ON –LINE LECTURE

Course Code : FMPE-510

Course Title : Ergonomics and Safety in Farm Operations

for

M. Tech and Ph.D Students of CAET Godhra

By

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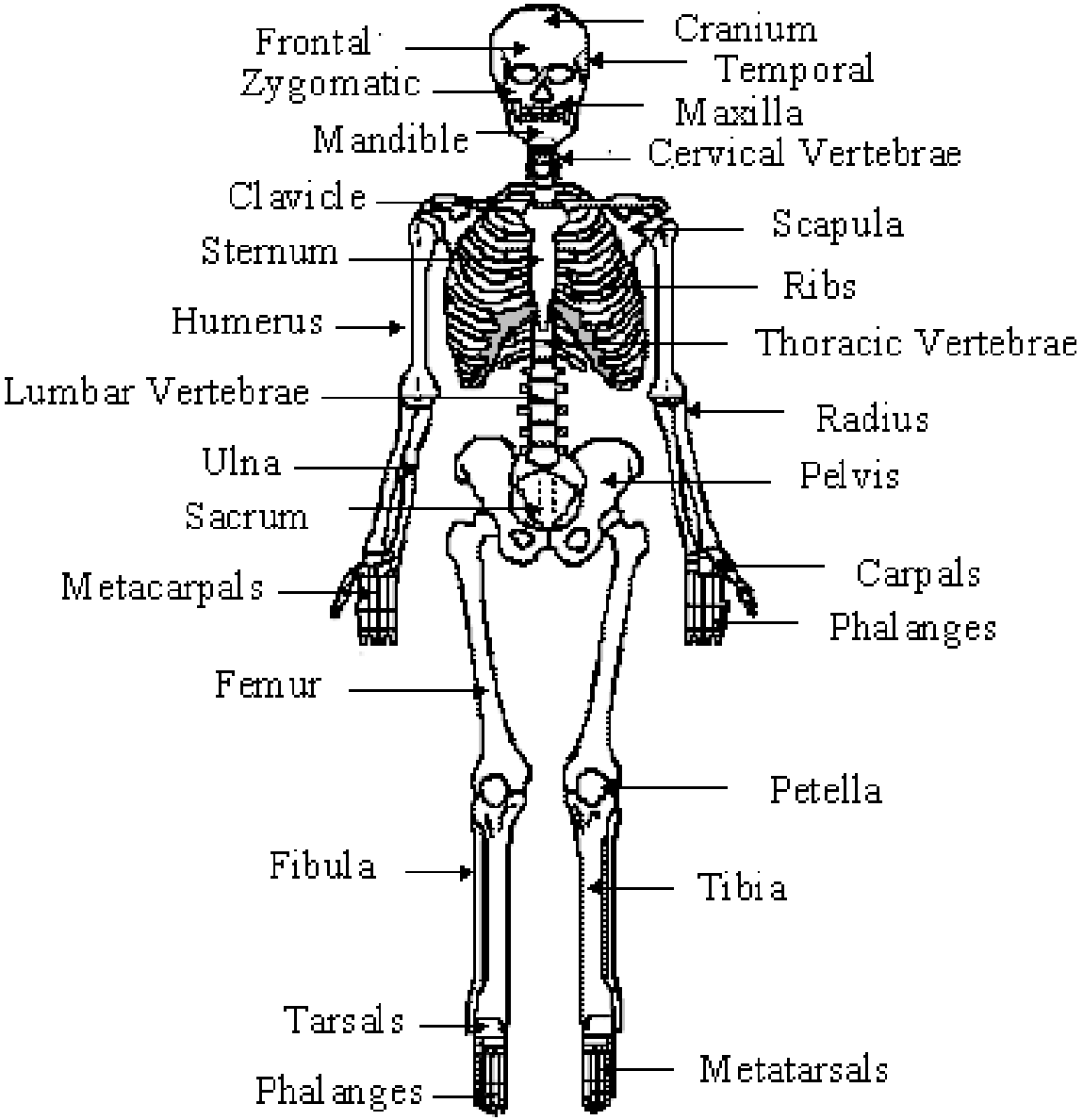
Skeletal system

- It is required to provide standing and sitting posture to human body.
- To provide movement mechanism- worked on the principle of mechanical lever whose movements are accomplished by contraction of the muscles.
- Consist of bones, cartilages and joints formed by their attachment to each other by connective tissues.
- It is made from three predominant types of tissues- bone tissues, cartilage tissues and hemopoietic tissues.

