

## **Course II: Molecular Biology and Biotechnology (MSCZO -507)**

### **UNIT WISE CONTENTS**

#### **Block I: Molecular Biology and Biotechnology**

##### **Unit 1: DNA replication**

- 1.1 Objectives
- 1.2 Introduction
- 1.3 Prokaryotic and Eukaryotic DNA Replication
- 1.4 Enzymes and accessory proteins involved in DNA replication
- 1.5 Mechanics of DNA replication
- 1.6 DNA damage and repair mechanism
- 1.7 Summary
- 1.8 Terminal Questions and Answers

##### **Unit 2: Transcription**

- 2.1 Objectives
- 2.2 Introduction
- 2.3 Prokaryotic & Eukaryotic transcription
- 2.4 Transcriptional activators & repressors
- 2.5 Regulatory elements and mechanisms of transcription regulation
- 2.6 Transcriptional polymerase, Capping, Elongation & Termination
  - 2.6.1 Structure and Function of different type of RNA
  - 2.6.2 RNA Transport
- 2.7 Summary
- 2.8 Terminal Questions and Answers

##### **Unit 3: Post-transcriptional modifications in RNA**

- 3.1 Objectives
- 3.2 Introduction
- 3.3 5'- Cap formation
- 3.4 End processing and Polyadenylation
- 3.5 Splicing and editing
- 3.6 Nuclear export of mRNA
- 3.7 Summary
- 3.8 Terminal Questions and Answers

##### **Unit 4: Translation**

- 4.1 Objectives
- 4.2 Introduction
- 4.3 Genetic code
- 4.4 Prokaryotic and Eukaryotic Translation
- 4.5 Regulation of Translation
- 4.6 Post-translation modifications of Proteins
- 4.7 Summary
- 4.8 Terminal Questions and Answers

## **Block II: Biotechnology**

### **Unit 5: Recombinant DNA Technology**

- 5.1 Objectives
- 5.2 Introduction
- 5.3 Gene cloning - the basic steps
- 5.4 Restriction enzymes – ligase, linkers and adaptors. cDNA transformation
- 5.5 Selection of Recombinants
- 5.6 Hybridization Techniques
  - 5.6.1 Blotting techniques: Southern blotting, Northern blotting and Western blotting
- 5.7 Gene probe - Molecular finger printing (DNA finger printing)
- 5.8 Molecular Markers in genome analysis (RFLP, RAPD and AFLP)
- 5.9 Genomic Library
- 5.10 Summaries
- 5.11 Terminal Question and Answers

### **Unit 6: Cloning Vectors**

- 6.1 Objectives
- 6.2 Introduction
- 6.3 Plasmid Biology
- 6.4 Cloning Vector
  - 6.4.1 Yeast
  - 6.4.2 *E. coli*
  - 6.4.3 PBR 322
- 6.5 Summary
- 6.6 Terminal Questions and Answers

### **Unit 7: Animal Biotechnology and its Application**

- 7.1 Objectives
- 7.2 Introduction
- 7.3 Cell, Organ and Whole embryo culture
- 7.4 In-vitro fertilization (IVF) technology
  - 7.4.1 Dolly, Embryo transfer in human
- 7.5 Transgenic animal
- 7.6 Human gene therapy, Cryobiology
- 7.7 Summary
- 7.8 Terminal Questions and Answers