#### 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		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, 5<sup>th</sup>Ed. 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.