Paper=

Molecular biology

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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

2)Nucleic acids

3)Chargaff's rule

4)Wobble hypothesis

1) Common tools of molecular biology
   =molecular biology technique are common method used in genetics, biochemistry, and biophysics, to address issues such as,

   =Nucleic acid fractionation

= polymerase chain reaction

=probes hybridization vector

Molecular donning nucleic acid, enzyme microarray

=DNA sequence

= electrophoretic separation of nucleic acid detection of genetic.

= DNA southern blotting, insita hybridization, fish technique.

= RNA northern blotting

=protein water blotting immunhistochemistry.

2) Nucleic acid =

Nucleic acid are polynucleotide chain (polymers) formed by the linkages of units called nucleotide.
There are two types of nucleic acid.

1) Deoxyribonucleic acid (DNA)
2) Ribonucleic acid (RNA)

=DNA is formed of deoxyribonucleotides while RNA is formed of Ribonucleotide

A nucleotide is composed of three component.

1) Pentose sugar
2) Nitrogenous base
3) Phosphoric acid

In a typical nucleotide, the nitrogenous base is attached to carbon no. 1 of Pentose sugar while phosphate group is attached to carbon no. 5 of the Pentose sugar.

= nitrogenous bases are of two types.

1) Pyrimidines. 2) purines

3)Chargaff's rule=

Chargaff's rule states that the molar ratios of adenine to thymine and Guanine to cytosine are approximately equal in a DNA helix. This is a result of complementry base pairing between single strands of DNA in a helix.

4) Wobble Hypothesis =

The wobble hypothesis is proposed by Francis crick in 1966 to explain the observed degeneracy in the third position of a codon.

"the wobble hypothesis propose that normal base pairing can occur between nitrogen bases in position 1 and 2 of the codon and the corresponding bases (3 and 2) in the anti-codon.

Actually the base form non- Watson – crick base pairing with the third position of the codon.

The hypothesis is applicable to most (not all) tRNA.

5) Names of main steps in Translation and Transcription=

1) Names of main steps in translation =

= the formation of protein with the help of RNAs is called translation.

=Translation is the second phase of gene expression.

=In prokaryotes translation occur in the cell cytoplasm, where the large and small subunits of ribosomes are located. In eukaryotes, translation occur across the membrane of endoplasmic reticulum, where ribosomes are located.

= the process of translation complete in four phases as following.

1) **Activation of amino acids**
2) **Formation of initiation complex**
3) **Poly peptide elongation**

4) Termination

Names of mean steps of transcription :

= the formation of mRNA from DNA inside the nucleus is called transcription.

=Transcription process consist of the following mechanism.

1) Initiation phase
2) Elongation phase
3) Termination phase

Q3: Explain the process of DNA Replication?

Answer =

DNA replication process =

The process of formation of two daughter DNA molecule from single parent DNA called DNA replication.

Mean steps of DNA replication =

DNA replication consists of the following three steps.

1) Initiation
2) Polymerization
3) Termination

1) **Initiation=**

=Replication always start at a very specific point which is called ori-point or simple origin of replication.

= in eukaryotic – DNA there may be more than one origion of replication sites but in prokaryotic DNA there is only one origion of replication.

=the enzyme used in imitation phase are DNA-gyrase, Helicase.

=the DNA-gyrase open the turn of DNA-double strands.

=DNA Helicase start the process where is replication bubble form.

= Helicase opens the two strand form each other, as a result unzipping occur in DNA molecule at replication sites.

= both single strand of unzipping DNA acts is template for the formation of new strands.

= the two separated strands are prevented from rejoining by single stranded binding proteins.

= each site of replication bubble is now termed is replication fork.

2) **Polymerization =**

The formation of new strand our template is called polymerization.

= during polymerization the daughter strands are synthesized by DNA – polymerase. But this enzyme can't work unless some nucleotide are arrange on template. For this purpose promise enzyme is involved to arrange some nucleotides called primers on template strands.

= Mechanism of DNA-polymers iii=

1) **DNA polymers – III is dimer molecule i-e it consis of two units-one acts as catalyst site and other acts as proofread site, both the units are joined by small polypeptide chain.**
2) **DNA – polymerase -iii can add nucleotide on 3- OH-group. So new bases are added on 3ends of old strand.**
3) **DNA -polymerase -iii synthesize both daughter strands along the tempate. During replication process.**
4) **This enzyme has ability to remove wrong nucleotide if it is added mistakenly.**
   This ability is called proof-reading.

Logging strands =

Polymerization always occur in such away that are strands synthesized continuously and other strand in fragments form(1000-2000 nucleotide in eukaryotes and 100-200 Nucleotide in prokaryotes). These are called okazaki fragments and that strand is called logging strand.

Leading strand =

The second strand being synthesize in continues fashion this is leading strand.

Termination phase=

The termination phase occur in the presence of enzyme called DNA polymerase 1.

= this phase is characterized by the replacement of primers by DNA nucleotides and joining of okazaki's is fragment to farm continues strand.

= polymerase 1 remove nucleotide from 5 end of primers in this way primer are removed

= two okazaki's fragments extended and then join by enzyme called DNA-ligase.