UNIT-2

✱ Integumentry System :-

→ The integument as an organ, and is alternative name for skin.

→ The integumentary system includes the skin and the skin derivatives hair, nails and glands.

The integument system :-

- It the Largest system of the body.
  - 16% of body weight,
  - 1.5 to 2 m^2 in area.
  - The integument is made of two parts:

1. Cutaneous membrane
   (a) Epidermis - superficial epithelium
   (b) Dermis - underlying CT with blood supply
2. Accessory structure
   (a) Hair
   (b) Nails
   (c) Exocrine glands.

Functions of the integumentary system :-

① protection
   (a) First line of defense against
      * Bacteria
      * Viruses
   (b) protects underlying structure from
      * Ultraviolet (UV) radiation
      * Dehydration

② Vitamin D production
(a) Needed for calcium absorption

③ Sensation
(a) Sensory receptors

④ Body temperature regulation
(a) If too hot
* Dermal blood vessels dilate
* Vessels carry more blood to surface so heat can escape

(b) If too cold
* Dermal blood vessels constrict
* prevent heat from escaping

⑤ Excretion
(a) Small amount of waste products are lost through perspiration.

Structure of skin :-

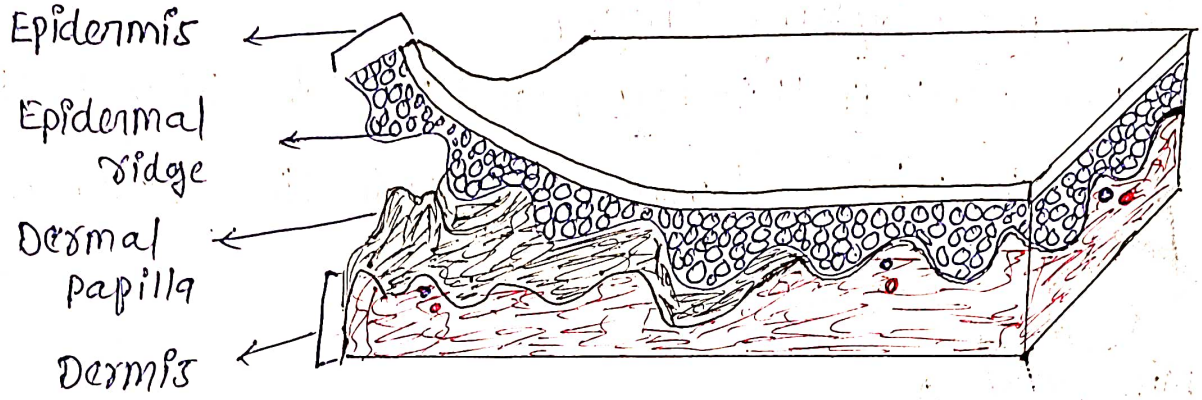
Made by two layer

① Epidermis (Outer part)
(Thin)
- Stratum corneum
- Stratum Lucidum
- Stratum granulosum
- Stratum Spinosum
- Stratum basale

② Dermis (Inner part)
(Thick)
- Outer papillary Layer
- Deep reticular layer

③ Hypodermis (Subcutaneous Layer)

Structure of skin :-



∴ Structure of skin :-

① Epidermis :-

→ It a vascular stratified squamoses epithelium
→ Nutrients and oxygen diffuse from capillaries in the dermis.

(i) Stratum corneum :-

→ Outer most layer of skin.
→ 15 to 30 layers of keratinized cells.
→ Water resistant.

(ii) Stratum Lucidum :-

→ Found in 2 to 4 cells Layer.
→ Cell shape is reticular.
→ Covers stratum granulosum

(iii) Stratum granulosum

→ Cells shape is oval.
→ Keratohyalin protein present
→ This Cell storeged glycogen

(iv) Stratum Spinosum :-

→ Found in 8 to 10 Layer of keratinocytes Cells.
→ Cell Shape is polygonal
→ Two Cells attatched by Desmosomes.

(v) Stratum Basale :-

→ This Layer made by Single Layer.
→ present melenocyte in this layer and provide Colour to skin.
→ Make new Cells Layer twoard upperside So this layer is called Germination Layer.

② Dermis :-

- Located blw epidermis and Subcutaneous Layer.
- Thick than epidermis.
- Two Components.
  1. outer papillary layer
  2. Deep reticular Layer

① Papillary Layer :-

- Consists of areolar tissue.
- Contains Smaller Capillaries. Lymphatics and Sensory neurons.

② Reticular Layer :-

- Contains of dense Irregular Connective tissue.
- Contain Larger blood vessels, Lymphatic vessels and nerve fiber,
- Contains Collagen and elastic fibers
- Contains Connective tissue proper.

☆ Skeletal System :-

→ The human skeleton is the internal framework of the human body.

→ It is composed of around 270 bones at birth - this total decreases to around 206 bones by adulthood after some bones get fused together.

→ The bone mass in the skeleton makes up about 14% of the total body weight and reaches maximum density around age 21.

Division of Skeletal System :-

- Divided into two divisions.
① Axial skelaton
② Appendicular skeleton - Limbs and girdle

① Axial skeletal :- (80 bones)

→ The axial skeleton is composed of the skull, vertebral column, and thoracic cage.

