Mid sem Questions :-

• What are the major functions of bones and muscles? Classify different types of muscles.

Ans:

Major functions of bones -

1) Support, movement and protection :

- supports body weight
- protects vital organs eg brain, heart etc
- ~~bo~~ due to the interaction of bones and muscles body can move. So it ~~offers~~ ~~r#o~~ enables mobility

2) Blood Cell formation :

- forms blood cells by hematopoiesis process
- blood cells are ~~from~~ formed from bone marrow.

3) Mineral Storage :

- Bones store minerals such as Calcium, Potassium, phosphate, magnesium, sodium.

functions of muscles -

1) Motion :

- Muscles interact with bones to enable motion of the body

2) Maintenance of posture:

- Muscles maintain the posture of the body

3) Heat production:

- Muscles produces heat.

Classification of Muscles:

1) Skeletal: This type of muscles are attached to bones and they move skeleton. These muscles are voluntary muscles. Skeletal Muscles are usually attached to bones by tendons. eg biceps.

2) Cardiac: These are the muscle of the heart and of the walls of blood vessels, intestine and other hollow structures and organs. These are involuntary muscles

3) Soo Smooth or visceral: Muscle of the Viscera.

• What are the differences between tendon and ligament?

Ans:-

Tendons are tough band of fibrous connective tissue that connects muscle to bone. It is capable of withstanding tension. Tendons may also attach muscles to structures such as the eyeball.

Ligaments are fibrous connective tissue that connects bone to boine. Ligaments act as actuators or springs, where muscles are the prime movers, ligaments control the ~~sub~~ movement.

• What are the differences between cartilaginous and synovial joints? Name few anatomical joints of each type.

Ans:-

*In Cartilaginous joints, bones are connected by fibrocartilage or hyaline cartilage. ~~These~~

*These types of joints are immovable (synarthrosis or synchondrosis) or slightly movable (amphiarthrosis).

*These joints lack synovial cavity

eg: joint between first rib and sternum (immovable)
pubic symphysis, intervertebral cartilaginous joints (both of these slightly moveable)

→ In synovial joints, the joints contain a fluid filled joint cavity. this cavity contains synovial fluid. and covered by synovial membrane.

→ these joints are diarthroses. or freely movable joints.

→ some synovial joints contain an articular disc. This occurs when articulating bones have different shapes. And also occurs in the temporomandibular joint and at the knee joint.

→ these joints are richly supplied with sensory nerves. and have a rich blood supply.

eg: shoulder joint, knee joint.

• What is meant by 'Gait Cycle'?

Ans:- A (bipedal) Gait Cycle is the time period or sequence of events or movements during locomotion in which one foot contacts the ground to when the same foot again contacts the ground, and involves forward propulsion of the center of gravity of the body.

or,

A Gait Cycle is a cyclic Activity consisting of two phases for each limb, stance and swing. Gait is more or less symmetrical with regard to angular motions of major joints, muscle activation patterns, and load bearing of the lower extremities and as a result, is efficient in translating the body's center of mass in the overall direction of locomotion.

• Explain with the help of a suitable diagram, the different phases of Gait Cycle.

Ans:-

For analysis of gait cycle one foot is taken as reference and the movement of that reference foot are studied. Gait cycle consists of two phases:

1) Stance Phase: This is the part of a gait cycle during which the foot remains in contact with the ground. In stance phase the reference foot undergoes five movements:

a) Heel Strike / Initial contact: the heel is the first of the reference foot to touch the ground. In this moment, toes donot touch yet.

b) Foot Flat/Loading Response: In loading response phase, the weight is transferred onto the referenced leg. It is for weight bearing, shock absorption and forward progression.

c) Mid Stance: It involves alignment and balancing of body weight on the reference foot.

d) Heel off / Terminal stance: the heel of reference foot rises while toes are still in contact with the ground.

e) Toe off: The toe off reference foot rises and swings in air.

2) Swing Phase: the swing phase is that part of the gait cycle during which the reference foot is not in contact with the ground and swings in the air. It has three parts:

a) intitial swing
b) Mid Swing
c) terminal Swing

- What are the joints and bones that constitute a 'knee joint'?

Ans:- The knee joint consists of two joints:

a) tibiofemoral joint (joint between femur and tibia)

b) patellofemoral joint (joint between femur and patella)

The bones constituting knee joint are - femur, tibia and patella. And there is another bone fibula attached to it.

- Name the major muscles, ligaments and tendons in the knee joint.

Ans:- The major ligaments of the knee joint are:

i) Anterior cruciate ligament (ACL): This is located in the center of the knee and controls rotation and forward movement of tibia.

ii) Posterior cruciate ligament (PCL): This is locate in the center of the knee and controls backward movement of the tibia.

iii) Medial Collateral ligament (MCL) :- This gives stability to inner knee.

iv) Lateral Collateral Ligament (LCL) :- This gives stability to outer knee

other ligaments are Fibular collateral ligament, superficial medial collateral ligament, transverse ligament etc.

