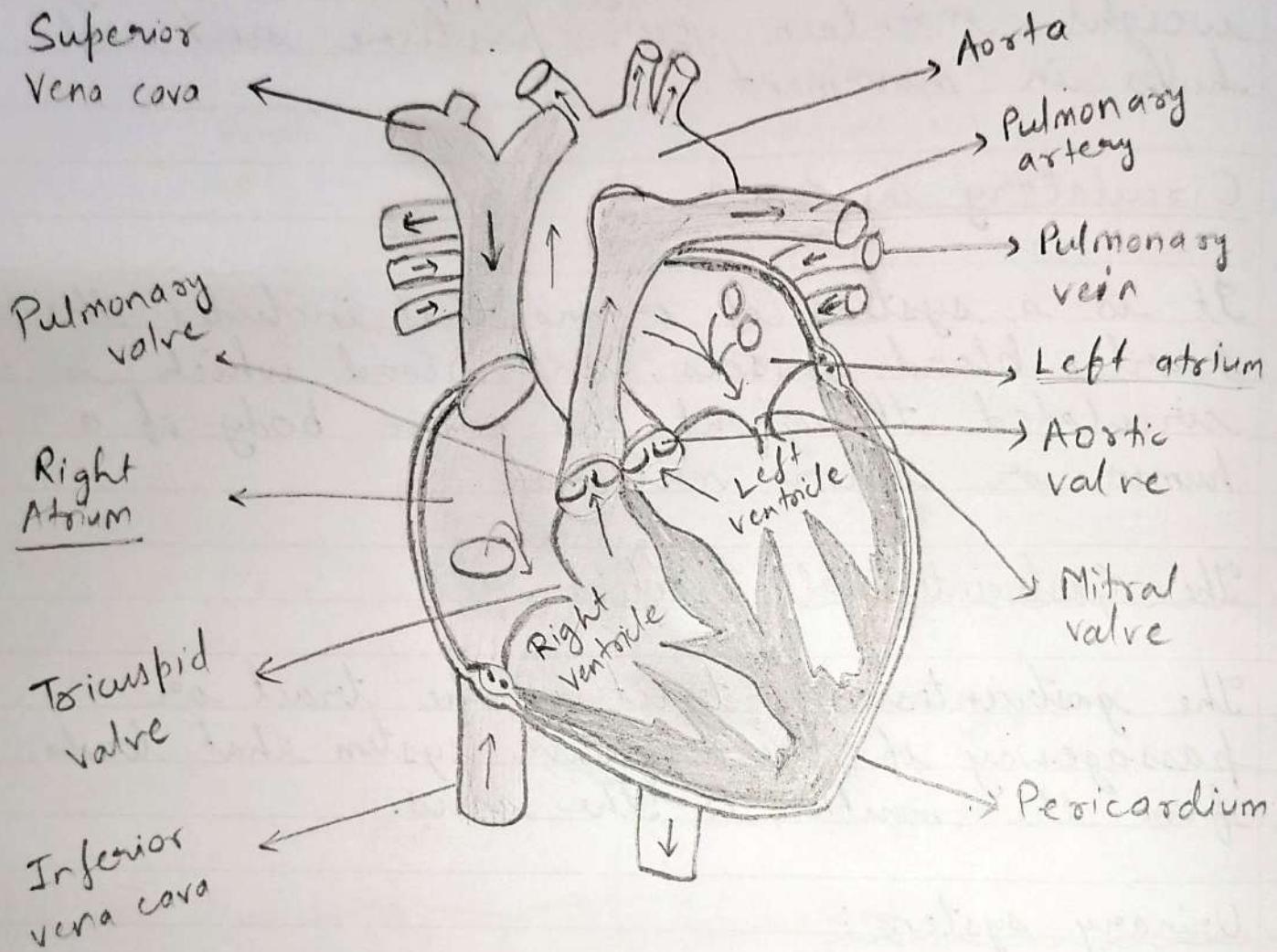


Fig :- Heart

6. Reproductive system:

The reproductive system of an organism, also known as the genital system, is the biological system made up of all the anatomical organs involved in sexual reproduction.

7. Types of muscle :- Immune system:

The immune system consists of a vast network of cells, organs, proteins, and tissues throughout the body.

A fully functional immune system can distinguish healthy tissue from unwanted substances. If it detects an unwanted substance, it will mount an immune response - a complex attack to protect the body from invaders. It also recognizes and removes dead and faulty cells.

Conclusion :-

Study of different system with the help of charts and models was done successfully.

