**Shehzad khan id 16813 BS MLT summer exam paper anatomy**

**Q1**

1. **Motor unit**

**A motor unit is made up of a**[**motor neuron**](https://en.wikipedia.org/wiki/Motor_neuron)**and the**[**skeletal muscle**](https://en.wikipedia.org/wiki/Skeletal_muscle)**fibers innervated by that motor neuron's**[**axonal terminals**](https://en.wikipedia.org/wiki/Axon_terminal)**. Groups of motor units often work together to coordinate the contractions of a single**[**muscle**](https://en.wikipedia.org/wiki/Muscle)**; all of the motor units within a muscle are considered a**[**motor pool**](https://en.wikipedia.org/wiki/Motor_pool_(neuroscience))**.**

1. **Ipsilateral**

**An ipsilateral position in anatomy refers to body parts on the same side of the body or in reference to a given point.**

**pertaining to, situated on, or affecting the same side of the body.**

**(C)supination**

**Rotation of the forearm and hand so that the palm faces forward or upward also : a corresponding movement of the foot and leg in which the foot rolls outward with an elevated arch.**

**(D)Axial skeleton**

**The axial skeleton is the part of the skeleton that consists of the bones of the head and trunk of a vertebrate. In the human skeleton, it consists of 74 bones and is composed of six parts; the skull (22 bones), the ossicles of the middle ear, the hyoid bone, the rib cage, sternum and the vertebral column.**

**(E)Arteriosclerosis**

**Arteriosclerosis is the thickening, hardening, and loss of elasticity of the walls of arteries.This process gradually restricts the blood flow to one's organs and tissues and can lead to severe health risks brought on by**[**atherosclerosis**](https://en.wikipedia.org/wiki/Atherosclerosis)**, which is a specific form of arteriosclerosis caused by the buildup of fatty plaques,**[**cholesterol**](https://en.wikipedia.org/wiki/Cholesterol)**, and some other substances in and on the artery walls.**

**(F)shunt**

**A shunt is a hole or a small passage which moves, or allows movement of,**[**fluid**](https://en.wikipedia.org/wiki/Bodily_fluid)**from one part of the**[**body**](https://en.wikipedia.org/wiki/Human_anatomy)**to another. The term may describe either**[**congenital**](https://en.wikipedia.org/wiki/Congenital)**or acquired shunts.**

**Q2 difference between type 1 and type 2 muscle fiber**

|  |  |  |
| --- | --- | --- |
| **Characteristic** | **Slow-Twitch Type I** | **Fast-Twitch Type IIA** |
| **Activities** | **Marathons, distance running, swimming, cycling, power walking, endurance training** | **Powerlifting, sprinting, jumping, strength and agility training** |
| **Muscle Fiber Size** | **Small** | **Large** |
| **Force Production** | **Low** | **High** |
| **Resistance to Fatigue** | **Slow** | **Quick** |
| **Contraction Speed** | **Slow** | **Quick** |
| **Mitochondria** | **High** | **Medium** |
| **Capillaries** | **High** | **Medium** |
| **Myoglobin** | **High** | **Medium** |
| **ATPase Level** | **Low** | **Medium** |
| **Oxidative Capacity** | **High** | **Medium** |

**Q3 classify the bones according to their shape.**

**Long Bones**

**A long bone is one that is cylindrical in shape, being longer than it is wide. Long bones are found in the upper limbs (humerus, ulna, radius) and lower limbs (femur, tibia, fibula), as well as in the hands (metacarpals, phalanges) and feet (metatarsals, phalanges). Long bones function as rigid bars that move when muscles contract.**

**Short Bones**

**A short bone is one that is cube-like in shape, being approximately equal in length, width, and thickness. The only short bones in the human skeleton are in the carpals of the wrists and the tarsals of the ankles. Short bones provide stability and support as well as some limited motion.**

**Flat Bones**

**The term flat bone is somewhat of a misnomer because, although a flat bone is typically thin, it is also often curved. Examples include the cranial (skull) bones, the scapulae (shoulder blades), the sternum (breastbone), and the ribs. Flat bones serve as points of attachment for muscles and often protect internal organs.**

**Irregular Bones**

**An irregular bone is one that does not have any easily characterized shape and therefore does not fit any other classification. These bones tend to have more complex shapes, like the vertebrae that support the spinal cord and protect it from compressive forces. Many bones of the face, particularly the jaw bones that contain teeth, are classified as irregular bones.**

