



GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING

Subject Code: 3165102

Subject Name: Recent Advances in Fruits and Vegetable Processing

WEF Academic Year:	2022-23
Semester:	6
Category of the Course:	Professional Core

Prerequisite: Knowledge about processing of fruits and vegetable

Rationale: To acquaint and equip the students with processing of fruits and vegetables with recent advances and the design features of the equipments used for their processing.

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	UNIT I Physiology of development, ripening and senescence of fruits and vegetables, Harvesting and harvesting indices of fruits and vegetables, post harvest changes of fruits and vegetables, Technological advances in thermal processing of fruit and vegetable.	12	25
2	UNIT II Minimal processed technology, Fresh-cut Produce, Quality Parameters of Fresh-cut Fruit and Vegetable Products, Safety Aspects of Fresh-cut Fruits and Vegetables, Enzymatic Effects on Flavor and Texture of Fresh-cut Fruits and Vegetables, Preservative Treatments for Fresh-cut Fruits and Vegetables, Application of Packaging and Modified Atmosphere to Fresh-cut Fruits and Vegetables, storage and handling of fresh produce.	12	25
3	UNIT III Edible coatings for fruits, Selecting edible coatings, Gas permeation properties of edible coatings, Wettability and coating effectiveness, Determining diffusivities of fruits, Measuring internal gas composition of fruits .	8	15
4	UNIT IV Recent techniques in fruits and vegetables: Microwave and radio frequency processing, ohmic and inductive heating, high pressure processing , pulsed electric field, high voltage arc discharge, pulsed light technology, oscillating magnetic fields and ultrasonics.	8	15
5	UNIT V	10	20



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Quality attributes of fresh fruits and vegetables, Quality indices of fruit and vegetable juices, Maturity and ripeness indices of fruits and vegetables, Microbiology of fresh and processed fruits and vegetable products, Advances in by-product utilization.		
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Reference Book:

- 1) Sumanbhatti & Uma Varma. 1995. Fruit and Vegetable Processing. CBS.
- 2) Mircea Enachescu Danthy. 1997. Fruit and Vegetable Processing. International Book Publ.
- 3) Srivastava RP & Sanjeev Kumar. 1994. Fruit and Vegetable Preservation. Principles and Practices. International Book Distr.
- 4) Cruess WV. 2000. Commercial Fruit and Vegetable Products. Agrobios.
- 5) P. Fellows. Food Processing Technology
- 6) Thompson AK. 1996. Post Harvest Technology of Fruits and Vegetables. Blackwell.
- 7) Verma LR & Joshi VK. 2000. Post Harvest Technology of Fruits and Vegetables. Vols. I-II. Indus Publ.

Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Identify the basic structure and importance of engineering properties of fruits and vegetables	RM
02	Understand different physical, thermal, frictional and aerodynamic properties of fruits and vegetables and its application in food processing operations.	UN
03	Apply the rheological physical properties of fruits and vegetables to design equipments.	AP
04	Discriminate between various fruits and vegetables based on its rheological state such Newtonian and non-Newtonian fluids.	AN
05	Develop food equipments based on thermal, electrical and magnetic properties of fruits and vegetables	EL

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List :

- 1) Advanced Drying Techniques: Practical sessions on techniques such as vacuum drying, freeze drying, and microwave drying for efficient preservation of fruits and vegetables.
- 2) Determination of the size, shape, sphericity of fruits and vegetables.
- 3) Determination of roundness and roundness ratio of fruits and vegetables.



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- 4) Demonstrations on how by-products from fruit and vegetable processing can be utilized to produce value-added products like dietary fibers, antioxidants, and natural colorants.
- 5) Determination of density, area-volume-mass relationship of fruits and vegetables.
- 6) Determination of bulk density, true density and porosity of fruits and vegetables.
- 7) Evaluation of washer, grader and packaging methods.
- 8) Experiments on drying of fruits and vegetables.
- 9) Controlled atmosphere storage and quality evaluation.
- 10) Conducting sensory tests to evaluate the acceptability and consumer preference of processed fruit and vegetable products.

List of Laboratory/Learning Resources Required :

Equipment:

- 1) Digital Vernier Calipers
- 2) Weighing balance
- 3) Terminal velocity measurement set up with Anemometer
- 4) Brookfield viscometer
- 5) Hunter colorimeter

List of Open Source Software/learning website:

- 1) <https://agrimoon.com/wp-content/uploads/Engineering-Properties-of-Biological-Materials-and-Food-Quality.pdf>
- 2) https://ecourses.icar.gov.in/e-Learningdownload3_new.aspx?Degree_Id=04