Aim :-

To determine the bleeding time of yourself.

Reference :-

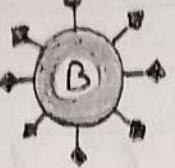
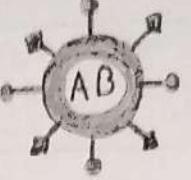
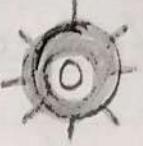
Waugh Anne, Grant Alison, Anatomy and Physiology in health and illness, Elsevier publication, 13th Edition.

Requirements :-

Lancets, Filter paper, cotton, sterile cotton dipped in alcohol, stopwatch.

Theory :

Bleeding time is a medical test that measures how fast small blood vessels in the skin stop bleeding. The bleeding time test is used to evaluate how well a person's blood is clotting. The test evaluates how long it takes the vessels cut to constrict and how long it takes for platelets in the blood to seal off the hole.

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in plasma	Anti - B	Anti - A	None	AntiA and AntiB
Antigens in red blood cell	A antigen	B antigen	A and B antigen	None

Blood type is determined, in part, by the ABO blood group antigens present on red blood cells.

1. A positive - Presence of Rh⁺
2. A negative - Presence of Rh⁻
3. B positive - Presence of Rh⁺
4. B negative - Presence of Rh⁻
5. AB positive - Presence of Rh⁺
6. AB negative - Presence of Rh⁻
7. O positive - Presence of Rh⁺
8. O negative - Presence of Rh⁻

Procedure:

- i) Prepare your ring finger of left hand by cleaning the tip portion by alcohol dipped cotton balls.
- ii) Prick the tip of ring finger by using pricking lancet.
- iii) Allow to flow the blood and start to place the droplets of your blood on the filter paper at the time interval of 30 seconds.
- iv) When the blood gets clotted, the tissue time should be noted in your practical record.
- v) Apply the alcohol dipped cotton on your finger tip for the cleaning and blood stoppage.

Result:

The determination of bleeding time was successfully done and my bleeding time was.

Aim:

To determine the self blood group.

Reference:

Human Anatomy and physiology by NN Yalayyaswamy, CBS Publishers, fourth edition, Page No:- 136-138.

Requirement:

Monoclonal antibodies A, B and D, glass slides, lancets, spirit, cotton etc.

Theory:

A blood type (also known as a blood group) is a classification of blood, based on the presence and absence of antibodies and inherited antigenic substances on the surface of red blood cells (RBCs). These antigens may be proteins, carbohydrates, glycoproteins, or glycolipids, depending on the blood group system. Some of these antigens are also present on the surface of other types of cells of various tissues. Several of these red blood cell surface antigens can stem from one allele (or an alternative version of a gene) and collectively form a blood group system.

Various Sorts of Blood Groups Alongside
Its Rhesus factor.

Blood type	A	B	O	AB
Rh - positive	A ⁺	B ⁺	O ⁺	AB ⁺
Rh - negative	A ⁻	B ⁻	O ⁻	AB ⁻

Procedure :

- First take a glass slide and mark three circles on it after cleaning the slide.
- Unpack the Monoclonal Antibodies (MAB) kit.
Now with the help of a dropper, add the Anti-A, Anti-B and Anti-D in the first, second and third circle respectively in a sequential order.
- Keep the slide aside safely without disturbing.
- Now you need to wipe the ring finger with the alcohol swabs and rub gently near the fingertip, where the blood sample will be collected.
- You need to prick the ring fingertip with the lancet and wipe off the first drop of the blood.
- As blood starts flowing out, allow it to fall on the three circles of the glass slide by gently pressing the fingertip.
- We must apply pressure on the pricked part in order to stop the blood flow. Use the cotton ball if required.
- Mix the blood sample gently with the help of a toothpick and wait for a minute to observe the result.

Teacher's Signature _____

Result :

My blood group is ____.

Aim :-

To analyse the body temp., pulse rate and blood pressure with the help of instruments.

Reference :-

Chiba M. K., Human Anatomy and physiology,
Tain publication, Jaipur, 2009 edition, Page no. 5.1 to 5.26.

Requirement :-

- Thermometer, P
- Pulse meter,
- Sphygmomanometer.

Theory :-

Pulse :- Pulse is defined as "the presence of the blood pushing against the wall of an artery as the heart beats and rates.

Pulse sites :-

- Temporal - forehead
- Carotid - neck
- Brachial - inner, upper arm
- Radial - wrist.

Pulse Rate :- Number of beats per minute.

