**BiS200 Quiz#1** (2024-03-20)

Answer in English, Closed book, 15 minutes
There will be a class after the quiz.

**Fill-in-the-blank questions:**

1. Water-soluble molecules are referred to as (hydrophilic), molecules that are not easily dissolved in water are called (hydrophobic), and molecules that contain both water-soluble and water-insoluble parts are called (amphiphilic).
2. The enzyme responsible for transcription is (RNA polymerase), and the complex that catalyzes translation is the (ribosome).
3. (Introns) are the sequences that are spliced or removed during RNA splicing, resulting in an mRNA transcript consisting only of (exons).
4. The four primary tissue types are muscle, nervous, epithelial, and (connective tissues).

**Short-answer questions:**

1. Starting from the familiar image of DNA in metaphase cells, name all the structural levels through which DNA is organized within our cells.
    1. Answer: DNA is organized into several levels of structure, including nucleotides, the double helix, nucleosome, chromatin (with histones), tightly packed chromatin, chromosomes, and genome.
2. What are the key enzymes involved in DNA replication in eukaryotic cells and what are their specific functions?
    1. Answer: Key enzymes include DNA helicase (unwinds the DNA double helix), DNA polymerase (synthesizes the new DNA strands), primase (lays down RNA primers), ligase (joins Okazaki fragments on the lagging strand), and topoisomerase (relieves supercoiling tension).
3. What are the three principal techniques used in recombinant DNA technology?
    1. Answer: The three main techniques include gene cloning, PCR (polymerase chain reaction), and gel electrophoresis.
4. What is the function of the RNA-induced silencing complex (RISC) in the mechanism of siRNA-mediated RNA interference?
    1. Answer: The RISC is involved in the RNA interference pathway where it incorporates one strand of the siRNA. The RISC-siRNA complex then binds to complementary mRNA molecules and induces their cleavage, leading to gene silencing.
5. RISC is composed of multiple proteins. What levels of protein structure are present in this complex?
    1. Answer: Quaternary (as it is a complex of multiple proteins, it inherently includes the quaternary structure. Each protein within the complex will also have primary, secondary, and tertiary structures.)