Anatomy and Physiology of Skeletal System

- The skeletal system is the framework of bones and cartilage that provides support, protection, and structure to the body.

  A bone is an organ made up of several diff erent tissues working together: bone (osseous) tissue, cartilage, dense connective tissue, epithelium, adipose tissue, and nervous tissue. The entire framework of bones and their cartilages constitute the skeletal system. The study of bone structure and the treatment of bone disorders is referred to as osteology.

- Key components of the skeletal system include:
  - **Bones**: Bones are rigid organs
  - **Cartilage**: Connective tissue that is more flexible than bone
  - **Joints**: Points of articulation between bones
  - **Bone Marrow**: A soft, gelatinous tissue found in the cavities of bones
  - **Ligaments**: Fibrous bands of tissue that connect bones to each other
  - **Tendons**: Connective tissue that attaches muscles to bones

Functions of the skeletal system

1. **Support:** The skeletal system provides a structural framework that supports the body's tissues and organs.
2. **Protection:** Bones protect vital organs from injury. For Eg, the skull protects the brain, and the rib cage protects the heart and lungs.
3. **Movement:** The attachment of muscles to bones allows for voluntary movements.
4. **Mineral Storage:** Bones store minerals such as calcium and phosphorus, which are essential for various physiological processes.
5. **Blood Cell Formation:** Bone marrow is involved in the production of blood cells, including RBC, WBC, and platelets.
6. **Triglyceride storage:** Yellow bone marrow consists mainly of adipose cells, which store triglycerides.

Types of Bones

. Long Bones:

- Elongated in structure

- Provide support, facilitate movement, and contain bone marrow- involved in blood cell production.
- **Examples:** Femur, humerus, radius, ulna, tibia and fibula.

2. Short Bones:

- Roughly cube-shaped and have a similar length, width, & thickness.
- They provide stability and support, with limited movement.
- **Examples:** Carpals (wrist bones) and tarsals (ankle bones).

Flat Bones:

- Thin, flattened, and often curved.
- Provide protection & broad surface for muscle attachment
- **Examples**: Skull bones, scapula, sternum and ribs.

4. Irregular Bones:

- Have complex shapes that don't fit into the other categories.
- They perform varied functions based on their unique shapes.
- **Examples:** Vertebrae, facial bones and hip bones.

5. Sesamoid Bones:

- Small, flat, and roughly oval-shaped.
- They develop within tendons, near joints.
- They reduce friction, alter the direction of tendon pull, and protect tendons from excessive wear.
- **Examples:** Patella (kneecap)

Divisions of the Skeletal System

- **The skeletal system is divided into two main divisions:**
    - The axial skeleton
    - The appendicular skeleton

1. Axial Skeleton:

- Forms the central axis of the body and it includes the bones of the skull, vertebral column, and rib cage.

2. Appendicular Skeleton:

- Consists of bones of the limbs & the girdles that attach the limbs to the axial skeleton.
- It facilitates movement and interaction with the environment.

Axial Skeleton (80)

- **Skull (22)**
  Cranium 8
  Facial bones 14
- **Hyoid bone 1**
- **Auditory ossicles 6**
- **Vertebral column 26**
- **Thorax (25)**
  Sternum 1
  Ribs 24

- The axial skeleton is crucial for maintaining the upright posture of the body, protecting vital organs, and facilitating various functions such as breathing, speaking, and head movement.
- It forms the foundation upon which the appendicular skeleton, consisting of the bones of the limbs and their girdles, is attached.

Appendicular Skeleton (126)

- **Pectoral (shoulder) girdles (04 bones)**

Clavicle	2
Scapula	2

- **Upper limbs (60 bones)**

Humerus	2	Carpals	16
Ulna	2	Metacarpals	10
Radius	2	Phalanges	28

- **Pelvic** (hip) **girdle (02 bones)**

Hip, pelvic	2

- **Lower limbs (60 bones)**

Femur	2	Tarsals	14
Patella	2	Metatarsals	10
Fibula	2	Phalanges	28
Tibia	2		