GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Vocation

Level: Under Graduate

Branch: Food Processing and Quality Control

Subject Code: BV05009041

Subject Name: By products utilization and management

w. e. f. Academic Year:	2026-27
Semester:	05
Category of the Course:	Core Course

Prerequisite:	By-products utilization and management
Rationale:	Bioproduct utilization focuses on the value addition of food waste such as crop residues, food processing waste, animal by-products, and microbial biomass. These materials can be converted into value-added products, including biofuels, biogas, biofertilizers, bioplastics, enzymes, nutraceuticals, and animal feed. Efficient management of bioproducts supports the circular economy, where waste is transformed into useful resources.

Course Outcome:

After Completion of the Course, the student will be able to:

No	Course Outcomes
01	To use food waste for the development of value-added products.
02	Promotes the management of waste for the safe disposal of waste materials.
03	To understand the various waste disposal methods
04	To know the importance of byproducts for human use.

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
3	0	0	3	50	0	0	0	50

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Sources for byproducts** Types and classifications of waste, including: Crop residues: straw, husk, stalks, bagasse, fruit and vegetable processing wastes, dairy, meat, poultry, and fish processing by-products.	06	12
2.	**Unit operation for byproduct development** Primary treatment process like screening, sedimentation, skimming, floatation, coagulation & flocculation, flow equalisation, filtration, adsorption, chemical oxidation, membrane separation, ion exchange. Anaerobic & aerobic digestion of organic wastes, activated sludge process, biomass generation & its utilisation.	12	25
3.	**Processing techniques for byproducts** Physical processing: size reduction, drying, separation. Biological processing: composting, fermentation, anaerobic digestion. Chemical processing: hydrolysis, extraction.	10	24
4.	**Value-added products** Animal feed, compost, organic manure, and bioactive compounds. Bioenergy production. Biogas production: raw materials, process, and applications. Bioethanol and biodiesel production.	08	22
5.	**Entrepreneurship and Future Trends** Small-scale bioproduct enterprises, Business models for bioproduct utilisation, Employment opportunities and job roles, Emerging trends: bioplastics, biochemicals, bio-refineries.	09	17
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**20**	**5**	**0**	**0**	**0**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Waste Management for the Food Industries, by Ioannis S. Arvanitoyannis, First edition 2008,Elsevier Inc, USA.
2. Food and Agricultural Wastewater Utilisation and Treatment, Sean X. Liu, First edition 2007Blackwell Publishing, Iowa 50014, USA.
3. Managing Food Industry Waste, ROBERT R. ZALL, First edition, 2004, Blackwell PublishingProfessional, 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 Publication
7. Post harvest Technology of Fruits and Vegetables by L.R. Verma. Indus Pub.

(b) Open-source software and website:

1. http://foodscience.uark.edu/
2. http://fssai.gov.in/manuals
3. http://fao.org/fao-who-codexalimentarius

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