GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3171405

Semester – VII
Subject Name: Controlled and Modified Atmosphere Storage

Type of course: Professional Elective Course

Prerequisite: Nil

Rationale: The course is essential to understand the basic mechanism underlying the controlled and modified atmosphere storage of agricultural commodities. It will be also beneficial to study the effect of storage variables on the postharvest behavior of commodities.

Teaching and Examination Scheme:

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

Content:

Sr. No.	Content	Total Hrs
1	**Storage Environment and Shelf-life:**Effect of temperature, humidity, season, moisture, respiration, maturity, etc on shelf life of perishable and durable commodities	**08**
2	**Controlled Atmosphere Technology:** Temperature & Humidity Control, Gas Control Equipment, Oxygen Control, Carbon Dioxide Control, Generating Equipment and measurement, Static & Dynamic CA, Hypobaric and Hyperbaric Storage.	**09**
3	**Effects and Interactions of CA Storage:** Carbon Dioxide and Oxygen Damage, High Oxygen Storage, Carbon Dioxide Shock Treatment, Total Nitrogen and High Nitrogen Storage, Delayed CA Storage, Interrupted CA Storage, Residual Effects of CA Storage.	**09**
4	**Modified Atmosphere Packaging:** Film & Coating types, Permeability, Gas Flushing, Perforation, Adjustable Diffusion Leak, Absorbents, Shrink wrapping, Vacuum Packing, Modified Interactive Packaging, Minimal Processing, Equilibrium Modified Atmosphere Packaging, Effect of scavengers	**09**
5	**Transport Systems:** CA Transport Technology, CA Containers, Hypobaric Containers, MA Packaging and Transport.	**07**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	30	20	20	10	---

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Controlled Atmosphere Storage of Fruits & Vegetables, A. Keith Thompson, 2nd edition, 1998.
2. Modified and Controlled Atmosphere for Storage, Transportation and Packaging of Horticultural Products, by Ethadi M Yahia, CRC Press.
3. Non-thermal Preservation of Foods, Enrique Palou, CRC Press; 1 edition, 1997.
4. Modified Atmosphere Packaging – Present and future uses of gas absorbents and generators, Smith JP, Abe Y, Hoshino J (1995).
5. Handling, Transportation, and Storage of Fruits and Vegetables: Fruits and tree nuts, Albert Lloyd Ryall, Werner J. Lipton, Wilbur Tibbils Pentzer.
6. Post-Harvest Diseases & Disorders of Fruits & Vegetables Volume I, By Anna L. Snowdon.

Course Outcome:

At the end of this module, following capabilities will be develop in the students:

1. Understand the basic requirement of CA/ MA storage for perishable and durable commodities
2. Know physiological effects of CA/MA storage on commodities
3. Knowledge about CA/MA transport systems

List of Practicals:

1. Assessment of post-harvest losses during marketing of fruits & vegetables in India.
2. Post-harvest pre-treatments for perishable commodities
3. Study of different methods used for measurement of storage gases.
4. Study of maturity indices of fruits and vegetables.
5. Measurement of rate of respiration of fruits.
6. Study of various changes taking place during ripening.
7. Calculation of the respiration rate & the heat generated by respiration of horticultural commodities.
8. Headspace gas analysis of MAP commodity
9. Study of shrink packaging of perishable commodity
10. Calculation of design parameters for CA storage facility of selected commodity.