Program Midtern of Discipline “Methods of molecular biotechnology”

6D070100 Biotechnology

**Module 1** Structure, feature and functions of nucleic acids

Methods of extraction of nucleic acids from different biological materials

Methods used for cell lysis

Main principles of RNA extraction

Main principles of RNA extraction

 Main approaches and methods of molecular biotechnology

Hybridization Conditions and Melting Temperature

Analysis and Characterization of nucleic acids

Important Factors that affect Stringency and Hybridization

Relation between melting temperature and Oligonucleotide concentration

Modification of nuclear acids

Different types of endonucleases and their use in molecular biotechnology

Main principles of electrophoresis for analysis of nucleic acids

Nucleic Acid Detection DNA

Mismatches and single nucleotide polymorphisms (SNPs)

Use of SDS-PAGE for analysis of nuclear

Separation Techniques for different types of DNA

Characterization of DNA cloning techniques

Subclone characterization and use.

 Multiple cloning site (MCS)characterization and use in molecular biotechnology.

Sequencing techniques

 **Module II** Structural analysis of nucleic acids.

Modification of nuclear acids

MicroRNA Cloning from Cells of the Immune System. Use of nucleases, exonuclease, restrictase in molecular biotechnology.

 Main principles of electrophoresis for analysis of nucleic acids

Analysis of different types nuclear acids.

 DNA Separation Techniques. Construction of Small RNA cDNA Libraries for Deep Sequencing MicroRNA-Profiling in Formalin-Fixed Paraffin-Embedded Specimens Functional Analysis of miRNAs in the Immune System: Gain-of-Function Expression of miRNAs in Lymphocytes.

Nucleic Acid Detection

DNA Separation Techniques for different types of DNA. DNA cloning techniques

The SDS-PAGE based DNA Separation Techniques.

Base‐Modified Nucleic Acids as a Powerful Tool for Synthetic Biology and Biotechnology.

Subclone characterization and use. Multiple cloning site (MCS)characterization and use in molecular biotechnology.

**Module III.**

Sequencing techniques.

### Genome mapping, genetic mapping, physical mapping , mapping distance.

### Gene expression analysis

Mass analysis of proteolytic peptides is a popular method of protein characterization, as cheaper instrument designs used for characterization.

Whole-protein mass analysis is primarily conducted using either time-of-flight (TOF) MS, or Fourier transform ion cyclotron resonance (FT-ICR). DNA Microarrays as new molecular biotechnology tool.

ALEXA is a microarray design platform

Strategies for SNP detections strategies for arrays.

Limitations of DNA microarrays. Protein sequencing by chemical methods. Protein sequencing by mass spectrometry

Different types of PCR in molecular biotechnology.

Preparation of DNA chip and the experiment

## **Collection and analysis of microarry.** To study transcriptomes and proteomes

To diagnose pathogenic as well as genetic diseases in man