**Mid-Term Assignment**

**Course Title: Biomechanics And Ergonomics I**

**DPT 2nd semester section B**

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

 **Marks: 30**

**Note:**

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

**Q1:** (A) What is biomechanics and ergonomics?

 (B) why we study biomechanics and ergonomics in physical therapy?

**Q2:** (A) What is shoulder complex? Elaborate it

 (B) What makes shoulder joint most mobile?

 (C) How normal position of scapula and Humerus aid in stability of shoulder joint?

 (D) What is osteo and Arthrokinematics? Explain it with example

 **Q3:** (A) How supraspinatus muscle different from other SITS muscle in GH stabilization?

 (B) Explain how scapula movement is necessary for normal range of motion of shoulder

Joint?

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Q.1(a)

Ans: **BIOMECHANICS It is the story of us how we move through the world forward, backwards,up and down, under and over.its story about technology, science, music, medicine, sports and art. its written in equation, collisions, code,sweat.its full of setbacks and success,it is the story built on the past informed by the present and envisioning of future for better world, emotiona. We tell this story, so that no matter how we move, we are always moving forward.**

**ERGONOMICS: It is the field of study dealing with the comfort and safety of the human body by**

**Adjusting tools, work station and work process to fit the worker.**

 **It is understandable that there are different definitions because ergonomics is all about difference.**

 **These are difference in the size, shape, strength and ability of individual worker. These difference calls for difference design in equipment, furniture, work station and rroutine**

**Q.1(b)**

**Ans: We study biomechanics because it show us the movement of joints and the injuries happened to the joints and how to prevent them.**

**And we study ergonomics to prevent our self from bad posture work place at job.**

**Q.2(a)**

**Ans: SHOULDER COMPLEX: The shoulder complex, composed of clavicle,scapula,and humerus**

**,Is an intricately designed combination of three joints that links the upper extremity to the thorax.**

**The articulated structure of the shoulder complex are designed primarily for mobility, allowing us to move and position the hand through a wide range of space.**

**The glenohumeral joint which link the humerus and scapula,has greater mobility than any other joint in the body.**

**FOUR JOINTS OF SHOULER COMPLEX: Movement at the shoulder complex occurs as a result of movement at each of these four joints. The interplay of 4 articulations**

* **Glenohumeral joint**
* **Acromioclavicular joint**
* **Sternoclavicular joint**
* **Scapulothoracic joint**

**Results in a coordinated movement pattern of the arm elevation**

**FUNCTION: The shoulder is not a single joint, but a complex arrangements of bones, ligaments, muscles, and tendons that is better called the shoulder girdle. The primary function of the shoulder girdle is to give strength and range of motion to the arm.**

**Q.2(b)**

**Ans: The shoulder joints (glenohumeral joint) is a ball and socket joint between the scapula and the humerus. It is the major joint connecting the upper limb to the trunk. It is one of the most mobile joints in the human body, at the cost of join stability.**

**Q.3(c)**

**Ans:** In normal upper quarter function, the scapula provides a stable base from which glenohumeral mobility occurs. The scapular muscle must dynamically position the glenoid so that efficient glenohumeral movement can occur

In glenohumeral ligaments (superior, middle and inferior) the joint capsule is formed by this group of ligaments connecting the humerus to the glenoid fossa. They are the main source of stability for the shoulder, holding it in place and preventing it from dislocating anteriorly.

Q.2(d)

Ans: Osteo=from the Greek osteon, meaning (bone)

 Arthro=from the Greek word arthron, meaning (joint)

Kenesis, meaning (motion or movement)

So osteokinematics is simply bone movement and arthrokinematics is joint movement. Another way to describe this would be that osteokinematics is the movement that is happening around the joint and arthrokinematics is the movement that is happening at the joint surface.

Osteokinematics is the gross movement that happens between two bones. This happens because our bone surface articulate at the joint.

Osteokinematics typically consist of flexion/Extension. Abduction, and internal rotation/ External rotation.

Arthrokinematics is the small movement happening at the joint surface. Arthrokinematics movement typically consist of rolls, glides/slides,and spins.

For example; When you raise your arm up, as if to ask a question, your humerus has is moving upwards. The head of your humerus has to roll downward into the glenoid cavity to allow for this movement. So the osteokinematics motion would be abduction of the humerus at the glenohumeral joint while the arthrokinematics movement is simultaneously occuring and moving the head of the humerus inferiorly via a glide/slides.

Q.3(a)

Ans: **supraspinatus muscle in glenohumeral joint:** The supraspinatus muscle is the most important muscle of the rotator cuff. It provides joint stability and with the deltoid muscle addicts the arm at the shoulder by fixing the head of the humerus firmly against the glenoid fossa. The supraspinatus muscle is inverted by the suprascapular nerve.

**SITS MUSCLE IN GLENOHUMERAL JOINT:** They are also reffered to as the SITS muscle, with reference to the first letter of their names ( Supraspinatus, infraspinatus, There’s minor , and subscapularis, respectively). The muscle arise from the scapula and connect to the head of humerus forming a cuff around the glenohumeral joint.

Q.3(b)

Ans: This system of joints and bones allows your shoulder to move in different directions. Each movement has a different range of motion. The ability of your shoulder to move in a normal range depends on the health of your;

* Muscle
* Ligaments
* Bones
* Individual joints

The shoulder have the ability to move more than most joints. Your shoulder range of motion is basically,how far you can move each shoulder in different directions without major joint pain or

Other issues.