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

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

**Time: 48 Hours**

**Q2: Write short notes on the following**

1. Common tools of molecular biology
2. Nucleic acids
3. Chargaff’s rule
4. Wobble hypothesis
5. Names of main steps in Translation and Transcription

**Q3: Explain the process of DNA Replication.**

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***BS # MLT 4th.***

***SUBJECT # Molecular Biology.***

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* ***Question: 1***
* ***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. ***Nucleic Acid*** 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 ***Replication 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. ***Charging*** is the process of covalently attaching an amino acid to the tRNA.
9. ***Single-Strand Binding Proteins*** are proteins which attach and help keep the separated strands apart.

* ***Question: 2***

Write a short on the following.

***Answer:***

1. ***Common Tools of Molecular Biology:***

*The common tools of molecular biology are us under.*

* *Nucleic acid fractionation.*
* *Polymerase chain reaction.*
* *Probes, Hybridization.*
* *Vector, Molecular cloning.*
* *Nucleic acid enzymes.*
* *DNA sequencing.*
* *RNA northern blotting.*
* *DNA southern blotting, inSitu hybridization FISH Technique.*
* *Protein western blotting. Immunohistochemistry.*

1. ***Nucleic Acid:***

* *Nucleic acid are biopolymers which are existent to all known forms of life.*
* *They were first isolated by friedrich miescher. From pus cells in 1869.*
* *Due to their acidic nature they were first named acid and then nucleinic acid and then nucleic acid.*
* *Nucleic acid are composed of nucleotides which are monomers made up of 3 components.*

1. ***A-5 carbon sugar.***
2. ***Phosphate Group.***
3. ***Nitrogenous base.***

* *If the sugar is compound ribose the polymer is RNA.*
* *If the sugar is deoxyribose the polymer is DNA.*
* *Nucleic acid store transmit and help express hereditary information.*

1. ***Chargaff `s Rule:***

* *Chargaff `s rule states that DNA from any cell of any organism should have a ratio of 1:1 of pyrimidine and purine bases and 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 stands of DNA.*
* *Adenine must pair with Thymine.*
* *Guanine must pair with Cytosine.*
* *The amount of given DNA molecule will be about the same.*

1. ***Wobble Hypothesis:***

* *The wobble hypothesis proposes that normal base pacing can occurs between nitrogen bases in position 1 and 2 of the codons and the bases 3 and 2 in the anticodon can form non Watson and crick base passing with the third position of the codon is wobble.*

1. ***Names of main steps of Translation and Transcription:***

* ***Translation Steps:***
* *Initiation.*
* *Elongation.*
* *Termination.*
* ***Transcription Step:***
* *Initiation.*
* *Elongation.*
* *Termination.*
* ***Question: 3***

*Explain the process of DNA Replication?*

***Answer:***

* ***DNA Replication:***
* *DNA replication is the process by which DNA makes a copy of it self during cell division.*
* ***Steps in DNA Replication:***
* *The first step of DNA replication is to unzip the double helix structure of DNA molecule.*
* ***Helicase:***
* *The separation of double helix structure of DNA molecule is called out by an enzyme called helicase which breaks the hydrogen bonds holding the DNA bases together.*
* ***Replication Forks:***
* *The separation of DNA stands create a Y shape called a replication forks. The 2 stands will act as templates for making new DNA stands.*
* ***Primers:***
* *The short piece of RNA is called primer. It is produced by an enzyme called primase. It comes along and binds to the end of leading strands. The primer acts as a starting point of DNA synthesis.*
* ***Synthesis of New DNA Strands:***
* ***DNA Polymerase:***
* *DNA polymerase catalyzed the synthesis of new DNA strand in 5` to 3` direction.*
* ***Leading Strand:***
* *In the leading strand one of the strand is oriented in 3` to 5` direction.*
* ***Logging Strand:***
* *The other strand is oriented in the 5` to 3` direction, Due to their different orientation. The 2 strands are replicated differently.*
* ***Okazaki Fragments:***
* *Chunk of DNA called Okazaki fragments. Are the added to the logging strands in the 5` to 3` direction.*
* ***Proofreading:***
* *In order to make sure there are no mistakes in the new DNA sequence the new strand is proofread.*
* ***DNA Ligase:***
* *An enzyme called DNA ligase seals up the sequence of DNA into two continuous double strands.*
* *The result of DNA replication is 2 DNA strands with 1` new and 1` old chains of nucleotides. That’s why the DNA replication is described as semi conservative because half of the chain is part of the original DNA molecule and half is brand new.*

***THE END***