

SEMESTER - III
Core Paper – X
FOOD BIOTECHNOLOGY

Instructional Hrs. : 75

Sub. Code : 17FNPC310

Max. Marks : CIA -25; ESE -75

Credits: 4

Objectives : To enable the students become aware of the current trends in food biotechnology and gain knowledge on application of enzyme technology in food industry and research.

UNIT I

13 Hrs.

Biology of Industrial Micro-organism: Industrial Microorganism – Cell growth and metabolism, primary and secondary metabolites – Vitamin- B₁₂, citric acid and Penicillin. **Plant tissue culture:** Media and culture techniques, Basic requirements for tissue culture laboratory- *Food applications of tissue culture.*

UNIT II

16 Hrs.

Recombinant DNA Technology: Genetic Engineering and cloning – Definition, Tools – Plasmids, Cosmids, Bacteriophages and shuttle vectors. Enzymes- Restriction enzymes, Ligases, Reverse transcriptase and Polymerase. **Steps in Gene Cloning**, Application of gene cloning - **Production of health care products** – Insulin, human growth hormone, vaccines and monoclonal antibodies. **Nutrigenomics:** Definition and Concept. **Genetically modified foods** – *Flavr savr Tomato and Golden rice – pros and cons.*

UNIT III

13 Hrs.

Food Fermentation: Batch and continuous process – Fermenter design –Types of fermenter, stages of fermentation – Downstream processing- bread making, *fermented soya based foods*, cheese making, *vinegar*, alcoholic beverages and *meat fermentations.*

UNIT IV

15 Hrs.

Enzyme Technology in Food Industry: Microbial production and applications of enzymes- Amylase, protease, lipase and pectinase- *New developments in the applications of lactic acid bacteria in the food industry.*

Immobilization of enzymes: Methods of immobilization –uses of immobilized enzymes in food industry- Development of novel sweeteners.

UNIT V

18 Hrs.

Environmental Biotechnology: Food Waste treatment –Nature of impurities– Biodegradation- Types of treatment systems -Anaerobic waste treatment- Aerobic waste treatment- Bio-polymers- Bio-insecticides- Bio-technology in agro – biomass utilization- *Biofuels - Ethanol and biogas production.*

Microbial biomass production: Single Cell Protein - Algal and fungal SCP and their uses.

Note : *Italics denote Topics for Self Study*

REFERENCE BOOKS

1. **Caside L.E.**, *Industrial Microbiology*, New Age International Publishers, New Delhi, 1999.
2. **Chatwal G.R.**, *Textbook of Biotechnology*, Anmol Publishers (P) Ltd., New Delhi, 2003.
3. **Dubey, R.C., and Maheswari, D.K.**, *A textbook of Microbiology*, S.Chand & Company Ltd., New Delhi, 2000.
4. **Dubey, R.C.**, *A textbook of bio-technology*, S.Chand & Company Ltd., New Delhi, 2005.
5. **Frazier and West Hoff**, *Food Microbiology*, Tata McGraw Hill Publishing

Company, New Delhi 1995.

6. **Gupta P.K.**, *Elements of Biotechnology*, Rostogi and Co, Meerat, 1996.

7. **Ignacimuthu, S.J.**, *Basic Biotechnology*, Tata McGraw hill publishing

Company., New Delhi, 1995.

8. **Kumaresan, V.**, *Bio Technology*, Saras Publications Kanyakumari, 2005.

9. **Sriram Sridhar**, *Enzyme Biotechnology*, Dominant Publishers, New Delhi 2005

10. **Singh B.D**, *Biotechnology*, Kalyani Publishers, Varanashi, 2005.

11. **Bhatia S.C**, *Handbook of Food Processing Technology*, Vol.3, Atlantic

Publishers, Delhi, 2008.

SEMESTER - III
Core Practical – II
QUALITY CONTROL

Instructional Hrs. : 45

Sub. Code : 17FNPCP02

Max. Marks : CIA -40; ESE -60

Credits: 4

Objectives: To enable the students to gain practical skill in Food Quality and to apply the techniques in research and work field.

1. Estimation of titrable acidity.
2. Estimation of total solids
3. Estimation of specific gravity in foods.
4. Analysis of pectin in foods.
5. Estimation of lactose in milk.
6. Estimation of tannins in tea.
7. Test for rancidity in oils – Kries test
8. Food adulteration – Tests to detect adulteration
9. Determination of gluten content of flour
10. Determination of bulk density, true density and porosity
11. Determination of physical dimensions of grains and extruded products – length, breadth, thickness and sphericity.
12. Preparation and inoculation of growth media – Inoculation and incubation –
Counting of microbes.

Includes Internship in food industry for one week.

40 CIA marks given as

20 for practical : Average of two tests -10 marks

Model practical exam -10 marks

20 for internship : Internship report -10 marks

Viva-Voce -10 marks