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**Department : Dpt**

**Semester : 2nd**

**Assignment : biomechanics**

**Submitted to: sir shahzeb**

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**Question no 1:**

**Explain “ biomechanics of articular cartilage” ?**

**Articular cartilage :**

**Articular cartilage is the smooth white tissue that cover the ends of bones where they come together to form joints . Healthy cartilage in our joints make it easier to move . It allow the bone to glide over each other with very little friction . Articular cartilage can be demage by injury or normal wear and tear . Articular cartilage covers bones surface within the joint capsule .**

**Function of articular cartilage :**

**Distributes joints loads over a wide area decreasing the stresses sustained by the contacting joint surface .**

**. Allows relatives movement of the opposing joint surface with minimize friction and wear .**

 **. Despite common beliefs does not serve as a shock absorber .**

**. Very thin .**

**. Capacity negligible compared to muscle and bone .**

**. Surface roll or slide during motion .**

**Types of cartilage :**

 **There are three types of articular cartilage**

**1 : hyaline: most common found in ribs , nose , larynx , treachea , is a precuror of bone .**

**2: fibro: is found in inverteberal discs , joints capsule ligaments.**

**3: Elastic : is found in the external ear , epiglottis and larynx.**

**Location of articular cartilage :**

**Articular cartilage is found only in diarthroidal joints ( synovial joints ) and is comprised of hyaline cartilage a particularly smooth types of cartilage which allows for easy articulation , increased weight distribution and shock absorption .**

 **Water :**

**Water is the most abundant component of articular cartilage contributing upto 80 % of its wet weight. Approximatly 30 % of these water is associated with the intrafibrillar space with in the collagen . The water flow through the cartilage and across the articular surface help to transport and distribute nutrient to chondrocytes in the addition to providing lubrication.**

**Summary :**

 **Articular cartilage is a highly specialised connective tissue of diarthroidal joints. Its principles function is to provide a smooth lubricated surface for articulation and to facilities the transmissions of load with a low frictional coefficient.**

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**Question no 2:**

**Explain “biomechanics of tendons in ligaments”?**

**Tendons :**

**Tendons connect muscle to bone .**

**Tendon consist of bundles of collagenus fibers arrange in parallel they are arrange in this way to form cords which have great tensile strength .**

**Origin at muscle crosses at least one joint and insert in bone .**

**Ligaments :**

**Ligaments connect bone to bone .**

**Ligaments consists mostly bundle of elastic molecules formed into elastic fiber with some bundles of collagen .**

**Origin and insert in bone.**

**More elastic and flexible than tendons .**

**Offer less tensile strength.**

**Function :**

**Tendons :**

**Tendons carry tensil force from muscles to bones .**

**They carry compressive force when wrapped around bone like a pulley .**

**Proprioception**

**Secondary function storage of energy .**

**Ligaments :**

**Its maintains correct bone and joint geometry .**

**Ligaments + associated joints capsules combinly function passive joints stablizers .**

**Secondary function : propioception.**

**Mechanical properties of ligaments in tendons**

**Both are viscoelastic tissue**

**Both exhibit the non linear behavior .**

**Strength ( sustain highly load ) .**

**When load is applied enough it cause injury demage , dependent on rate and amount of load .**

**Factor that effact the biomechanical properties of ligaments And tendons**

**Maturation and aging .**

**Pregnancy and postpartum period .**

**Mobilization and immobilization.**

**Diabetes mellitus .**

**Steroids .**

**Non steroidal anti – inflammatory drugs .**

**Hemodialysis .**

**Grafts .**

**There are five major regions that can be identified on the stress - strain curve of a tendons or ligaments which include .**

**1. Toe region .**

**2. Linear or elastic region .**

**3. Progressive failure or plastic region .**

**4. Major failure region .**

**5. Complete failur region.**

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