

GANPAT UNIVERSITY					
FACULTY OF DIPLOMA ENGINEERING					
Programme	Diploma		Branch/Spec.	Agricultural Engineering	
Semester	III		Version	1.0.0.0	
Effective from Academic Year		2026-27	Effective for the Batch admitted in		July 2025
Course Code	1AE3103	Course Name	Post Harvest Technology		

I. TEACHING, LEARNING AND ASSESSMENT SCHEME

Course Type	Course Code	Course Title	Total IKS Hrs for Sem	Learning Scheme					Credits	Examination Scheme										Total
				Actual Contact Hrs/week			SLH	NLH		TH				PR				SLA		
				CL	TL	LL				FA-TH	SA-TH	TOTAL		FA-PR	SA-PR	TOTAL				
												Max	Min			Max	Min	Max	Min	
DSC	1AE3103	Post Harvest Technology	-	3	-	2	1	6	3	40	60	100	40	30	20	50	20	20	8	170

Abbreviations:	CL- Classroom Learning			TL- Tutorial Learning			LL- Laboratory Learning		
	SLH- Self Learning Hour			NLH- National Learning Hour			SLA- Self Learning Assessment		
	FA- Formative Assessment (Term work + Mid Exam + Attendance)						SA- Summative Assessment		

II. PRE-REQUISITES

This course covers Applied Physics (heat, temperature), Applied Chemistry (food constituents, pH), and Soil & Crop Science (crop types, harvesting). It also includes Environmental Studies (food safety, waste management) and Basic Agricultural Engineering (material handling, storage). These basics help understand food processing and storage.

III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES

Students can handle post-harvest operations, apply drying and storage principles, and operate relevant machinery. They'll manage grain storage, prevent losses, and ensure food safety in processing units. With these skills, they can work in agro-processing, cold storage, or warehouses as technicians or quality assistants.

IV. COURSE LEARNING OUTCOMES

- CO-1. Understand the fundamental concepts of post-harvest technology, including its need, scope, and various post-harvest operations such as drying, storage, milling, and processing of agricultural produce.
- CO-2. Analyze the principles and mechanisms of drying and storage of cereals, pulses, fruits, and vegetables, considering factors like moisture content, temperature, and microbial spoilage.
- CO-3. Evaluate different food processing and preservation methods, including freezing, canning, dehydration, and beverage processing, to ensure food quality, safety, and shelf-life enhancement.
- CO-4. Apply food chemistry and microbiology principles to assess food spoilage, contamination sources, and preservation techniques for maintaining food safety and quality.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Unit	Content	Hrs.
1	Introduction: Introduction to post harvest technology of agricultural produce, its need, scope and Importance, Brief description and introduction to various post harvest operation such as cleaning, grading, sorting, drying, storage, milling, size reduction, expelling, extraction, blending, heat treatment, separation, material handling (transportation, conveying, elevating), washing, their functions and use in the post harvest processing	5
2	Drying of Cereals and Pulses: i. Thermal properties - Specific heat - Thermal Conductivity - Thermal diffusivity ii. Theory of grain drying - Thin layer drying - Moisture content - Moisture measurement - Direct and indirect methods, Equilibrium moisture content (EMC) - Determination of EMC - EMC models - Hysteresis - Bound, unbound and free moisture, Drying curves - Constant rate period and falling rate period - Deep bed drying, Methods of grain drying - Conduction, Convection, Radiation, Dielectric, Chemical and Sack drying, iii. Principles of operation of different types of dryers viz. Deep bed dryers, flat bed dryers, continuous flow dryers, L.S.U. dryers, fluidized bed dryers, rotary dryer, spouted beds, tray and tunnel dryers. iv. Paddy and its handling - Cleaning - Drying - Cracking of paddy during drying and its prevention - Methods of paddy drying - Sun drying and mechanical drying v. Storage of Cereals and Pulses	6
3	Storage of Cereals and Pulses: Introduction, need and importance, general principles of storage, temperature and moisture changes during storage i.e. influence of moisture content, relative humidity,	5