- Adults :- 60- 90 bpm
- Children > 7 years → 70-90 bpm
- Children 1-7 → 80-110 bpm
- Infant → 80-110 bpm

Bradycardia :- Pulse rate under 60 beats per minute.

Tachycardia → Pulse rate greater than 100 beats per minute.

- Rate → beats per minute.
- Rhythm → regularity or spacing of beats.
- Arrhythmia → irregular heartbeats / pulse.

Factors that increase the Pulse.

- Exercise
- Stimulant drug
- Excitement
- Fever
- Shock
- Nervous tension.

Factors that decrease the pulse.

- Sleep
- Depressant drug
- Heart disease
- Physical training
- Coma.

Apical Pulse :- Heartbeat taken by listening with a stethoscope over the apex of the heart.

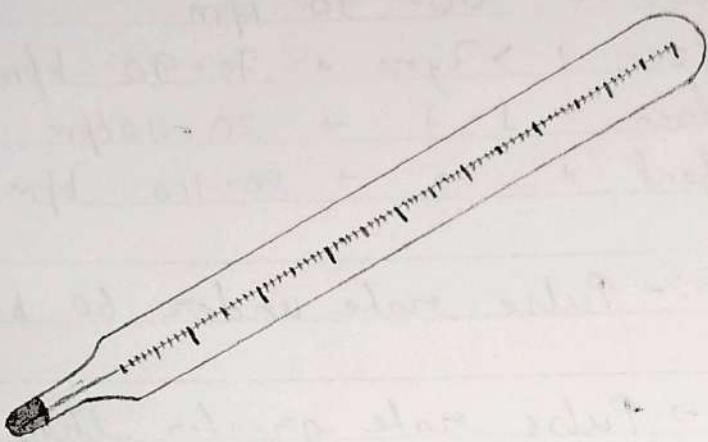


Fig :: Mercury Thermometer.

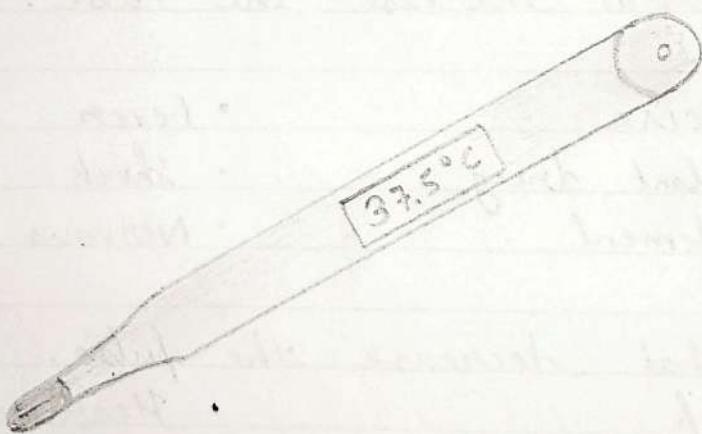


Fig :: Digital Thermometer.

Blood Pressure :-

Pressure coated by the heart as it pumps blood through the arteries and the circulatory system.

Top number [Systolic] - Pressure while heart is resting b/w beats.

Normal blood Pressure $< 140/90$

High blood Pressure $> 140/90$

Blood Pressure measurement :-

- Sphygmomanometer
- Systolic pressure - Pressure when 1st sound is heard.
- Diastolic pressure - Pressure when last sound is heard.
- Unit of measurement of B.P. is mm Hg.
- Normal B.P. -
 - Systolic - 120 (100 - 140 mm Hg)
 - Diastolic - 80 (60 - 90 mm Hg)

Body temperature :

A thermometer is the combination of two wards and thermo stand for warm and meter stand for to measure.

A thermometer is an instrument that measure the temp. of the system in a quantitative way.

Types of thermometer :-

- Mercury thermometer
- Digital thermometer
- Infrared thermometer.

Result:-

The analysis of the self.

Body temp. is - 37.2°C

Blood Pressure is - $11.5 / 70.5 \text{ mm/Hg}$.

Pulse rate is - 73 beats /minutes.

Aim :-

To analyse the ECG [Electrocardiogram] of PQRST waves.

Reference :-

Agarwal R.N. Anatomy Physiology and health education.
C.B.S publishers and Distributors. pvt ltd. New Delhi
1st edition 2012 Page No - 395 to 447.

Marya R.K. Fundamentals of Human physiology AIIBS
Publishers, India medical Publishers First edition 2013,
Second edition 2019, Page No - 134-163.

Requirement:-

ECG chart paper.

