

Content of matter

Part I: Molecular Biology:

Expression of genetic information: protein synthesis (Transcription, Translation).

Regulation of gene expression: Transcriptional regulation , Translational regulation.

Basic techniques of molecular biology: - preparation of nucleic acids (extraction and purification) - separation of nucleic acids (agarose gel electrophoresis, pulsed field electrophoresis, etc.). Detection, characterization and identification of nucleic acids (membrane transfer, labeling, hybridization, etc.). - DNA sequencing. - *in vitro* amplification of nucleic acids (PCR, RT (reverse transcriptase)- PCR, etc.).

Part II: Genetic Engineering:

1. *In vivo* cloning :

1.1. Elements necessary for cloning: DNA to be cloned, restriction enzymes, ligation enzymes , cloning vectors, their construction and characteristics, host cells.

1.2. Cloning steps: construction of the vector, insertion of the DNA to be cloned, transformation of bacteria, selection of recombinants, analysis of recombinants.

2. Recombinant DNA technology: Synthesis of recombinant proteins, cDNA and expression vectors. Example of protein production by *E. coli* and *Saccharomyces cerevisiae* .