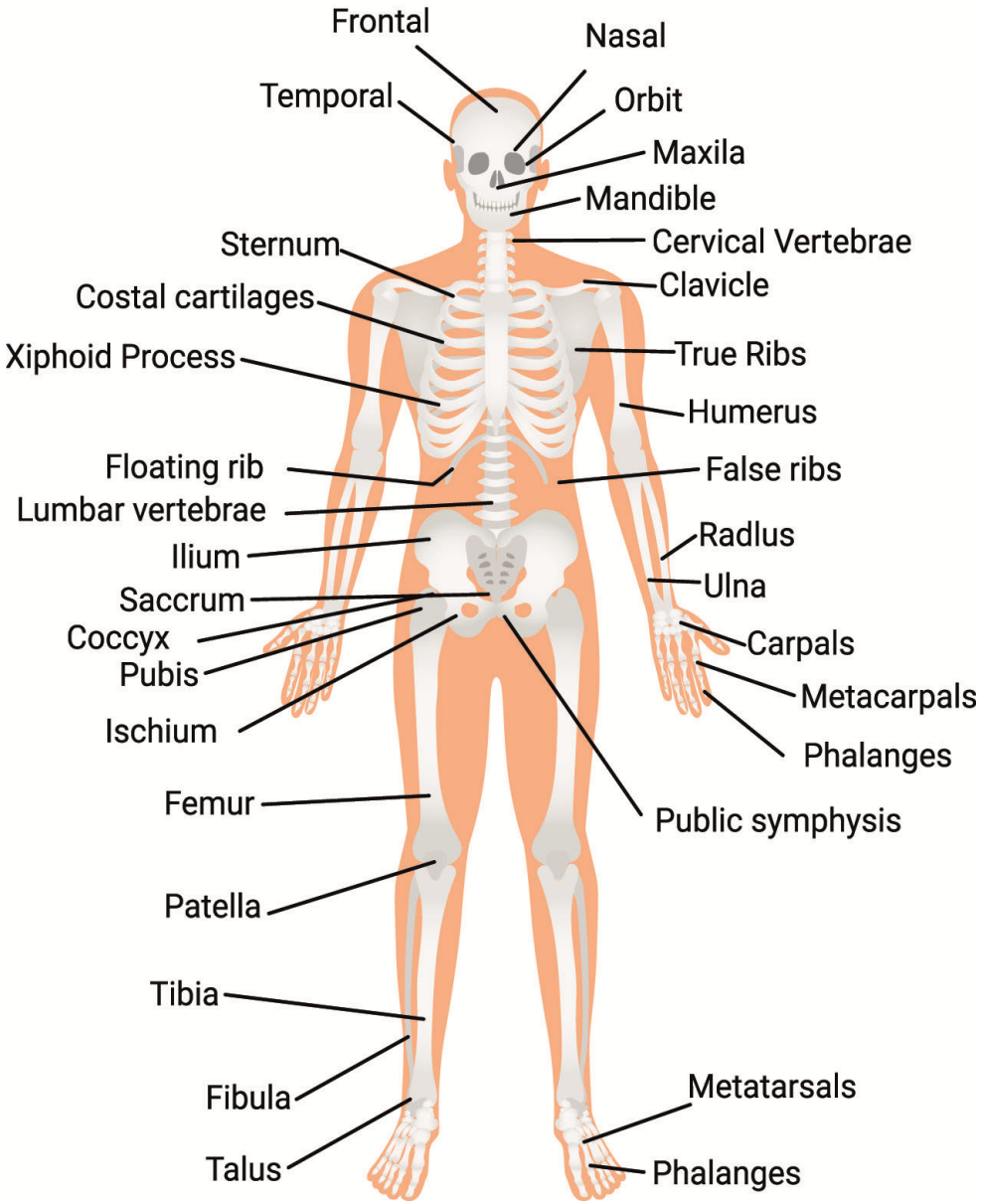
Skeletal System…

- **Bones – 206 bones in the human body**
- **Classified according to their shape**
  - **Long bones:** humerus (upper arm), radius and ulna (forearm), femur (thigh), tibia and fibula (lower leg), and phalanges (finger bones, metacarpals (palm hand), toe bones and metatarsals (feet)
  - **Short bones:** carpals (wrist bones) and tarsals (ankle bones)
  - **Flat bones:** scapulae, ribs and skull
  - **Irregular bones:** vertebrae, sacrum, coccyx, mandible (lower jaw) and hyoid bone

Skeletal System...



