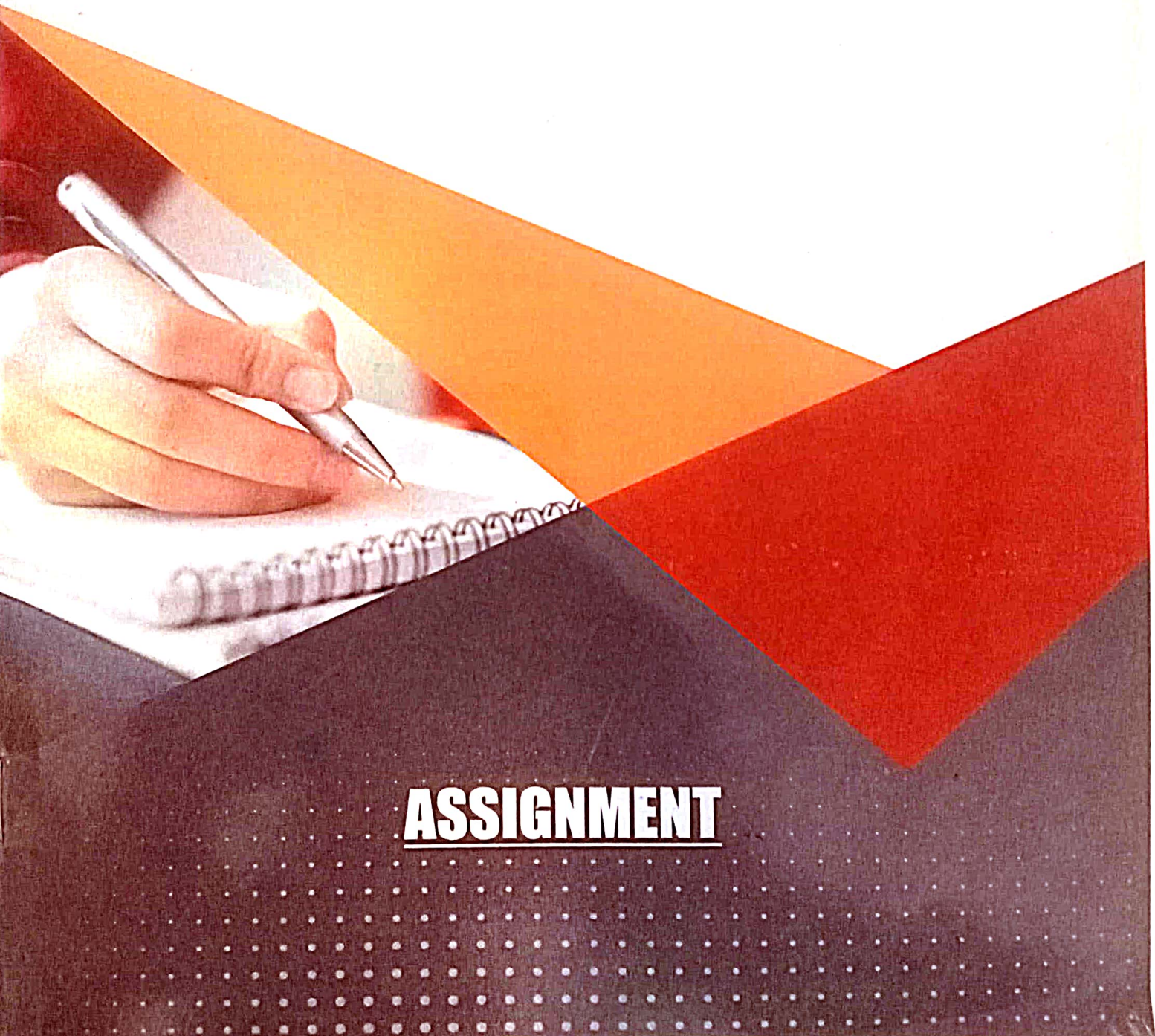




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GROUP OF COLLEGE

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ASSIGNMENT

Unit I

Q - निष्क्रिय व सक्रिय परिवहन को समझाए।

Unit II

Q - Polytene & Lampbrush गुणसूत्र की समझाए।

Unit III

Q - उत्परिवर्तन का आविर्भाव आधार पर विस्तार से लिखिए।

Q - निम्न टिप्पणी लिखिए।

i) Plasmid

ii) Cosmid

Ans-1 Passive transport does not require cell energy: it moves substance from high to low concentration like water following gravity.

