



SYLLABI OF BIOTECHNOLOGY IDC PAPERS

SEMESTER-I

BTC IDC 101T

BIOTECHNOLOGY IN HUMAN WELFARE

Contact Hours: 45

Full Marks = 100 [ESE (70) CCA (30)]

***Course Objective:** The objective of the course is to provide students with a comprehensive understanding of the applications of biotechnology in various aspects of human welfare, including medicine, healthcare, agriculture, environment, and industry. The course aims to introduce students to the principles and techniques of genetic engineering, production of therapeutic products, gene therapy, forensic science, plant biotechnology, environmental biotechnology, and industrial biotechnology. It also aims to highlight the potential benefits and challenges associated with the use of biotechnology in improving human well-being.*

UNIT 1 *(7 Lectures)*

Biotechnology: definition and scope; major milestones; applications in healthcare; agriculture, and industry; overview of genetically modified organisms (GMOs).

UNIT 2 *(10 Lectures)*

Medicine and healthcare biotechnology: introduction to genetic engineering; production of therapeutic products – e.g. insulin and growth hormone; gene therapy and its potential for treating genetic diseases. **Forensic science:** solving violent crimes such as murder and rape; solving claims of paternity; introduction to DNA finger printing – PCR and RFLP.

UNIT 3 *(10 Lectures)*

Plant Biotechnology: basic techniques of plant tissue culture; somaclonal variation – principle, application and limitations; somatic hybridization; biopesticides and biofertilizers – principles and applications; production of transgenic plants – BT cotton and golden rice.

UNIT 4 *(9 Lectures)*

Environmental Biotechnology: introduction to bioremediation and its role in cleaning up pollutants; treatment of municipal waste and industrial effluents; biogas production; use of biosensors for environmental analysis.

UNIT 5 *(9 Lectures)*

Industrial Biotechnology: introduction to bioprocess technology; principles of upstream processing- media preparation and sterilization; design of bioprocess vessels; introduction to downstream processing, product recovery and purification.

Course Outcome: *Students will gain a comprehensive understanding of biotechnology and its applications in healthcare, agriculture, industry, and the environment. They will learn about genetic engineering, plant tissue culture, environmental biotechnology, and industrial biotechnology. By the end of the course, students will be equipped with the knowledge and abilities to contribute to the field of biotechnology across various sectors.*

SUGGESTED READING

1. Sateesh MK (2010) Bioethics and Biosafety, I. K. International Pvt Ltd.
2. Sree Krishna V (2007) Bioethics and Biosafety in Biotechnology, New age international publishers
3. Ratledge, C., & Kristiansen, B. (Eds.). (2001). Basic biotechnology. Cambridge University Press.
4. Wang, L. K., Ivanov, V., Tay, J. H., & Hung, Y. T. (Eds.). (2010). Environmental biotechnology (Vol. 10). Springer Science & Business Media.