SKELETAL SYSTEM



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➢ Functions of the bones

- **Supporting the bodys framework (structure),**
- **Providing shells to protect vital organs**
- **Allowing movement of the body**
- **Housing bone marrow which produce red blood cells**
- **Storing calcium and phosphorus**

- **Joint – it is junction between two or more bones**
- **Types of joint – based on their function**
- ✓ **Diarthroses (diarthrotic joints):**
  - **A small space exists between the articulating surfaces of two joined bones**
  - **No other tissues grow in this cavity, the surface move freely against one another.**
  - **Functionally defined as free movable joints**
  - **eg. Ball and socket joint, hinge joint**

✓Synarthroses joint (synarthrotic joints):

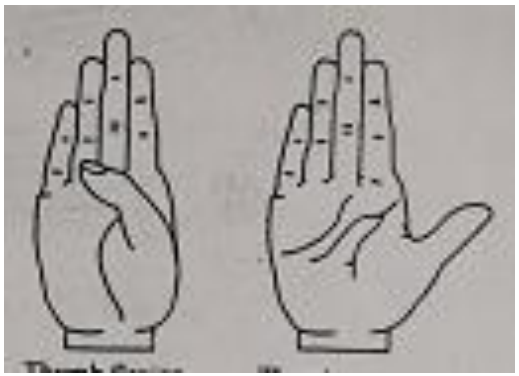
- **It does not have a joint cavity**
- **Fibrous cartilage or bone tissue grow between the articulating surfaces of two joined bones and make them unable to move free against one another.**
- **Functionally defined as free immovable (or slightly movable) joints**
- **Eg. Skull joints**

- **Joint Movements**
  - ✓ **Extension and flexion**
  - ✓ **Abduction and adduction**
  - ✓ **Circumduction**
  - ✓ **Rotation**
  - ✓ **Pronation and supination**

➢ Extension and Flexion:

- ✓ **Extension is a stretching or straightening movement which increases the angle between two bones.**
- ✓ **Flexion is a movement which decreases the angle between two bones. It is also referred to as bending or making an angle.**

Elbow Extension and Flexion



Thumb Extension and Flexion

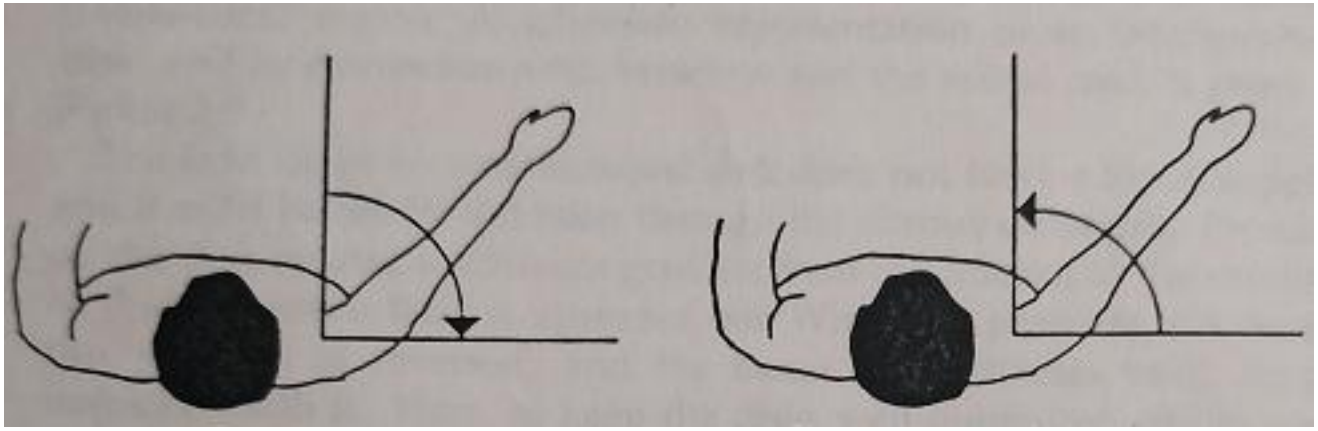
Shoulder Extension and Flexion

➢ Abduction and Adduction:

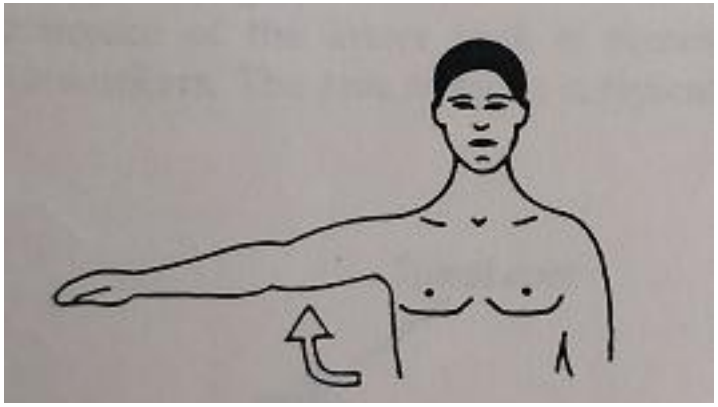
- ✓ **Abduction means moving away laterally from the central axis of the body (e.g, the median plane).**
- ✓ **Adduction means moving toward the central axis of the body (e.g, the median plane).**