Active transport requires cell energy (ATP) to move substances from low to high concentration against their gradient.

Passive transport

- Requires energy - No cellular energy ATP is required
- Direction of Movement - Substances move naturally from an area of high concentration
- Analogy - like a canoeist drifting downstream without paddling
- Examples - Simple diffusion (like oxygen entering cells and osmosis (water movement)).

Active transport -

Requires energy - Cellular energy, usually in the form of ATP, is required for this process.

Direction of movement - Moves substances from an area of low concentration to an area of high concentration against natural gradient.

- Analogy - like a canoeist paddling up stream.

- Examples - The sodium potassium pump which moves ions and endocytosis where cells engulf large particles.

Ans. 2 Polytene chromosome are giant chromosome in insect larvae with many parallel DNA strands forming visible bands while lampbrush chromosome in vertebrate oocytes, characterized by lateral chromatin loops that facilitate high levels of RNA transcription during meiosis.

Polytene chromosome -

Structure - formed from repeated DNA replication without cell division, creating thousands of parallel sister chromatids

Location - found in the salivary glands of insect larvae particularly in dipterans (eg. fruit flies)

features - Display distinct dark and light banding patterns which can be used to map genes and study mutations
Puffs or Balbiani rings are regions of regions of high RNA synthesis where the chromosome fibres uncoil and large active sites

function - Involved in producing large amounts of RNA and proteins such as salivary proteins to support larval growth and development

Lampbrush -

Structure - Very long chromosome with numerous paired lateral loops extending from a central chromomeric axis

location - occurs in the growing oocytes (immature eggs) of most vertebrates except mammals and in some invertebrates, during the prophase of meiosis

feature - the loops are active sites of high level RNA transcription with RNA fibrils extending from the DNA axis

function - Produce large amounts of messenger RNA (mRNA) for the early stages of development they provide a way to visualize and study gene expression in detail

Ans-3 : The molecular basis of mutation involve permanent change to an organism DNA sequence such as (the substitution insertion and deletion of one or more nucleotides)

Causes of mutations-

Mutation can be divided into two main categories based on their origin

Spontaneous mutation

These occur naturally due to errors during essential biological process such as DNA replication, repair or recombination

Induced mutations-

These are caused by external agents known as mutagens.

Physical mutagens - Agents like UV radiation and X-rays can damage DNA by forming thymine dimers or inducing double strand breaks.

- **Chemical Mutagens** - chemicals such as base analogs (eg. 5-bromo-uracil) and alkylating agents can modify DNA bases leading to incorrect base pairing during replication

- **Biological Mutagens** -

Some viruses can insert their genetic material into the host genome causing mutations

Types of molecular changes -

- **Point mutations** - A change in single nucleotide base pairs

- Substitution

- Insertion

- Deletion

- **Frameshift mutations** - Insertion or deletion that shift the reading frame (codons) of the genetic code, altering the entire sequence of amino acids that follow

Ans - 4

(i) Plasmids are small circular DNA molecules, distinct from cell's main chromosome, that replicate independently. Found naturally in bacteria and some other organisms they carry genes for beneficial traits like antibiotic resistance, virulence or the ability to degrade chemicals.

Key characteristics

Extrachromosomal DNA - Plasmids are separate from the cell's primary chromosomal DNA.

Small and circular - They are typically small, double-stranded DNA molecules that form a circular shape.

Independent Replication - They carry genes that code for specialized functions such as:

- **Antibiotic resistance** - Genes that make bacteria resistant to antibiotics.

Gene carriers -

- Antibiotic resistance -
- Virulence factors -
- Degradative pathways

Types of plasmids

- Resistance plasmids (R-Factors)
 - Virulence plasmids
 - Degradative plasmids
 - Col plasmids
 - Fertility (F) Plasmids
- Uses in Biotechnology.
- Cloning vehicles
 - Gene therapy
 - Research

(ii) - A cosmid is a type of cloning vector used in genetic engineering that combines the properties of a plasmid and bacteriophage allowing it to carry large DNA fragments up to 45 kb