GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING SYLLABUS

Subject Code : 3155102

Subject Name :Food Drying, Dehydration and Preservation

WEF Academic Year :	2023-24
Semester :	5
Category of the Course :	Professional Core

Prerequisite:Nil

Rationale:

1. Food Drying is study of moisture removal process for food preservation.
2. It includes moisture content in foods, its determination, Equilibrium moisture content and its importance.
3. Various dyers with their basic construction and applications.
4. It also includes quality of dried products classifications and selection of dryers, novel drying technology.

Course Scheme:

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Course Content:

Sr. No.	Course Content	No. of Hours	% of Weightage
1	**Introduction:** Drying definition, Moisture removal and its need, Dehydration of food, Utilities of drying, Theoretical aspects of drying, Thermal properties related to drying of foods.	7	15
2	**Food Moisture:** Moisture content measurement, representation and determination, Equilibriummoisturecontent(EMC), its determination, methods, models and importance, Moisture sorption curves, Hysteresis phenomenon.	8	15
3	**Drying theory and mechanisms:** Drying process and methods, Drying rate periods–constant and falling rate periods and their calculation, Capillary and diffusion theory,Thinlayeranddeepbeddrying,Dryerperformanceindices–overallthermal efficiency, specific energy consumption, coefficient of performance.	8	14
4	**Classification and selection of dryers:** Classification and selection, Quality criteria for dryer selection.	4	9
5	**Types of dryers and their applications:** Basic construction and application of the following dryers –Tray dryers, Vacuum dryers, Spray dryers, Fluidized bed dryers,	7	15

	Freeze dryers, Flash Dryers, Super-heated steam drying, Solar energy based dryers, Osmotic Dehydration, Drum dryer.		
6	**Dryer design:** Basic design steps and calculations–Tray dryer	**3**	7
7	**Propertiesofdriedproducts:**Physical,ChemicalandMicrobiologicalcharacteristicsofdehydratedfoods,Re-hydrationratio,sizeanddensity,shelf-life,wateractivity.	**4**	9
8	**EmergingTrendsinDryingTechnologies:**Novel dryingtechniques,Hybrid dryers,Energyand environmentconservation.	**4**	9
9	**Food Preservation and Processing:** Basic concepts, factors affecting the food deterioration and different preservation techniques	**3**	7

Reference Book:

1. Unit operations of chemical engineering by McCabe and Smith. McGraw-Hill
2. Drying of Foods, Vegetables and Fruits (Volume 1), Sachin V. Jangam, Chung Lim Law and Arun S.Mujumdar.
3. Drying Technologies for Foods: Fundamentals and Applications, Prabhat K. Nema, Barjinder Pal Kaur,ArunS. Mujumdar, CRCPress, 2018
4. Handbook of Industrial Drying, EditedByArunS. Mujumda,CRCPress,2006
5. Hand Book Of Food Dehydration & Drying, by Eiri Board, Published by Engineers India Research Institute(2008)
6. Drying and Dehydration of Foods Paper back by HarryW.Von Loesecke, DelanyPres,2012

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level*
01	Understand moisture content, moisture removal and its requirement.	RM
02	Understand moisture content measurement and thermal properties related to drying.	UN
03	Understand drying mechanism for foods.	UN
04	Select suitable dryer meeting requirement.	AN
05	Develop functional design of dryers.	AP

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

Suggested Course Practical List:

1.Tomeasurethermalpropertiesoffoodproduct
2.EMCdeterminationofgrains
3.Determinationofdryingratecharacteristics
4.Evaluateperformanceoftraydyer
5.Evaluatedehydrationandrehydrationoffoodproduct
6.Evaluatespraydryingperformance

7.Studyof solar drying
8. Study of freeze drying process
9.Studyofqualitychangesduringdryingof food materials
10.Studyof LSUtype grain dryer
11.Evaluateperformanceofvacuumdryer

List of Laboratory/Learning Resources Required:

Major Equipments

1. Tray dryer
2. Vacuum dryer
3. Hotair oven
4. Weighing balance
5. Microwave oven
6. Solar dryer
7. Moisture meters
8. Freeze dryer
9. Infrared dryer

Listofopen-sourcesoftware/learningwebsites

a. http://www.aces.uiuc.edu/vista/html_pubs/DRYING/dryfood.html
b. http://nchfp.uga.edu/how/dry.html
c. http://www.britannica.com/EBchecked/topic/172410/drying-process
d. http://science.utcc.ac.th/lecturer/muanmai/AITdownload/Ch5_moisture&drying.ppt

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