Wrist Abduction and Adduction

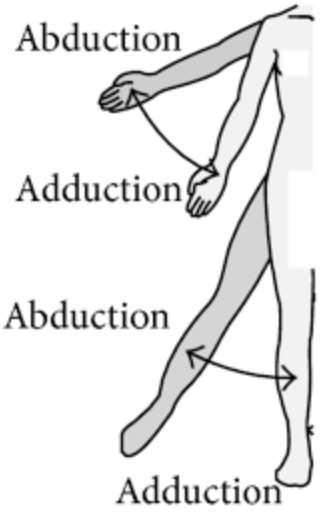
- **Examples of Abduction and Adduction**



Shoulder horizontal Abduction and Adduction



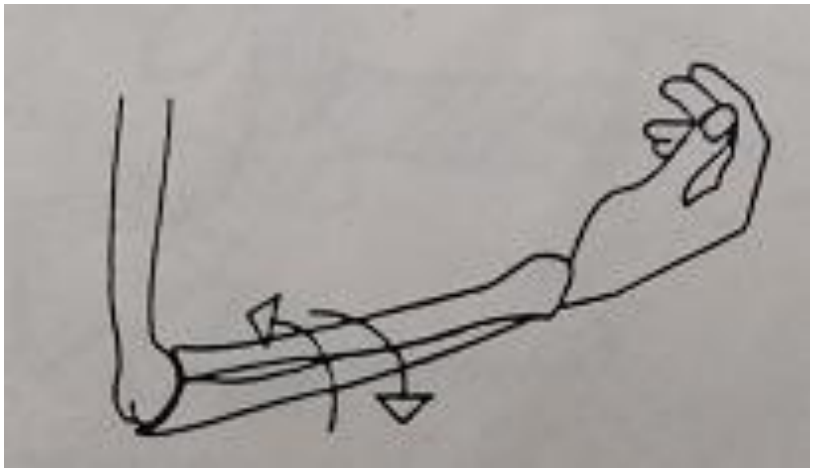
Shoulder Vertical Abduction



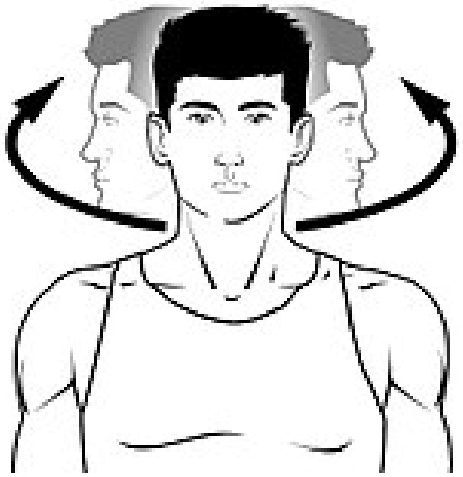
➢ Circumduction:

- ✓ **Circumduction is an action which involves flexion, abduction, extension, and adduction, in sequence.**
- ✓ **Circumduction is a conical movement of a body part, such as a ball and socket joint.**
- ✓ **For example: Circumduction occurs when spinning the arm when performing a serve in tennis or bowling a cricket ball.**

- **Rotation:** **Rotation is a movement of a bone around its long axis.**



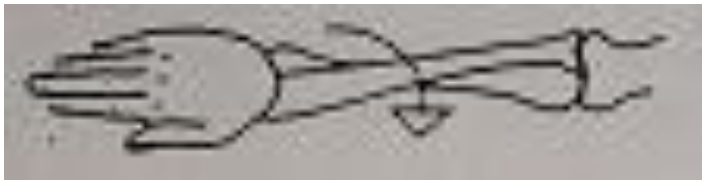
Rotation of Elbow (Radius rotates about Ulna)



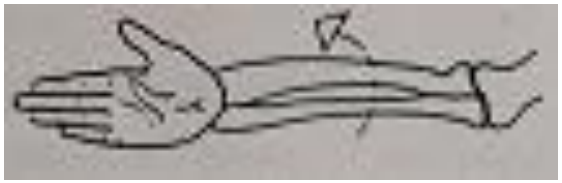
Rotation of Neck

➢ Pronation and Supination:

