

# FUNDAMENTAL OF MICROBIOLOGY

EXAM : MID-TERM

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DEPARTMENT : MICROBIOLOGY 2nd

Q.No.1 :what are the significant different in the process of DNA replication transcription and translation in prokaryotic.

**ANSWER : 1**

DNA Replication in prokaryote (E.coil)

\* the genome of E.coil is replication bi\_directionally from a single origin,oric. E.coil replication is circular with no free ends .replication of DNA in E.coil is also know as theta replication and it occurs in the steps.

Another explanation.

\*In prokaryotic DNA replication starts when. a regulatory protien binds to a single starting point on the chromosome .This triggers the beginning of DNA replication.

\*Replication in most prokaryotic cell starts from a single point and proceed in two direction until the entire chromosome is copied.

\*three stages of replication.

1\_ initiation.

\*occures at the origin of replication.

\*separates dsDNA primer synthesis.

2\_Elongation.M

\*involves the addition of new nucleotides (dNTPs) based on complementarity of the template strand.

\*froms phosphoester bonds correct the mismatch bases extending the DNA strand.

### 3\_termination.

\* stops the DNA replication occurs at a specific termination step.

### DNA replication steps.

- 1\_identification of the origins of replication .
- 2\_unwind (denaturation) of dsDNA to provide an ssDNA template.
- 3\_formation of the replication fork.
- 4\_initiation of DNA and synthesis and elongation .
- 5\_ primer removal and ligation of the newly synthesized DNA segments .
- 6\_ reconstitution of chromatin structure.

### 2 .TRANSCRIPTION.

- 1\_it is formation of RNA from DNA.
- 2\_the template is antisense strand of DNA.
- 3\_it occurs inside the nucleus in eukaryotic and cytoplasm in prokaryotic.
- 4\_the raw materials are four types of ribonucleoside triphosphates  
\_ATP,GTP,CTP,and UTP.
- 5\_it forms three types of RNAs\_rRNA,tRNA,mRNA.
- 6 transcription requires RNA polymerases and some transcription factors.
- 7\_polymerase moves over the template .
- 8\_ An adapter molecule is not required .
- 9\_product often requires splicing.
- 10\_the product undergoes processing that involves cutting modification of nitrogen bases folding and attaching of specific groups at the end.

### TRANSLATION.

- 1\_it is synthesis of polypeptide over ribosome.
- 2\_the template is mRNA.
- 3\_it occurs in cytoplasm.
- 4\_ the raw materials are 20 types of amino acids.

5\_all the There types of RNAs take part in translation.

,6\_translation requires initiation elongation and translocase factors.

7\_ ribosome moves over mRNA.

8\_ adapter (adaptor) molecules bring amino acids over the temple.

9\_ splicing is absent .

10 \_processing involves occasional modification of amino acids combining with other substance (e.g glycosylation ) and packing.

## ANSWER : 2

mitosis and meiosis.

1\_ mitosis.

1\_ mitosis occurs continuously in the body or somatic cells.

2\_the whole process complete in one sequence or phase after one round of DNA replication.

3\_the prophase is of short duration and does not include any sub stage .

4\_the homologous chromosomes duplicate into two chromatides the chromatides separates and from new chromosomes.

5\_no pairingor synapsis takes place in the between the homologous chromosomes .

6\_duplication of chromosomes takes place in the early prophase.

7\_no chiasma formation or crossing over takes place.

8\_ the exchange if the genetic materials between the homologous chromosomes does not occur.

9\_the chromosome number remains the same in the newly format daughter cells.

10\_two daughter cells are formed.

2\_MEIOSIS.

1\_ meiosis occure in the germ cells during the process of gametigenesis.

2\_the whole process complete in two successive divisions which occur one after the other.

3\_the prophase is of longer duration and it complete in six successive stages .

4\_out of the two homologous chromosomes only one type of chromosomes either material or paternal moves to the daughter cells.

5\_pairing or synapsis occure between the homologous chromosomes. .

6\_duplication or splitting of chromosomes takes place in late prophase.

7\_chiasma formation or crossing over takes place during meiosis .

8\_ the exchange of genetic. material takes place between the chromatides of homologous chromosomes.

9\_chromosomes number is reduced into half in the newly formed daughter cells.

10\_ four daughter cell are formed.

Explain point and silent mutation.