**Sesamoid Bones**

**A sesamoid bone is a small, round bone that forms in tendons (sesamo- = “sesame” and -oid = “resembling”). Tendons are a dense connective tissue that connect bones to muscles and sesamoid bones form where a great deal of pressure is generated in a joint. The sesamoid bones protect tendons by helping them overcome excessive forces but also allow tendons and their attached muscles to be more effective. Sesamoid bones vary in number and placement from person to person but are typically found in tendons associated with the feet, hands, and knees. The patellae (singular = patella) are the only sesamoid bones found in common with every person.**

**Q4 difference between artery , vein and capillary.**

|  |  |  |
| --- | --- | --- |
| **ARTERIES** | **VEINS** | **CAPILLARIES** |
|  |  |  |
| **1) These blood vessels have thick walls and carry blood from the heart to different body parts.** | **1) These blood vessels have thin walls and carry blood from different body parts to the heart.** | **1) These blood vessels are narrow and have very thin walls, they connect arteries and veins.** |
| **2) They do not have valves.** | **2) They have valves and prevent backflow of blood.** | **2) They do not have valves.** |
| **3) All the arteries carry oxygenated blood except the pulmonary artery.** | **3) All the veins carry deoxygenated blood except the pulmonary vein.** | **3) As it connects arteries and veins, therefore, it contains both oxygenated and deoxygenated blood.** |

**Q5 mechanism of skeletal muscle contraction.**

**The following steps are involved in muscle contraction:**

**(1) The sequence of events leading to contraction is initiated somewhere in the central nervous system, either as voluntary activity from the brain or as reflex activity from the spinal cord.**

**(2) A motor neuron in the ventral horn of the spinal cord is activated, and an action potential passes outward in a ventral root of the spinal cord.**

**(3) The axon branches to supply a number of muscle fibers called a motor unit, and the action potential is conveyed to a motor end plate on each muscle fiber.**

**(4) At the motor end plate, the action potential causes the release of packets or quanta of acetylcholine into the synaptic clefts on the surface of the muscle fiber.**

**(5) Acetylcholine causes the electrical resting potential under the motor end plate to change, and this then initiates an action potential which passes in both directions along the surface of the muscle fiber.**

**(6) At the opening of each transverse tubule onto the muscle fiber surface, the action potential spreads inside the muscle fiber.**

**(7) At each point where a transverse tubule touches part of the sarcoplasmic reticulum, it causes the sarcoplasmic reticulum to release Ca++ ions.**

**(8) The calcium ions result in movement of troponin and tropomyosin on their thin filaments, and this enables the myosin molecule heads to “grab and swivel” their way along the thin filament. This is the driving force of muscle contraction.**

**Contraction is turned off by the following sequence of events:**

**(9) Acetylcholine at the neuromuscular junction is broken down by acetylcholinesterase, and this terminates the stream of action potentials along the muscle fiber surface.**

**(10) The sarcoplasmic reticulum ceases to release calcium ions, and immediately starts to resequester all the calcium ions that have been released.**

**(11) In the absence of calcium ions, a change in the configuration of troponin and tropomyosin then blocks the action of the myosin molecule heads, and contraction ceases.**

**(12) In the living animal, an external stretching force, such as gravity or an antagonistic muscle, pulls the muscle back to its original length.**

### **Muscle contraction**

#### **Contraction Phase**

**Resting state**

**Motor nerve action potential arrives at motor end plate**

**Acetylcholine released, sarcolemma and membranes depolarized (Na+ flux into fiber)**

**Action potential transmitted via T-tubules to SR**

**Ca++ released from SR terminal cisternae into sarcoplasm**

**Ca++ bound by troponin**

**Myosin ATPase activated and ATP hydrolyzed**

**Tropomyosin shift from actin binding site**

**Actin-myosin crossbridge formation**

**Repeated formation & breaking of crossbridges resulting in sliding of filaments and sarcomere shortening**

**Q6 Anatomical position of scapula and clavicle.**

**Scapula**

**The scapula, also known as the shoulder blade, is a flat triangular bone located at the back of the trunk and resides over the posterior surface of**[**ribs**](https://www.kenhub.com/en/library/anatomy/the-ribs)**two to seven. The scapula, along with the**[**clavicle**](https://www.kenhub.com/en/library/anatomy/the-clavicle)**and the manubrium of the**[**sternum**](https://www.kenhub.com/en/library/anatomy/sternum)**, make up the**[**pectoral (shoulder) girdle**](https://www.kenhub.com/en/library/anatomy/shoulder-girdle)**which connects the**[**upper limb**](https://www.kenhub.com/en/library/anatomy/upper-extremity-anatomy)**of the appendicular skeleton to the axial**[**skeleton**](https://www.kenhub.com/en/library/anatomy/the-musculoskeletal-system)**.**