Theory :-

The electrical activity within the heart generates small electric current that can be detected by attaching electrodes to the surface of body. The recording of these electrical activities of heart is called electrocardiogram.

Electrocardiograph is the instrument used to record the electrical activity of the heart and this technique is called electrocardiogram.

This technique is discovered by Dutch Physiologist Willem Einthoven, who is known as father of E.C.G.

E.C.G Machine.

This instruments amplifies the electrical signals from the heart and records them on a moving strip of paper. The markings (lines) on this paper are called E.C.G grid.

Electrodes connect the surface of the body with the body E.C.G. Machine and record the E.C.G by amplifying the heart's electrical activity.

Normal E.C.G.

The E.C.G shows a series of positive and negative waves which occur during each heart beats.

These waves have been named P, Q, R, S, and T waves.

P-Wave -

It is the first wave in E.C.G and is a small upward deflection on the E.C.G.

This wave arises when the impulse from the S.A. node spread throughout both the atria.

The P wave represents atrial depolarization or contraction of the atrial muscle.

Duration of P-wave is not more than 0.1 sec.

QRS complex:

This second wave continues as a large, upright, triangular wave and end as a downward wave.

Q wave is due to the depolarization of the basal portion of the interventricular septum.

R wave is due to the depolarization of the apical portion of the intraventricular septum ventricular muscle.

S wave is due to depolarization of the basal portion of ventricular muscles.

The ventricles start contracting shortly after the QRS complex begins.

The normal duration of QRS complex ranges from 0.08 to 0.12 sec.

T-Wave :-

It represents the relaxation of the ventricular repolarization.

This wave is a dome-shaped upward deflection and it occurs just before the ventricles start relaxing.

ECG analysis also involves the examination of the time spans b/w which are called intervals of and segments of ECG include.

The various intervals and segments of ECG P-Q interval.

It is the interval b/w the beginning of P-wave and the onset of the Q wave.

The lengthening of P-Q interval signifies coronary artery disease or rheumatic fever.

Q-T interval

It is the interval between the start of the QRS complex and the end of T-wave; that is it is the time from the beginning of ventricular depolarization till the end of ventricular repolarization.

S-T segment:

It is the time interval b/w the end of S-wave and the start of T wave.

The elevation of the S-T segment indicates myocardial infection and its depressions indicates myocardial ischaemia.

Significance of E.C.G.

It is very important technique to determine the following.

- (i) Abnormalities in the conduction pathway.
- (ii) Enlargement of the heart.
- (iii) Damage of the heart.

The size of ECG wave can also indicates abnormality.

- (i) Large P wave indicates atrial enlargement.
- (ii) Large Q wave indicates atrial myocardial infection.
- (iii) Large R wave indicates ventricular enlargement.

Cardiac:

The study of heart is called cardiology.

Two types of heart is mainly found.

A) Myogenic heart. B) Neurogenic heart.

- It is main pumping organ.
- It originated from mesoderm
- It is located in thoracic cavity.
- Slightly tilted toward left.
- Weight - in male - 280 - 340 gm
- in female - 230 - 280 gm.
- * Double walled membrane is found around the heart known as pericardium.

Function of Pericardial fluid:-

- Protect heart from mechanical injuries and shocks.
- Protect from collapse of membranes.
- It allows free movement of heart.
- Provide moisture to the heart.
- * Heart having four chambered upper two chamber left and right atrium, lower two chamber left and right ventricles.

Trach Cardia

- Heart beat become more than normal.
- During Exercise
- High temp rise

Brady Cardia

, Heart beat become less than normal.

→ During rest

→ High low temp.

Cardiac cycle:

The cardiac events that occurs from the beginning of one heart beat to the beginning of the next are called the cardiac cycle.

- Each cycle is initiated by spontaneous generation of an action potential in the sinus node.
- Diastole : Period of relaxation - heart fills with blood.
- Systole :- Period of contraction - heart pumps the blood.
- Normal average . HR .75 bpm . during each cardiac cycle is $60/75 = 0.8$ sec.

Atrial cycle:

Atrial systole - 0.1 sec]
Atrial diastole - 0.7 sec] $\rightarrow 0.8$ sec

Ventricular systole - 0.3 sec
 Ventricular Diastole 0.5 sec] → 0.8 sec

Joint cardiac Diastole - 0.9 sec.

* Cardiac output = Stroke volume × Heart Rate
 $70 \times 72 = 5040$ litre.

The value of cardiac output is almost 5 lit.

Result :-

The electrocardiogram (ECG) waves PQRST was studied with the help of ECG chart.