- ✓ **Pronation is a medial rotation (or inward rotation) of a body member. For example, medial rotation of the forearm brings the palm of the hand downward (facing the ground).**
- ✓ **Supination is a lateral (or outward) rotation of a body member. For example, lateral rotation of the forearm brings the palm of the hand upward (facing up).**



Pronation of forearm

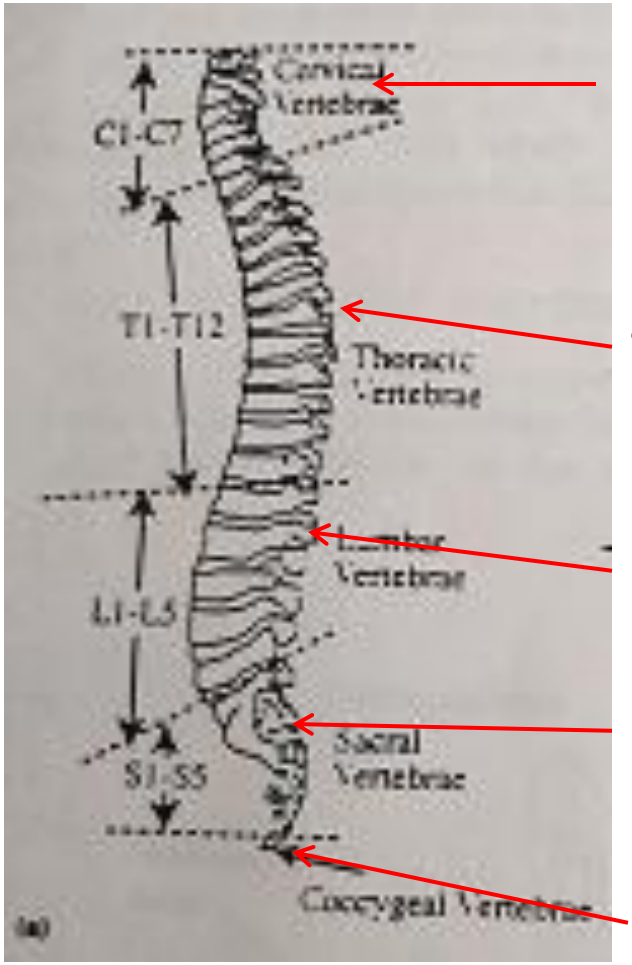


Supination of forearm

- **Back Structure:** **It consist of**
  - **Muscles**
  - **Bones (vertebrae and processes)**
  - **Ligaments**
  - **Tendons**
  - **Blood supply**
  - **The spinal cord and branched nerves**

Skeletal System…

- Back Structure



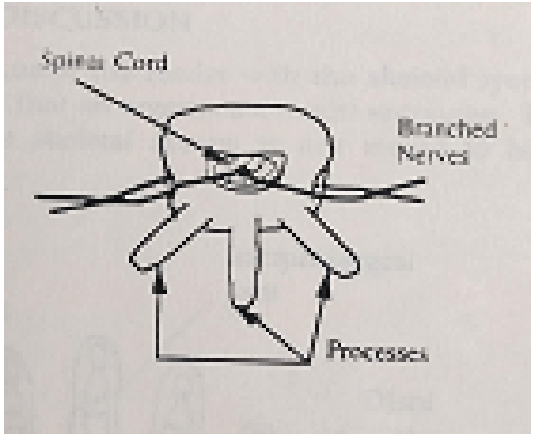
Cervical vertebrae

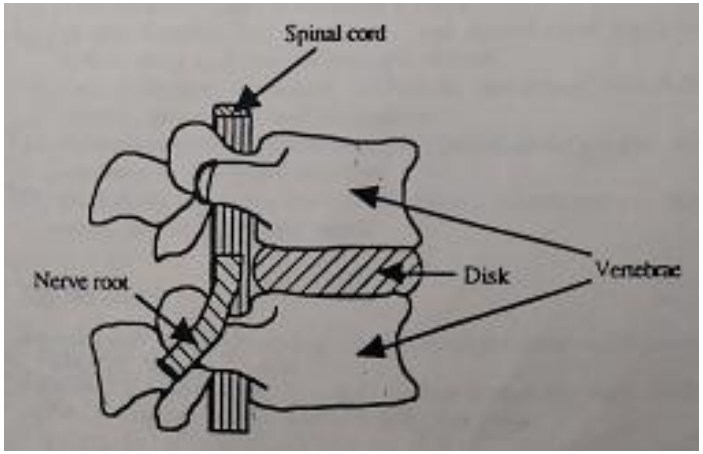
Thoracic vertebrae

Lumber vertebrae

sacral vertebrae

Coccygeal vertebrae





THANK YOU