

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VII

BIO-TECHNOLOGY

Subject Name: **Agricultural and Food Biotechnology**

Subject Code: **170402**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	3	6	70	30	30	20

PART [I] AGRICULTURAL BIOTECHNOLOGY

Sr. No	Course Content	Total Hrs.
1.	Multiple faces of Agribiotech: <ol style="list-style-type: none"> Genetic engineering of crop plants: Agrobacterium-mediated gene transfer and Direct gene transfer methods Engineering of crop plants for industrial traits: Tomato fruit ripening, production of high-value peptides & proteins, starch synthesis & site manipulation, fatty acid biosynthesis & site manipulation Biopharming and production of foreign compounds in transgenic plants: bioactive peptides, human proteins, enzymes, vaccines and antibodies. Conservation of plant genetic resources, plant patents and plant variety certificates Importance of Marine Compounds for Industrial application, role of marine biotechnology 	8
2.	Biofertilizers, Biopesticides & Organic farming: <ol style="list-style-type: none"> Biofertilizers: Introduction, types, advantages, disadvantages and future perspective. Biopesticides: Introduction, types, advantages, disadvantages and future perspective. Organic farming: Overview, management of agricultural pollution, use of traditional and non-traditional additives for organic farming, agricultural waste management, crop production, biogas technology and organic farming, future trends 	8

PART [2] FOOD BIOTECHNOLOGY

3.	<p>Introduction to Food Science and Technology</p> <p>Fundamentals and Aims of food science and technology. Interdisciplinary approach, Nutritive value of foods, Food as a source of energy, Food Health and disease</p> <p>Food Microbiology:</p> <p>Microbial growth pattern, Microbial examination of food, Types of micro-organism normally associated with food-mold, yeast, and bacteria. Micro-organisms in natural food products. Contaminants of foods-stuffs, Fisheries, milk and meat during handling and processing. Biochemical changes caused by micro-organisms, deterioration of various types of food product. Food poisoning and microbial toxins, standards for different foods. Food borne intoxicants and mycotoxins.</p> <p>Food Preservation</p> <p>Principles of food preservation: Physical, chemical, and biological methods of preservations. Bioprocessing of meat, Fisheries, vegetables, dairy products. Irradiated foods</p>	12
4.	<p>Food Biotechnology:</p> <p>Biotechnology in relation to food industry, Enzymes in foods and food industry, Nature and type of starters, Role of starters in Fermented foods, Fermentation of Milk products-Fermented soy and peanut milk, Fruit and cereal based beverages, Non beverage plant products. Mycoprotein production, probiotics, microbial control by new nonthermanl methods,</p> <p>Food additives and Food Analysis:</p> <p>Brief overview: Sampling techniques and theory and practice of chemical and physical methods of food analysis for determination of food composition; Pigments in food, food flavours, food additives and toxicants. Natural sweeteners and artificial sweeteners and their role in controlling diseases and deficiencies, Nutraceuticals, and Functional Foods</p>	12
5.	<p>Food Processing:</p> <p>Basic principles, unit operations, and equipment involved in the commercially important food processing methods and unit operations; materials and containers used in food packaging. Basic principle and practice to cleaning and sanitation involved in food industry.</p> <p>Food Quality Assurance</p> <p>Food regulations, grades and standards, Concept of Codex Alimentarius/HACCP/USFDA/ISO 9000 series etc. Food laws and standards.</p>	8

List of Practicals:

1. Microbial examinations of food and food products
2. Standard plate count of bacteria in food stuff.
3. Estimation of coliform bacteria in food.
4. Estimation of starch from potato/wheat flour/ from given sample.
5. Estimation of extracted starch sample
6. Estimation of lactose in milk by Lane & Eynon's method
7. Extraction & estimation of amino acid from pea (free amino acids by ninhydrine test)
8. To separate different pigment from plant leaves by solvent extraction methods
9. To isolate DNA from cotton seed.
10. To perform Qualitative analysis of milk by MBRT test
11. To Detect presence of adulterants in milk.
12. To Detect presence of preservatives in milk.
13. Protoplast isolation from plant leaves.
14. Practicals and term work based on agriculture practices in recent times

Text Book: (Agricultural Biotechnology)

1. Agricultural Biotechnology, Arie Altman, Marcel Dekker Inc., First Edition.

Text Book: (Food Biotechnology)

1. Food Microorganisms, Dr. H. A. Modi, 2008, Aavishkar Publishers and Distributors, Jaipur
2. Food Processing and preservations, B. Sivankar, PHI, first edition.

Reference Books: (Agricultural Biotechnology)

1. Biotechnology by B.D. Singh, Kalyani pub.
2. Elements of Biotechnology by P.K. Gupta, Rastogi Publications.
3. Modern Concepts of Biotechnology by H.D. Kumar, Vikas Pub. House.
4. Plant Genetic Engineering by Dodds J.H., Cambridge University Press.
5. Plant Biotechnology, H.S. Chawla. Second Edition.
6. Principles of Gene Manipulation, S.B. Primrose, Sixth Edition, Blackwell science

Reference Books: (Food Biotechnology)

1. Jay J.M. 1986. Modern Food Microbiology. 3rd Edn. VNR, New York.
2. Food Microbiology fourth edition William C. Frazier, Tata Mc Graw Hill
3. Food Microbiology 2nd Edition, Michael P. Doyle, ASM press
4. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York.
5. Meyer, L.H. 1973. Food Chemistry. East-West Press Pvt. Ltd., New Delhi.

6. Charalambous, G. and Inglett, G. 1981. The Quality of Foods and Beverages. (2 vol. set). Academic Press, New York.
7. Ranganna, S. 1986. Handbook of Analysis and Quality Control for Fruits and Vegetable Products. Tata McGraw Hill, New Delhi.
8. Introduction to Food Biotechnology, Perry Johnson, Green Publishers, CRC Press, 2002.