	temperature, fungi etc. on stored product. Fungi, insect and other organism associated with stored grains. Familiarization with the various types of storage structures. Deep and shallow bins. Traditional and modern storage structures. Management of storage structures. Losses during storage and their control, space requirement of bag storage structure.	
4	Post Harvest Technology of Fruit and Vegetable Processing i. Production and processing scenario of Fruits and vegetables in India and world-scope of fruit and vegetable processing industry in India- present status, constraints and prospective. Factors affecting rate of dehydration Reconstitution -coefficient of rehydration. ii. Freezing-process, types of freezing-changes during cold storage-thawing; Canning of fruits and vegetables-process-unit operations. Hurdle concept- Intermediate moisture foods iii. Processing Technology of Jam – What is Jam?-Ingredients and their role in quality of Jam- Processing of Jam (flowcharts)-Tests for end point determination-Problems in Jam making. iv. Jelly and Marmalades – Jelly- Difference between Jam and Jelly Processing of Jelly-End point determination-Failure of Jellies to set Cloudy or foggy Jellies-Formation of crystals- Syneresis. & Marmalades-what is a marmalade-types-Jam marmalade-Jelly marmalade Problem in marmalade making. v. Sauces and Ketchups- what are sauces –difference between sauce and a ketchup classification of sauces-thick and thin sauces-processing of Tomato sauce/ketchup- Preparation of soya sauce(thin sauce)-problems in making of sauces vi. Types of Beverages-Processing, technology of Beverages-Flow charts of Juice-examples- RTS –Nectar, cordial and Squash. vii. Processing technology of vegetable wafers- potato wafers- preparation types of peeling discolorations-slicing-Drying-Frying-Salting-packing.	9
5	Food chemistry & Food Microbiology: Definition, Introduction, Importance and History of Food Chemistry, Water activity and sorption isotherm, Microbial spoilage of foods, Cause of spoilage classification of foods by ease of spoilage. Factors affecting kinds and numbers of microorganisms in food, Extrinsic factors, Intrinsic factors, Contamination of Foods. Sources of contamination, Principles of Food Preservation. Methods of Food preservation, application in food preservation	5

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

1. Determination of physical properties of agricultural materials e.g. size, shape, density and angle of repose.
2. Study of operation and adjustments of air screen cleaner-cum-grader.
3. Study of operation and adjustment of specific gravity separator.
4. Study of operation and adjustment of indented cylinder separator.
5. Determination of moisture content of grains
6. Study of different types of dryers.
7. Study of domestic grain storage structures.
8. Visit to warehouses (bag storage and bulk storage structures).
9. Visit to cold-storage.
10. Study of different packaging materials.

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

1. Study of Post-Harvest Losses
2. Drying System Analysis by Compare sun drying and mechanical drying of grains
3. Storage Structure Evaluation and study traditional and modern grain storage structures
4. Fruit & Vegetable Processing Project viz., Preparation of jam/jelly/sauce and study quality parameters and shelf life
5. Preparation of charts/models on: Dryers, storage structures, food preservation methods
6. Case study on cold storage and warehousing
7. Video-based learning on food processing techniques
8. Report on local agro-processing units or FPOs
9. Visit to cold storage / processing plant and report submission

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD

1. Moisture meter (digital/oven method)
2. Hot air oven
3. Grain cleaners and graders
4. Specific gravity separator
5. Indented cylinder separator
6. Tray dryer / cabinet dryer
7. Weighing balance
8. Sieves and size graders

9. Packaging materials and sealing machine
10. pH meter and thermometer
11. Storage structure models (traditional & modern)
12. Food preservation methods charts
13. Fruit and vegetable processing flow charts
14. Packaging material samples

IX. LIST OF REFERENCE BOOKS

1. Post Harvest Technology of Cereal, Pulses, Oil seeds by A.Chakraverty; Oxford & IBH Publication Co.
2. Unit operation of Agro Processing Engineering by Dr.K.M. Sahay& K.K Singh; Vikas Publications.
3. Physical properties of plant and animal materials by N.N.Mohsenin, Gordon and Breach, 1970
4. Post Harvest Technology of fruits & Vegetables by Thompson; CBS Publishers and Distributors, 485 Jain Bhavan, Shandara Delhi-II 0032.
5. Post Harvest (Introduction Physiology Handling fruits & Vegetables by Wills R.B.H. et al; Oxford & IBH Publication Co.

X.LINK OF LEARNING WEB RESOURCE

1. <https://www.youtube.com/@icarindia>
2. <https://www.youtube.com/@nptelhr>
3. <https://icar.org.in>
4. <https://agricoop.nic.in>
5. <https://ncdc.gov.in>
6. <https://fssai.gov.in>

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	U-Level	R-Level	A-Level	Total Marks
1.	Introduction to Post-Harvest Technology & Operations	CO1	5	8	6	4	18
2.	Drying of Cereals and Pulses	CO2	6	10	12	8	30
3.	Storage of Cereals and Pulses	CO2	5	8	8	6	22
4.	Post-Harvest Technology of Fruits & Vegetables	CO3	9	12	12	10	34
5.	Food Chemistry & Food Microbiology	CO4	5	8	6	4	18
		Grand total	30	46	44	32	122

XII. COs AND POs AND PSOs MAPPING

Course Outcome (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	1	2	2	1	-
CO2	3	3	2	1	-	-	2	3	2	-
CO3	2	3	3	2	1	-	1	3	3	2
CO4	2	2	2	-	-	2	3	2	2	1

Legends: - 3- High 2-Moderate/Medium 1-Slight/Low 0-None