1\_point mutation.:

\* point mutations involve alterations in the structure or location of a signal gene . generally ,only one or a few base pair are involved.

\* point mutation may be caused by physical damage to the DNA from radiation or chemicals or may occur spontaneously.

\* point mutation can sighthcatly affect protien structure and function.

\*point mutations are often caused by mutagens.

2\_SILENT MUTATION.

A silent mutation or point mutation refers to change a single nuceotide bade. When this occurs different bad substitutes for a nucleotides base yet still codes for the same amino acids .the nucleotide bases code for amino acids in groups of three bases known as codons some amino acids are condons through multiple code meaning that there can be more than one group of three bases coded for that amino acids.

\* silent mutation no effect on produce protein.

\*LEADING STAND LAGGING STAND.

1\_LEADING STAND.

\*Leading strand synthesis CONTINUOUSLY in 5'→3'.

\*it is replication strand of DNA which grows continuously without any gap.

\*only a single RNA primer is required.

## 2\_LAGGING STRAND.

\*lagging strand synthesis in fragment in 5'→3'.

\* DNA ligase is required for joining okazaki fragment .

\*formation of lagging strand slower.

## \*TALOPHASE AND MATAPHASE.

### 1\_TALOPHASE.

\*chromatids arrive at opposite poles of cell and new membrane forms around the daughter nuclei.

\* the chromosomes disperse and are no longer visible under the light microscope.

\*the spindle fibers disperse and cytokinesis or the partitioning of the cell may also begin during this stage..

### 2\_MATAPHASE.

\*Spindle fibers align the chromosomes along the middle of the cell nucleus.

\* this line is referred to as the metaphase plate.

\* this organization helps to ensure that in the next phase when the chromosomes are separated each new nucleus will receive one copy of each chromosome.

## R\_SELECTION AND K\_SELECTION.

### 1\_R\_SELECTION.

\* reproduce quickly but under normal circumstances most offspring do not survive to adulthood.

\* FOR EXAMPLE. A rabbit (mature after 8 months )can produce 10-30 offspring per year.

2\_K\_SELECTION. \*some animals such as the human and northern gannet do not reach sexual maturity for many years after birth and even then produce few offspring.

FOR EXAMPLE :eg elephant ,whales,humans.

Q.NO:3.WHAT is mutation .what are the roles of mutation in human diseases.

## ANSWER : 3 PART :A

### MUTATION:

\* mutation are heritable change in the DNA .

\*they are essential to the study of genetic and are useful in many other biological fields .

\*somatic mutations:occur in non reproductive cells.

\*germ line mutation: occur in cells that gives rise to gametes.

\*mutation :a change in the nucleotide base sequence of a gene or DNA molecule.

### \*ROLE OF MUTATION IN HUMAN DISEASE.

1\_mutation of DNA can be caused by an exogenous or endogenous source.

2\_many external factors like irradiation or chemical induce mutation .some endogenous mutation arise from oxidative stress insufficient DNA repair or spontaneous mutation on the molecular level.

Diseases cause.

1\_sickle cell anemia recessive .

\* the diseases affected a person,s red blood cell.

2\_COLLAGEN RELATED DISEASE.

\* several heritable diseases result from mutation in the collagen.

\*marfan,s syndrome and ehler,s danlos syndromes inherited disorder of connected tissue which affect many organ system including the skeleton lung eye heart and blood vessels.

## ANSWER :3 PART :B

### 1\_DNA.

- \*DOUBLE stranded polynucleotids.
- \* found in nucleus chloroplast and mitochondria.
- \*contain genetic information about an organisms.
- \* sugar deoxyribose.
- \* base adenine ,guanine,thymine,cytocine.
- \*DNA is the genetic material in all living organisms.
- \*a primer is needed for replication.

### 2\_RNA.

- \*SINGLE stranded poly nucleotides.
- \* found in the cytoplasm ribosome and nucleus.
- \* copies information in DNA for protien synthesis.
- \*sugar ribose.
- \* base adenine,guanine,cytocine,uracil.
- \* RNA is genetic materiak in some virus.
- \*no primer is needed for transcription.

How first DNA OR RNA.

RNA was the first genetic molecule .

Experiment 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 protein. .experments performed two decades later showed that some RNAs can even act as an enzyme to self edit their own genetic code.