Mid-Term Assignment (Spring-2020) (BS-MLT 4th)

Course Title: Molecular Biology **Instructor: Mr. Fazli Zahir Mian**

Time: 48 Hours

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Q1: Fill in the Blanks.

1) James watson and Francis Crick discovered the double helical structure of the DNA molecule.
2) Watson and Crick were awarded Nobel Prize in 1962.
3) DNA store, transmit, and help express hereditary information.
4) The amino acid sequence of a polypeptide is programmed by a unit of inheritance called a Gene.
5) Hundreds of Y-shaped regions of replicating DNA molecules where new strands are growing called Replicating forks.
6) Topoisomerase are enzyme which relieves stress on the DNA molecule by allowing free rotation around a single strand.
7) Genetic code is a dictionary that corresponds with sequence of nucleotides and sequence of amino acids.
8) Aminoacylation is the process of covalently attaching an amino acid to the tRNA.
9) DNA Helicase are proteins which attach and help keep the separated strands apart.

Q2: Write short notes on the following

1) Common tools of molecular biology

Answer:

:> Nucliec acid fractionation
:> Polymerase chain reaction
:> Probes , hybridization
:> Vector, molecular cloning
:> Nucliec acid enzymes
:> Microarray

:> DNA sequencing

:> Electrophoretic separation of nucliec acid

:> Detection of genes

2) Nucleic acids

Answer:

:>Nucleic acids are the biopolymers, or small biomolecules, essential to all known forms of life.

:>The term nucleic acid is the overall name for DNA and RNA. They are composed of nucleotides, which are the monomers made of three components: a 5-carbon sugar, a phosphate group and a nitrogenous base.

3) Chargaff' rule

Answer:

:>Chargaff's rules state that DNA from any cell of any organisms should have a 1:1 ratio of pyrimidine and purine bases and, more specifically, that the amount of guanine should be equal to cytosine and the amount of adenine should be equal to thymine.

:> This pattern is found in both strands of the DNA.

4) Wobble hypothesis

Answer:

:>Wobble Hypothesis explains why multiple codons can code for a single amino acid.

:>One tRNA molecule (with one amino acid attached) can recognise and bind to more than one codon, due to the less-precise base pairs that can arise between the 3rd base of the codon and the base at the 1st position on the anticodon.

5) Names of main steps in Translation and Transcription

Answer:

Main steps of Translation:

:>Initiation

:>Elongation

:>Termination

Main Steps of Transcription

:>Initiation

:>Elongation

:>Termination

:>Processing

Q3: Explain the process of DNA Replication.

Ans: Process of DNA Replication:

1. Unzipping of Double Hilex Structure:

The first step in DNA replication is to 'unzip' the double helix structure of the DNA? molecule.

2. Role of Helicase Enzyme:

This is carried out by an enzyme called helicase which breaks the hydrogen bonds? holding the complementary bases of DNA together (A with T, C with G).

3. Acting as Templates:

The separation of the two single strands of DNA creates a 'Y' shape called a replication 'fork'. The two separated strands will act as templates for making the new strands of DNA.

4.Orientation of strands:

One of the strands is oriented in the 3' to 5' direction (towards the replication fork), this is the leading strand. The other strand is oriented in the 5' to 3' direction (away from the replication fork), this is the lagging strand. As a result of their different orientations, the two strands are replicated differently.

5. Matching of bases:

Once all of the bases are matched up (A with T, C with G), an enzyme called exonuclease strips away the primer(s). The gaps where the primer(s) were are then filled by yet more complementary nucleotide.

6.Correction in DNA Sequence:

The new strand is proofread to make sure there are no mistakes in the new DNA sequence.

7.Sealing of DNA sequence:

Finally, an enzyme called DNA ligase?(An enzyme that joins together two strands of DNA.) seals up the sequence of DNA into two continuous double strands.

8.Reason of Semi conservative:

The result of DNA replication is two DNA molecules consisting of one new and one old chain of nucleotides. This is why DNA replication is described as semi-conservative, half of the chain is part of the original DNA molecule, half is brand new.

9.continous process:

Following replication the new DNA automatically winds up into a double helix.