- Axial = 80 bones
- Skull - 22
- Vertebrae - 26
- Ribs and sternum - 25
- Auditory ossicles - 6
- Hyoid - 1

ⓐ Skull (22) :-

(1) Cranial bones :- (8 bones)
- 1 Frontal bone
- 2 parietal bones
- 2 temporal bones
- 1 occipital bone
- 1 Sphenoid bone
- 1 Ethmoid bone

② Facial bone :- (14 bones)

- 2 nasal bones
- 2 maxillas
- 2 zygomatic bones
- 1 mandible
- 2 lacrimal bones (
- 2 palantines bone
- 2 inferior nasal conchae
- 1 vomer

② Vertebae (26) :-

- 7 Cervical vertebrae (C1-C7) (neck region)
- 12 thoracic vertebrae (T1 - T12)
- 5 Lambar vertebrae (L1-L5) (Support the lower back)
- 1 Sacrum
- 1 Coccyx

③ Ribs and sternum :- (25)

→ 12 ribs right side
→ 12 ribes Left side of body in Lungs
→ 1 Sternum in midle of right and ~~of~~ Left ribs.

② Appendicular skeleton :-

→ The appendicular skeleton is composed of 126 bones.
→ Functionaly ~~is~~ it is involved in locomotion (Lower limbs) of axial skelotal

Appendicular - 126 bones.

① pectoral girdle and upper limb. - 64
② pelvic girdle and lower limb - 62

① pactorial girdle and upper dimb :-

pactorial girdle :-

① Clavicles - 2
② Scapula - 2

Upper Limb :-

- ① Humerus (2-pair)
- ② Radius (2-pair)
- ③ Ulna (2-pair)
- ④ Carpal bones (8)x(8)
- ⑤ Metacarpal bones (5)x(5)
- ⑥ phalanges (14)x(14)

② Pelvic girdle and lower Limb :-

① Hipe bone (2 pair)
② Femur (2 pair)
③ patella (2 pair
④ Tibia (2 pair)
⑤ Fibula (2-pair)
⑥ Tarsals (7x7)
⑦ Metatarsals (5x5
⑧ phalanges (14x14)

Functions of the skeletal System :-

1. **Movement:** Skeletal System provides points of attachment for muscles. your Leg and arms ~~ha~~ move when the muscles pull on the bones.
2. **Support:** The backbone is the main support center for the upper body. It holds your head up and protects your spinal cord.
3. **protection:** The bones of your skull protect your brain. your ribs protect your lungs and heart from injury.
4. **Makes blood:** Red and White blood cells are formed by tissue called marrow, which is in the center of the bone.
5. **storage:** Bones store minerals, such as calcium and phosphorus for use by the body.

☆ Organization of Skeletal muscle:-

→ All activities that involve movement depend on muscles.
→ 650 muscles in the human body
→ Various purposes for muscles for:
- Locomotion
- Upright posture
- Balancing on two Legs.
- Support of internal organs
- production of head
- Three types of muscles in the human body,
  * Skeletal
  * Cardiac
  * Smooth

→ Skeletal muscles are muscles which are attached to the skeleton.
→ 40% of human body mass
→ Skeletal muscles are mainly responsible for locomotion, and voluntary contraction and relaxation.

☆ physiology of muscle Contraction:-

#Contraction phase:-

Resting
↓
·Motor nerve action potential arrives at motor end plate
↓
Acetylcholin released. Sarcolemma and membranes depolarized (Na+ flux into fiber)
↓
Action potential transmitted via T-tubules to SR
↓
Ca++ released from SR terminal cisternae into Sarcoplasm
↓
Ca++ bound by troponin

⭐ Physiology of neuromuscular junction :-

#Neuromuscular junction :- The synapse between motor neuron and muscle fiber is called the neuromuscular junction.

Physiolog NMJ :-

① Action potential from motor neuron
② VG Ca^{+2} channels open
③ Ca^{+2} influx
④ Vesicles of Ach release to synaptic cleft
⑤ Ach binds to ligand-gated Na^{+}-Channels on muscle membrane
⑥ Na^{+}-Influx
⑦ Depolarization of muscle cell

⭐ Joints :-

→ A joint is the location at which two or more bones make contact.
→ They are constructed to allow movement and provide Mechnical support, and

Classification

Fibrous joint	Cartilaginous	Synovial
(Inmovable)	(Slightly Movable)	(Freely movable)
Ex. Skull	Ex. Intervertabra joint - Pelvic bone	Ex. Synovial joint - Synovial fluid - Synovial cavity

① Fibrous or fixed joint (Immovable) :-

→ These joints are held together by tough tissue which develops during childhood.

→ Ex. Cranium.

② Cartilaginous or Slightly movable joints :-

→ Here movement is needed but only to a certain point e.g the vertebral Column,

③ Synovial (freely moveable joints) :-

→ These joints are allow movement to take place.

→ This Lubricates the joint, like oil in a working engine. It enables all parts of the joint to move against each other smoothy.

Types of Synovial joints :-

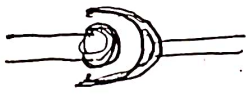
→ Synovial joints can be divided into six groups depending upon the way they move.

① Ball and Soket joint
② Hinge joint
③ pivot joint
④ Gliding joint
⑤ Saddle joint
⑥ Condyloid joint

① Ball and Socket joint :-

→ It allows the greatest range of movement.

→ In this type of joint, head of bone is fits into a socket of another bone.



→ Held together by ligaments and tendons

→ Ex. Shoulder and hip joints.

② Hinge joint :-

→ Is allow flexion and extension with only a small amount of rotation.

Eg. Elbow, knee, ankle, finger, toes .etc.

③ pivot joint :-

→ Is allow only rotation.

Eg. Skull on atlus vertebrae, Radius or Ulna

④ Gliding joints :-

→ In this joint the articular surface of bone it looks flate & move on the another bone in ~~sft~~ sliping movement.

Eg. joint blw carpal & tarsal bone

⑤ Saddle joint :-

→ The saddle joint allow the movement of the joint forward and backwards, and right to left.

Eg. Wrist joint

⑥ Condyloid joints :-

- This is allow for movement in all directions, however full rotation?

- Eg. Wrist joint,
  - metacarpophalangeal joint
  - Metatarsal phalangeal joint