SEMESTER-VIII

BTC DSM 451T
RECOMBINANT DNA TECHNOLOGY

Contact Hours: 60
Full Marks = 100 [ESE (70) CCA (30)]

Course Objective: *The Recombinant DNA Technology course is designed to provide students with a deep understanding of the principles and techniques involved in genetic engineering. It covers key topics such as restriction enzymes, vectors, gene transfer methods, hybridization techniques, library construction, PCR, DNA sequencing, and applications of genetic engineering in animals and plants. The course aims to equip students with the knowledge and skills required for working with recombinant DNA and genetic modification, preparing them for careers in biotechnology, research, or related fields.*

UNIT 1 *(10 Lectures)*

Introduction: definition and principles of recombinant DNA technology. **Enzymes:** restriction enzymes, ligases and polymerases. **Vectors:** plasmid, cosmid, BAC and YAC. **Gene transfer:** transformation, microinjection, electroporation and ultrasonication.

UNIT 2 *(8 Lectures)*

Hybridization techniques: southern blotting and northern blotting**. Library construction and screening:** preparation of genomic and cDNA library; screening of recombinants.

UNIT 3 *(9 Lectures)*

PCR: principle, procedure and applications. **DNA sequencing methods:** Maxam & Gilbert method and Sangers method.

UNIT 4 *(10 Lectures)*

Genetic engineering in animals: production and applications of transgenic mice, production of therapeutic products (insulin, growth hormone and clotting factors). **Genetic modification in medicine**: gene therapy, in-vivo and ex-vivo gene therapy.

UNIT 5 *(8 Lectures)*

Genetic engineering in plants: *Agrobacterium tumefaciens* and *A. rhizogenes*, Ti plasmids, binary vectors and co-integrate vectors, T-DNA transfer and integration.

Course Outcome: *By the conclusion of this course, students will have a comprehensive understanding of recombinant DNA technology and its applications. They will be proficient in techniques such as PCR and DNA sequencing, capable of constructing genomic and cDNA libraries, and skilled in screening recombinant DNA libraries. Moreover, students will be well-versed in the use of genetic engineering in animals and plants, including the production of transgenic organisms and therapeutic products. This knowledge will empower them to contribute to advancements in biotechnology and genetic research.*

SUGGESTED READING

1. Brown TA. (2006). Gene Cloning and DNA Analysis. 5th edition. Blackwell Publishing, Oxford, U.K.
2. Clark DP and Pazdernik NJ. (2009). Biotechnology-Applying the Genetic Revolution. Elsevier Academic Press, USA.
3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications of recombinant DNA. ASM Press, Washington
4. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics, 7th edition. Blackwell Publishing, Oxford, U.K.
5. Sambrook J, Fritsch EF and Maniatis T. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press.