**The scapula is an important bone as each scapula provides a point of attachment for a number of muscles that make up the**[**arm and shoulder**](https://www.kenhub.com/en/library/anatomy/arm-and-shoulder-anatomy)**. It also articulates with the humerus and clavicle, forming the [glenohumeral (shoulder) joint](https://www.kenhub.com/en/library/anatomy/the-shoulder-joint) and [acromioclavicular joint](https://www.kenhub.com/en/library/anatomy/acromioclavicular-ac-joint) respectively. However, because the medial aspect of the scapula is not directly attached to the axial skeleton, but is rather held in place and connected to the**[**thorax**](https://www.kenhub.com/en/library/anatomy/thorax)**and**[**vertebral column**](https://www.kenhub.com/en/library/anatomy/the-vertebral-column-spine)**by muscles, the scapula can move freely across the posterior thoracic wall ([scapulothoracic joint](https://www.kenhub.com/en/library/anatomy/scapulothoracic-joint)). This allows the arm to move with the scapula, providing a wide range of movement and mobility for the upper limb compared to the lower limb.**

**clavicle**

**The collarbone is a large doubly curved**[**long bone**](https://en.wikipedia.org/wiki/Long_bone)**that connects the**[**arm**](https://en.wikipedia.org/wiki/Human_arm)**to the**[**trunk**](https://en.wikipedia.org/wiki/Torso)**of the body. Located directly above the first**[**rib**](https://en.wikipedia.org/wiki/Rib)**, it acts as a strut to keep the scapula in place so that the arm can hang freely. Medially, it articulates with the manubrium of the**[**sternum**](https://en.wikipedia.org/wiki/Sternum)**(breastbone) at the [sternoclavicular joint](https://en.wikipedia.org/wiki/Sternoclavicular_joint" \o "Sternoclavicular joint). At its lateral end it articulates with the**[**acromion**](https://en.wikipedia.org/wiki/Acromion)**, a process of the**[**scapula**](https://en.wikipedia.org/wiki/Scapula)**(shoulder blade), at the [acromioclavicular joint](https://en.wikipedia.org/wiki/Acromioclavicular_joint" \o "Acromioclavicular joint). It has a rounded medial end and a flattened lateral end.**

**From the roughly pyramidal sternal end, each collarbone curves laterally and anteriorly for roughly half its length. It then forms an even larger posterior curve to articulate with the acromion of the scapula. The flat acromial end of the collarbone is broader than the sternal end. The acromial end has a rough inferior surface that bears a ridge, the**[**trapezoid line**](https://en.wikipedia.org/wiki/Trapezoid_line)**, and a slight rounded projection, the conoid tubercle (above the**[**coracoid process**](https://en.wikipedia.org/wiki/Coracoid_process)**). These surface features are attachment sites for muscles and ligaments of the shoulder.**

**It can be divided into three parts: medial end, lateral end and shaft.**

### **Medial end**

**It is also known as the sternal end. The**[**medial**](https://en.wikipedia.org/wiki/Anatomical_terms_of_location)**end is quadrangular and articulates with the clavicular notch of the manubrium of the sternum to form the sternoclavicular joint. The articular surface extends to the inferior aspect for articulation with the first**[**costal cartilage**](https://en.wikipedia.org/wiki/Costal_cartilage)**.**

### **Lateral end**

**The lateral end is also known as the acromial end. It is flat from above downward. It bears a facet that articulates with the shoulder to form the acromioclavicular joint. The area surrounding the joint gives an attachment to the joint capsule. The anterior border is concave forward and posterior border is convex backward.**

### **Shaft**

**The shaft is divided into the medial two-thirds and the lateral one third. The medial part is thicker than the lateral.**