

GENERIC ELECTIVE COURSE
GE FT05: Food Engineering and Packaging Technology

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITE OF THE COURSE

Course title & code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Theory	Tutorial	Practical/Practice		
Food Engineering and Packaging Technology	4	3		1	XII Pass with Science	

Learning Objectives

1. understand the fundamental engineering principles of Unit operations.
2. To acquaint with fundamentals of food engineering and its process.
3. To develop an understanding of the various packaging materials, techniques and package design used for food packaging.

Learning Outcomes

After completing this course, students will be able to:

1. Understand the principles of Unit operation
2. Acquaint with fundamentals of food engineering and its processes
3. Develop an understanding of different food packaging materials and packaging design and techniques used for various foods

SYLLABUS

THEORY
Credits 3 (45 Hrs.)

UNIT I:

Unit Operations and Processes: Engineering Concepts **20 hours**

- Units and Dimensions, Mass and Energy Balance
- Food Plant Layout and Design.

- Heat transfer- Laws of Conduction, convection, Radiation
- Steam: Thermodynamics of Phase change, Pressure enthalpy diagram, Boilers
- Evaporation – Evaporator types and Design of single effect evaporator
- Dehydration- Basic drying process and Principle
- Refrigeration and Freezing -VCR System, Pressure Enthalpy Charts, Mathematical expressions useful in analysis of VCR System. Freezing time prediction- Plank's Equation
- Psychrometrics- Psychrometric Chart construction and uses
- Fluid flow-Liquid Transport system, Properties and Classification of fluids, Reynolds number.

UNIT II:

Separation and Size Reduction Processes 10 hours

- Principle and equipment used for Filtration, Extraction, Distillation, Centrifugation, Sieving.
- Milling, Grinding and Mixing of Foods

UNIT III:

Food Packaging 15 hours

Food Packaging- Concept, Functions and Significance. Manufacturing Process and Application of Rigid, Semi Rigid and Flexible Food Packaging Material. Aseptic, Intelligent and Active packaging. Packaging Techniques for Fresh Agricultural Produce, and Processed Foods.

PRACTICAL (Credit 1; Hours 30)

- Study the dehydration process of foods.
- Study the freezing characteristics of foods.
- Study the evaporation process.
- Study and use of psychrometric chart.
- To design layout of a food plant.
- Sieve analysis of Food samples.
- Determination of viscosity of foods using Viscometer.
- Identification and Testing of packaging materials.
- Demonstration of vacuum/gas packaging of foods.

Essential Readings (Theory):

1. Singh, R.P. and Heldman, D.R.(2013).Introduction to food engineering, 5thEd. Academic Press

2. Rao, D.G.(2010).Fundamentals of food engineering. PHI learning private Ltd.
3. Robertson, (2012) Food Packaging: Principles and Practices , CRC Press
4. Saha, N.C., Ghosh, A.K., Garg, M., Sadhu, S.D (2022) Food Packaging :Materials, Techniques and Environmental Issues, publisher springer
5. Kshitiz Kumar, Pravin M Ganorkar, Vijay Singh Sharanagat (2023). Food Packaging- Principles and Applications. Nipa® genx electronic resources & solutions p. Ltd. New Delhi.

Essential Readings (Practical):

1. Meenakshi Garg, Premlata Meena, Sushmita D Sadhu, Tanveer Alam. “Food Packaging: A Practical Guide” The Computype Media (Publishing Division), ISBN No.614027934-9; 2020.