

BHARATHIAR UNIVERSITY, COIMBATORE 641 046.

B.Sc. BIOTECHNOLOGY DEGREE COURSE
(Affiliated Colleges)
(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR
2014-15 onwards)

Note: The revised syllabi for the following papers Semester – V Core Paper - VII PLANT AND ANIMAL BIOTECHNOLOGY SEMESTER VI - CORE PAPER: XI MICROBIAL BIOTECHNOLOGY are furnished below be followed for the candidates admitted from the academic year 2014-15 onwards and there is no change in the existing scheme of examinations and syllabi of remaining papers.

Semester – V Core Paper - VII

Subject Title: PLANT AND ANIMAL BIOTECHNOLOGY

Subject description: This course presents the application of Plants in Biotechnology

Goals: To make the student to understand usage of Plant and Animal products and exploitation of them in Biotechnology.

Objectives: On successful completion of the subject, the student should have understood: Crop development, Callus culture, Biotechnological applications of plants, Animal tissue culture, Animal products, production & improvement of them.

Unit I

Introduction to cell and tissue culture, Plant tissue culture media (composition, types and preparation), plant hormones and growth regulators in tissue culture, Preparation of suitable explants for organogenesis. Micropropagation on large scale, somatic embryogenesis, protoplast culture and somatic hybridization, Anther, pollen and ovary culture for production of haploid plants and homozygous lines.

Unit II

Cell culture methods for the secondary metabolite production, somaclonal variation and its significance, Cryopreservation, Gene banks for germplasm conservation. Plant transformation techniques – Mechanism of DNA transfer – Agrobacterium mediated gene transfer, general features of TI and RI plasmids and their use as vectors, role of virulence genes; design of expression vectors; use of 35S and other promoters, reporter genes.

Unit III

Animal cell cultures: Culture media – composition and preparation, Balanced salt solution and simple growth medium, chemical, physical and metabolic functions of different constituents of culture medium-Role of CO₂, serum and protein-free defined media and their applications; Culturing and maintenance of different animal cell lines (Primary and established cell lines). Characterization of

cultured cell, measurement of viability, cyto-toxicity and growth parameters. Stem cell cultures, embryonic stem cell and their applications, cell culture based vaccines, measurement of cell death, scaling up animals cell cultures.

Unit IV

Transgenic animals: Method of obtaining transgenic animals using fertilized eggs and embryonic blastocyst cell, example, production of recombinant gene products and proteins for pharmaceutical use. Animal models for tackling human diseases (Gene knock out in mice models), Transgenic Plants, GM crops and GMO's. Ethical issues in Biotechnology.

Unit V

Transgenic silkworms, Animal cloning: Methods of cloning in animal system – Rat, Sheep, Pig; importance of cloning – Gene therapy and cell mediated therapy.

REFERENCES

1. Plant genetic engineering, Dodds J.H.
2. Plant molecule biology, Grierson and S.V. Convey
3. Molecular biotechnology, Principle and applications of recombinant DNA technology, Bernard R Glick.
4. Plant Biotechnology-Monica Hughes.
5. Animal cell culture – a practical approach, 4th ED., Freshney. John Wiley Pub.
6. Mammalian Cell Biotechnology- A practical approach. ED Butler. Oxford UNI Press.
7. Methods in Cell Biology. VOL 57 Animal methods, ED Mather & Barnes, Academic Press.
8. Exploring Genetic mechanisms. ED Singer & Berg.

SEMESTER VI - CORE PAPER: XI

Subject Title: MICROBIAL BIOTECHNOLOGY

Subject description: This course presents the utility of Microbes

Goals: To make the student to understood the applications of Microbes

Objectives: On successful completion of the subject the student should have understood: Fermentation, Microbial products, Vaccine and antibiotics.

UNIT I:

Microbial Biotechnology: Scope and application-horizons of microbial Technology, public concern about the microbial biotechnology and Economics of microbial biotechnology.

UNIT II:

Microbes: Living factories for macromolecules-Production of proteins in Bacteria and yeast; recombinant and synthetic vaccines; microbial insecticides (*Bacillus.thuringiensis*, *B.spaerinus*, *B.papilliae* and Baculo-Viruses); microbial enzymes application in starch processing , textile designing, detergents, cheese making; polysaccharides and polyesters.

UNIT III:

Microorganisms in fermentation-Ethanol from feed stocks to fermentable Sugars, from sugars to alcholols, clostridial fermentation, lactic acid fermentation, acetic acid production and industrial production of various milk products.

UNIT IV:

Metabolites from microorganisms-amino acids; antibiotics-antibacterial agents (β -lactams, tetracyclines, peptides, amino glycosides), antifungal agents, anti-tumor antibodies.

UNIT V:

Production of biofertilizers (nitrogen fixing Bacteria, single cell protein, mycorrhiza and phosphate solubilizing Bacteria). Introduction to intellectual property and intellectual property rights (IPR) - types: patents, copy rights, trade marks, design rights and geographical indications.

REFERENCES :

1. Glazer, A.N. and Nikaido, H. 1995. Microbial biotechnology. W.H.Freeman & Co.,New York
2. Encyclopedia of Microbiology. 1992. Vols.1-4. Academic Press.
3. Preve et al. 1987. Fundamentals of Biotechnology. VCH Publ.
4. Stanbury, P.F. Whittaker, A, Hall, S.J. 1995. Principles of fermentation technology.Butterworth Heinemann.
5. Prescott, L.M. Harley, J.P. and Klein, D.A. 1999. Microbiology. McGraw Hill Co.
6. Glick, B.R. and Pasternak, J.J. 1998. Molecular Biotechnology. Washington D.C. ASM Press.
7. Stainer, R.Y. Ingraham, J.L., Wheelis, M.L. and Painter, P.R. 1987. General Microbiology. Macmillan Co.
8. Lancini, G. Parenti, F. and Gallo, G.G. 1995. Antibiotics-A multidisciplinary Approach. Plenum Press, New York.
9. Gunasekaran.P. 1995. Laboratory manual in microbiology. New Age International Limited. New Delhi.