Mid-Term Assignment

Course Title: Fundamental Microbiology-ll

BS (Microbiology 2nd)

Instructor: Ms. Pashmina

Time: 6 days **Max Marks: 30**

Note:

- **Attempt all questions from this section, all questions carry equal marks.**
- **Answer Briefly and to the point, don't cut past avoid un-necessary details**

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Q1: (10 Marks)

What are the significant differences in the process of DNA replication, transcription and Translation in prokaryotes?

DNA REPLICATION IN PROKARYOTES

In prokaryotic cells, there is only one point of origin, replication occurs in two opposing directions at the same time, and takes place in the cell cytoplasm. the short replication in prokaryotes occurs almost continuously, but eukaryotic cells only undergo DNA replication during the S-phase of the cell cycle

DNA TRANSCRIPTION IN PROKARYOTES

Transcription and translation occur simultaneously.Prokaryotic transcription occurs in the cytoplasm.RNAs are released and processed in the cytoplasmRNA polymerases are a complex of five polypeptides.It doesn't require any proteins or other factors for the initiation of transcription.

DNA TRANSLATION IN PROCARYOTES

The key difference between eukaryotic and prokaryotic translation is that eukaryotic translation and transcription is a asynchronous process whereas prokaryotic translation and transcription is a synchronous process.

Q2: (10 Marks)

Differentiate between

MEIOSIS AND MITOSIS

Mitosis involves the division of body cells, while meiosis involves the division of sex cells. The division of a cell occurs once in mitosis but twice in meiosis. Two daughter cells are produced after mitosis and cytoplasmic division, while four daughter cells are produced after meiosis.

R SELECTION AND K SELECTION

The two evolutionary "strategies" are termed r-selection, for those species that produce many "cheap" offspring and live in unstable environments and K-selection for those species that produce few "expensive" offspring and live in stable environments.

POINT MUTATION AND SILENT MUTATION

Point mutations happen when there is a replacement of one base pair from another, while silent mutations occur when there is an insertion or deletion of the base pairs from the DNA structure.

Point mutations occur due to alterations in the single nucleotide, whereas silent occurs due to alterations in numerous nucleotides.

Point mutation brings changes in the structure of a gene because of the substitutions with another base pair, on the contrary, silent mutations change the number of nucleotides due to either insertions or deletions of the nucleotides.

TELOPHASE AMD METAPHASE

In metaphase, chromosomes are lined up and each sister chromatid is attached to a spindle fiber. In telophase, chromosomes arrive at opposite poles, and nuclear envelope material surrounds each set of chromosome.

Q3: (10 Marks)

a) What is mutation? What are the roles of mutation in human diseases?

MUTATION

The changing of the structure of a gene, resulting in a variant form that may be transmitted to subsequent generations, caused by the alteration of single base units in DNA, or the deletion, insertion, or rearrangement of larger sections of genes or chromosomes.

ROLE OF MUTATION IN HUMAN DISEASES

When a mutation alters a protein that plays a critical role in the body, it can disrupt normal development or cause a medical condition. A condition caused by mutations in one or more genes is called a genetic disorder. In some cases, gene mutations are so severe that they prevent an embryo from surviving until birth

DISEASES DUE TO MUTATION

Some well-known inherited genetic disorders include cystic fibrosis, sickle cell anemia, Tay-Sachs disease, phenylketonuria and color-blindness, among many others. All of these disorders are caused by the mutation of a single gene.

Q3 b) Differentiate between DNA and RNA? What was the first?! DNA or RNA explains with suitable reasons?

DIFFERENCE BETWEEN DNA AND RNA

DNA is a double-stranded molecule, while RNA is a single-stranded molecule.DNA and RNA base pairing is slightly different since DNA uses the bases adenine, thymine, cytosine, and guanine; RNA uses adenine, uracil, cytosine, and guanine. Uracil differs from thymine in that it lacks a methyl group on its ring

WHAT WAS FIRST DNA OR RNA

Experiments in the 1960s showed that messenger RNA has the ability to store genetic information, while transfer and ribosomal RNA have the ability to translate genetic information into proteins. Experiments performed two decades later showed that some RNAs can even act as an enzyme to self-edit their own genetic code! These results raised two questions:

1) Why does RNA play so many roles in the flow of genetic information?

2) Why bother storing genetic information in DNA, if RNA alone could do the job?

RNA has great capability as a genetic molecule; it once had to carry on hereditary processes on its own. It now seems certain that RNA was the first molecule of heredity, so it evolved all the essential methods for storing and expressing genetic information before DNA came onto the scene. However, single-stranded RNA is rather unstable and is easily damaged by enzymes. By essentially doubling the existing RNA molecule, and using deoxyribose sugar instead of ribose, DNA evolved as a much more stable form to pass genetic information with accuracy.