The major tendons of the knee joint are:

i) Patellar tendon ii) Biceps femoris Tendon

iii) Quadriceps tendon iv) Popliteus tendon.

The major muscles of the knee joint are:

i) Quadriceps femoris group: There are four muscles in this group - Vastus lateralis, Vastus medialis, vastus intermedius, and rectus femoris.

ii) The Hamstring group muscles: this is a group of three muscles - biceps femoris, semimembranosus, and semitendinosis.

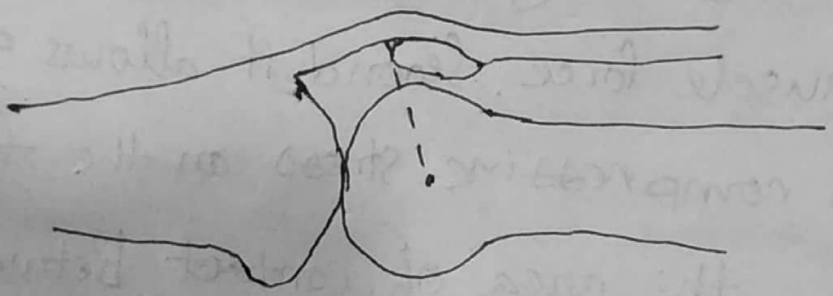
• What are the biomechanical functions of the patella at the knee joint?

As: The patella serves two important biomechanical functions in the knee. First, it aids knee extension by producing anterior displacement of the quadriceps tendon throughout the entire range of motion, thereby lengthening the lever arm of the quadriceps muscle force. Second, it allows a wider distribution of compressive stress on the femur by increasing the area of contact between the patellar tendon and the femur.

At full flexion, patella produces little anterior displacement of the quadriceps tendon and it contributes the least (about 10% of total length) to the length of the quadriceps muscle force lever arm. This length increases rapidly with extension up to 45°. (about 30%). beyond 45°, the lever arm diminishes slightly.

If the patella is removed from a knee, the patellar tendon lies ~~closure~~ closer to the center of motion of the tibiofemoral joint, acting with a shorter lever arm, the quadriceps

muscle must produce more force than is normally required. Full active extension of such a knee may require as much as 30% more force, this increased force may be beyond the capacity of the quadriceps muscle in some people.



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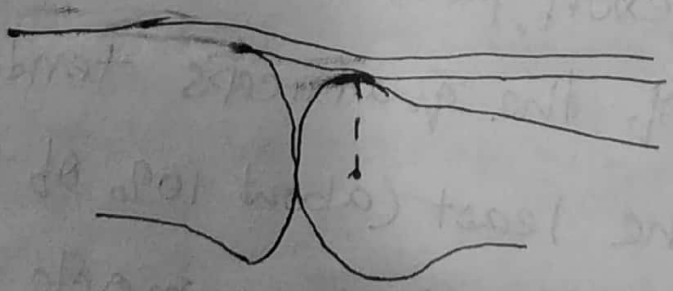

After removing Patella

• Using a simple sketch, indicate clearly the action of musculoskeletal forces on the knee joint.

• What are the joints and bones that constitute a shoulder girdle?

As: The bones that constitute the shoulder joint are:

i) Humerus ii) Scapula iii) Clavicle

iv) Coracoid process

the joints that constitute the ~~sol~~ shoulder joint are:

i) Sternoclavicular (SC) joint

ii) Acromioclavicular (AC) joint

iii) Glenohumeral (GH) joint

iv) Scapulothoracic Gliding Plane (STGP)

• What are the range of movements offered by the shoulder joint and the names of the major muscles responsible for these movements.

As: The range of motions of the shoulder are:

1) Abduction and adduction

2) flexion and extension

~~3) Horizontal flexion and extension.~~

3) internal rotation and external rotation.

4) Horizontal flexion and ext

Ans: The range of motions of the shoulder are:

1) Abduction and Adduction

2) flexion and extension.

3) internal Rotation and External Rotation.

The muscles responsible for these movements are:

abduction: Deltoid, Supraspinatus, Pectoralis major

adduction: Pectoralis major, Coracobrachialis, Teres Major

flexion: Coracobrachialis, Anterior Deltoid

extension: Latissimus dorsi, Teres major, Posterior Deltoid

internal Rotation: Subscapularis, Anterior Deltoid

external Rotation: Infraspinatus, Teres minor, Posterior deltoid.

• Name the muscles that constitute the 'rotator cuff'. What are the function of rotator cuff muscles?

As: The rotator cuff muscles are:

1) Teres Minor 2) Infrapinatus

3) Suprapinatus 4) Subscapularis

These muscles

1) provide rotational stability to the shoulder

2) allows the shoulder to rotate

3) Suprapinatus helps in abduction of the shoulder.