

# GUJARAT TECHNOLOGICAL UNIVERSITY

## B. E. SEMESTER: VII

### FOOD PROCESSING TECHNOLOGY

Subject Name: **By-product Utilization and Management**  
(Department Elective-I)

Subject Code: **171405**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	<b>Food industry By-products and Waste:</b> Introduction, status in India, definition, origin and type of waste and by-products, their identification, classification, composition and characterization, need for treatment and utilization, impact on environment, food waste as source of biogenic raw material and energetic utilization.	10
2.	<b>Introduction to Food Waste Treatment</b> , basic unit operations, techniques & equipment for treatment, primary treatments like screening, sedimentation, skimming, floatation coagulation & flocculation, flow equalization, filtration, adsorption, chemical oxidation, membrane separation, ion exchange. Anaerobic & aerobic digestion of organic wastes, activated sludge process, biomass generation & its utilization.	12
3.	<b>Food Wastes and By-products Related to Specific Processing Industries</b> like fruit and vegetables (apple, orange, mango, potato etc.), dairy industry, oil and oil seeds industry, sugar industry, grains and milling industry, fermentation ( alcohol and beer), livestock and poultry, fish, meat.	08
4.	<b>Brief Case Studies</b> involving (i) utilization of whey from dairy industry, (ii) Utilization of specific plant by-products for recovery of proteins, pectins, dietary fibres, antioxidants, colorants etc. (iii) Utilization of biomass for production of animal feed, compost and bio-gas.	08
5.	<b>Introduction to Food Packaging Waste</b> handling and treatment, Farm wastes. Incineration of solid food waste and its disposal.	03
6.	<b>Future Trends</b> , introduction to legal and statutory requirements for food waste handling, treatment and disposal.	03

## **Reference Books:**

1. Waste Management for the Food Industries, by Ioannis S. Arvanitoyannis, First edition 2008, Elsevier Inc, USA.
2. Food and Agricultural Wastewater Utilization and Treatment, Sean X. Liu, First edition 2007, Blackwell Publishing, Iowa 50014, USA.
3. Managing Food Industry Waste, ROBERT R. ZALL, First edition, 2004, Blackwell Publishing Professional, Iowa, USA.
4. The Treatment and Handling of Waste by Bradshaw AD Chapman & Hali.
5. Alternative Strategies for the Treatment of Food Processing Waste by Rockey J.
6. Food Processing Waste Management by Green J.H. AVI Publications.
7. Post harvest Technology of Fruits and Vegetables by L.R. Verma. Indus Pub.