



Mentor Guru

Class 12 – Biology

Chapter 5 – Molecular Basis of Inheritance

Long types question with answer

Q.1. Enumerate the post-transcriptional modifications in a eukaryotic mRNA.

A.1. Transcription is the process of conversion of DNA to mRNA. The post-transcriptional modifications include:

- Capping at 5'-end
- Poly-A tail at 3'-end
- mRNA splicing

The 5' cap protects the RNA from ribonuclease. The poly-A tail protects the mRNA from enzymatic degradation. The introns are spliced during mRNA splicing and the exons are joined together to form a continuous sequence that codes for a functional protein.

Q.2. Explain the process of translation.

A.2. The translation is the process of protein synthesis in which the mRNA is used to synthesize proteins. The mRNA sequence is decoded to specify the amino acid of a polypeptide. The process of translation is carried out in the following steps:

- Initiation.
- Elongation.
- Termination.

Q.3. Explain the process of DNA fingerprinting.

A.3. DNA fingerprinting is a technique that is used to analyze the genetic makeup of living beings. It is widely used for DNA analysis in forensic tests and paternity tests to identify the biological parents of the child, and also to identify the criminal during forensic investigations.

Q.4. What is an operon? Explain an inducible operon.

A.4. An operon is the functional unit of DNA that contains a cluster of genes controlled by a single promoter. It consists of the following components:

- The DNA fragment that transcribes the mRNA.
- Regulator gene that codes for a repressor protein.
- Inducer that prevents the repressor from binding to the operator.
- A promoter where the RNA polymerase binds and initiates the transcription.
- An operator that is a DNA sequence adjacent to the promoter where the repressor protein binds.

The lac operon of E.coli is an inducible operon.

Q.5. Explain the process of DNA replication.

A.5. DNA replication is a biological process of producing two identical strands of DNA from the original strand. The original strand is known as the parent strand and the new strands are known as the daughter strands. This is achieved by a number of enzymes such as DNA polymerase, helicase, primase, topoisomerase, and ligase.



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