**Final-Term Assignment**

**Course Title: Biomechanics And Ergonomics I**

**DPT 2nd semester section B**

**Instructor: Dr. M .Shahzeb khan (PT)**

**Marks: 50**

**Note:**

* **Attempt all questions, all questions carry equal marks.**
* **Answer Briefly and to the point, avoid un-necessary details**

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Paper :- Biomechanics

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Semester/Section :- 2nd (B)

**Q1:** (A) What is Humeroulnar Joint? Explain different movements at HU joint.

* Answer :-
* Humeroulnar Joint :-
* The humeroulnar joint (ulnohumeral or trochlear joint), is part of the elbow-joint.
* It is composed of two bones, the humerus and ulna, and is the junction between the trochlear notch of ulna and the trochlea of humerus.
* Movements at HU joint :-
* The humeroulnar joint, is part of the elbow-joint or the Olecron Joint, between the ulna and humerus bones is the simple hinge-joint, which allows for movements of flexion, extension and circumduction.

(B) What is Humeroradial joint? Explain different movements at this joint.

* Answer
* Humeroraidal Joint :-
* The humeroradial joint is the joint between the head of the radius and the capitulum of the humerus, is a limited ball-and-socket joint, hinge type of synovial joint.
* Movements on HR joint :-
* The two joints linking these bones—the humeroulnar and humeroradial joints—are hinge joints and are capable of flexion and extension of the elbow. Flexion involves the movement of the hand and forearm toward the shoulder via rotation around the joint.

(C) What is carrying angle? Why it is important.

* Answer :-
* Carrying Angle :-
* When your arms are held out at your sides and your palms are facing forward, your forearm and hands should normally be about 5 to 15 degrees away from your body. This is the normal "carrying angle" of the elbow. This angle allows your forearms to clear your hips when you swing your arms, such as during walking.
* Importance of Carrying Angle :-
* This angle allows your forearms to clear your hips when you swing your arms, such as during walking. It is also important when carrying objects. Certain fractures of the elbow can increase the carrying angle of the elbow, causing the arms to stick out too much from the body. This is called an excessive carrying angle.

**Q2:** (A) What is Wrist complex? Explain joints, contribution and ROM of wrist complex

* Answer
* Wrist complex joints, contribution and ROM :-
* The wrist is a complex joint that bridges the hand to the forearm. It is actually a collection of multiple bones and joints. The bones comprising the wrist include the distal ends of the radius and ulna, 8 carpal bones, and the proximal portions of the 5 metacarpal bones.

(B) What is carpal Tunnel syndrome?

* Answer:-
* Carpal Tunnel Syndrome :-
* Carpal tunnel syndrome is a common condition that causes pain, numbness, and tingling in the hand and arm. The condition occurs when one of the major nerves to the hand the median nerve is squeezed or compressed as it travels through the wrist.

**Q3:** (A) Write down definitions of Muscle Twitch, summation and Refractory period.

* Answer:-
* Muscle Twitch :-
* A muscle twitch is an involuntary contraction of the fibers that make up a muscle. Nerves control muscle fibers. When something stimulates or damages a nerve, it causes the muscle fibers to contract, resulting in a twitch. A person can often see or feel these twitches below the skin.
* Summation:-
* Summation occurs as successive stimuli are added together to produce a stronger muscle contraction. Tetanus is the fusion of contractions to produce a continuous contraction. Increasing the number of motor neurons involved increases the amount of motor units activated in a muscle.
* Refractory Period :-
* The absolute refractory period of a human muscle fibre is typically between 2.2 and 4.6 ms. The refractory period causes 3 things to occur: The brain will be able to perceive nerve impulses as separated events since there is a time lag between them.

(B) Explain Types of Muscle contraction with example in your own words.

* Answer:-
* Types of Muscle Contraction :-
* Isometric: A muscular contraction in which the length of the muscle does not change.
* isotonic: A muscular contraction in which the length of the muscle changes.
* eccentric: An isotonic contraction where the muscle lengthens.
* concentric: An isotonic contraction where the muscle shortens.
* Example :-
* when lifting a heavy weight, a concentric contraction of the biceps would cause the arm to bend at the elbow, lifting the weight towards the shoulder. Cross-bridge cycling occurs, shortening the sarcomere, muscle fiber, and muscle.

(C) In Grade III muscle strain why we can’t feel pain?

* Answer :-

Pain must be feel because strain tears the muscle all the way through, sometimes causing a "pop" sensation as the muscle rips into two separate pieces or shears away from its tendon. Grade III strains are serious injuries that cause complete loss of muscle function, as well as considerable pain, swelling, tenderness and discoloration. Because Grade III strains usually cause a sharp break in the normal outline of the muscle, there may be an obvious "dent" or "gap" under the skin where the ripped pieces of muscle have come apart.

Q4: (A) What is difference between cranial and spinal nerve? How ventral and dorsal ramus form from ventral and dorsal root?

* Answer :-
* Difference b/w Cranial and Spinal nerve :-
* Cranial nerves are the nerves that emerge directly from the brain (including the brainstem). In contrast, spinal nerves emerge from segments of the spinal cord. Cranial nerves relay information between the brain and parts of the body, primarily to and from regions of the head and neck.
* Ventral and dorsal ramus form from ventral and dorsal root :-
* Shortly after a spinal nerve forms from the dorsal and ventral roots of the spinal cord it branches into the dorsal ramus and ventral ramus. Spinal nerves are mixed nerves that carry both sensory and motor information.

(B) What is difference between Neuropraxia, Axonotmesis and Neurotmesis?

* Answer :-
* Difference between Neuropraxia, Axonotmesis and Neurotmesis :-
* Neuropraxia :-

Neuropraxia is a type of peripheral nerve injury, and is known as the mildest form of nerve injury. It is classified as a transient conduction block of motor or sensory function without nerve degeneration, although loss of motor function is the most common finding.

* Axonotmesis:-

Axonotmesis is a moderate nerve injury caused by axon damage with intact endoneurium, perineurium, and epineurium.

* Neurotmesis:-

Neurotmesis is the most severe grade of peripheral nerve injury. It occurs when the axon, myelin, endoneurial tubes, and connective tissue components are damaged, disrupted, and/or transected, despite the preservation of the perineurium.

Q5: (A) What is Wolf’s Law?

* Wolf's Law :-

Wolff’s Law states that bone grows and remodels in response to the forces that are placed upon it in a healthy person. After an injury to a bone, placing specific stress in specific directions to the bone can help it remodel and become normal, healthy bone again.

Or

Wolff's Law states that your bones will adapt based on the stress or demands placed on them. When you work your muscles, they put stress on your bones. In response, your bone tissue remodels and becomes stronger.

(B) How fracture repair? Explain different stages of fracture repair

* Answer :-
* Fracture Repair :-
* While some bones can heal by wearing a cast, others may require more invasive treatments, such as bone fracture repair. Bone fracture repair is a surgery to fix a broken bone using metal screws, pins, rods, or plates to hold the bone in place.

* Different Stages of fracture :-

There are four stages in the repair of a broken bone:

1) the formation of hematoma at the break.

2) the formation of a fibrocartilaginous callus.

3) the formation of a bony callus.

4) remodeling and addition of compact bone.