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Courses » Mechanics of Human Movement

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# Unit 5 - Week 3

## Course outline

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Pre-requisite

Week 1

Week 2

Week 3

- Muscle Action-Part I
- Muscle Action-Part II
- Principles of Statics
- Static Analysis of Elbow- Part I
- Static Analysis of Elbow- Part II
- Week 3 - Lecture Notes
- Quiz : Assignment 3
- WEEK 3 - FEEDBACK - Mechanics of Human Movement

Week 4

## Assignment 3

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. **Due on 2018-09-05, 23:59 IST.**

1) Force generation is reduced at high velocities of muscle contraction because of **1 point**

- Higher number of sarcomere units at higher velocities
- Thicker sarcolemma at higher velocities
- Fewer cross bridges formed at higher velocities
- More straight bridges formed at higher velocities

**No, the answer is incorrect.**  
**Score: 0**

**Accepted Answers:**  
*Fewer cross bridges formed at higher velocities*

2) A batsman has to flex her elbow while playing a cricket shot. The biceps brachii helps in flexing the elbow and has points of origin and insertion at scapula and radius respectively. Which kind of muscle will help in keeping the scapula intact to help the batsman complete her shot successfully? **1 point**

- Agonist
- Antagonist
- Neutralizer
- Stabilizer

**No, the answer is incorrect.**  
**Score: 0**

**Accepted Answers:**  
*Stabilizer*

3) When a person flexes her elbow while carrying a dumbbell in her hand, the biceps brachii will be in **1 point**

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Week 8	ce De	<b>Score: 0</b>	
Week 9		<b>Accepted Answers:</b> <i>Concentric Action</i>	
Week 10		4) Passive tension and viscoelastic nature play a greater role in <b>1 point</b>	
Week 11		<input type="radio"/> Concentric Action	
Week 12		<input type="radio"/> Eccentric Action	
VIDEO DOWNLOAD		<input type="radio"/> Isometric Action	
		<input type="radio"/> Isotonic Action	
		<b>No, the answer is incorrect.</b>	
		<b>Score: 0</b>	
		<b>Accepted Answers:</b> <i>Eccentric Action</i>	
		5) Cross-bridges formed in the sarcomere of a muscle are highest in <b>1 point</b>	
		<input type="radio"/> Concentric Action	
		<input type="radio"/> Eccentric Action	
		<input type="radio"/> Isometric Action	
		<input type="radio"/> Isotonic Action	
		<b>No, the answer is incorrect.</b>	
		<b>Score: 0</b>	
		<b>Accepted Answers:</b> <i>Isometric Action</i>	
		6) As a mechanical equivalent, a muscle can be assumed to be a <b>1 point</b>	
		<input type="radio"/> Single force member	
		<input type="radio"/> Two force member	
		<input type="radio"/> Three force member	
		<input type="radio"/> Four force member	
		<b>No, the answer is incorrect.</b>	
		<b>Score: 0</b>	
		<b>Accepted Answers:</b> <i>Two force member</i>	
		7) Which of the following muscles cause elbow flexion? <b>1 point</b>	
		<input type="checkbox"/> Biceps brachii	
		<input type="checkbox"/> Brachialis	
		<input type="checkbox"/> Brachioradialis	
		<input type="checkbox"/> Biceps Femoris	
		<b>No, the answer is incorrect.</b>	
		<b>Score: 0</b>	
		<b>Accepted Answers:</b> <i>Biceps brachii</i> <i>Brachialis</i> <i>Brachioradialis</i>	
		8) Elbow joint is a <b>1 point</b>	
		<input type="checkbox"/> Cartilaginous joint	

- Synovial joint
- Fibrous joint
- Diarthrodial joint

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Synovial joint*

*Diarthrodial joint*

9) What type of lever is a bent arm?

**1 point**

- Class I lever
- Class II lever
- Class III lever
- Class IV lever

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Class III lever*

10) While drawing a free body diagram, we include

**1 point**

- External forces on the body
- Internal forces of the system that are external to the body
- Internal forces on the body
- Internal moments on the body

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*External forces on the body*

*Internal forces of the system that are external to the body*

11) Which of the following strategies can be adopted for solving a statically indeterminate system in biomechanics?

**1 point**

- Relationship between muscle force and the cross sectional area of the muscle
- Optimization to reduce metabolic cost, joint reaction etc.
- Relationship between muscle force and EMG signal
- Relationship using velocities and accelerations of individual segments

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Relationship between muscle force and the cross sectional area of the muscle*

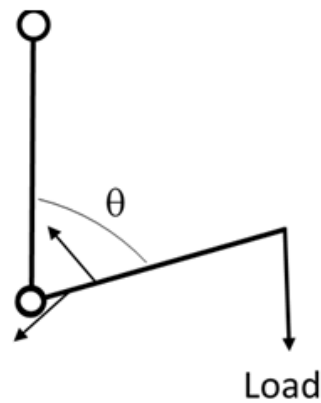
*Optimization to reduce metabolic cost, joint reaction etc.*

*Relationship between muscle force and EMG signal*

12) Consider a 160cm tall boy ( $H=1.6\text{m}$ ) weighing 60kg holding a mass of 5kg in his hand as shown in the figure below. The forearm makes an angle  $\theta$  with the upper arm, which is vertical. The insertion points of the biceps brachii and triceps brachii, are 0.1m and 0.05m from the elbow, respectively. Their lines of action are at 30 degrees and 10 degrees, respectively, to the axis of the forearm as shown. Assuming the arm is in static equilibrium at  $\theta = 90^\circ$ , answer Q12-15. Use appropriate anthropometric data provided for calculating the length, weight and the distance of the

**1 point**

centre of mass (CoM) from the proximal joint of the individual segments. Assume  $g=10 \text{ m/s}^2$ .  
Given:



$$L_{forearm} = 0.2H$$

$$W_{forearm} = 2\%W$$

$$CoM_{forearm} = 0.5L_{forearm}$$

Choose the answer closest to the solution you have obtained.

The moment about the elbow joint due to the external forces is

- 2 Nm
- 8 Nm
- 16 Nm
- 18 Nm

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*18 Nm*

13) Assuming only the biceps brachii is acting, calculate the force exerted by it.

**1 point**

- 704N
- 358N
- 70.4N
- 60N

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*358N*

14) If the triceps are also acting, the force in the biceps muscle

**1 point**

- Will be the same as in Q13
- Will be greater than the value in Q13

- Will be lesser than the value in Q13
- Will be independent of the load being carried

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Will be greater than the value in Q13*

15 Assume that the ratio of cross-sectional area of the biceps brachii to the triceps is 2. The force in the triceps muscle is **1 point**

- 98N
- 196N
- 392N
- 784N

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*196N*

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