

**UNIVERSITY OF DELHI**  
**DEPARTMENT OF HOME SCIENCE**  
**B.A. (PROG) WITH FOOD TECHNOLOGY (FT)**

**SEMESTER -I:**

<b>S.No.</b>	<b>Content</b>
<b>1.</b>	<b>B.A. (Prog.) with Food Technology (FT) as Major DISCIPLINE SPECIFIC CORE (DSC)</b> DSC-1-FT: Basics in Food and Nutrition DSC-2-FT: Food Science Part I
<b>2.</b>	<b>B.A. (Prog.) with Food Technology (FT) as Non-Major DISCIPLINE SPECIFIC CORE (DSC)</b> DSC-2-FT: Food Science Part I

**SEMESTER -II:**

<b>S.No.</b>	<b>Content</b>
<b>1.</b>	<b>B.A. (Prog.) with Food Technology (FT) as Major DISCIPLINE SPECIFIC CORE (DSC)</b> DSC-3-FT: Nutrition and Well Being for Lifespan DSC-4-FT: Food Science Part II
<b>2.</b>	<b>B.A. (Prog.) with Food Technology (FT) as Non-Major DISCIPLINE SPECIFIC CORE (DSC)</b> DSC-4-FT: Food Science Part II

**Semester III, IV:**

**DISCIPLINE SPECIFIC CORE COURSES (DSC):**

**CREDITS – 6 (4 Credit Theory and 2 Credit Practical)**

DSC-FT 3: Basic Baking Technology (Theory + Practical) (Semester III)

DSC-FT 4: Introduction to Food Safety and Preservation (Theory + Practical) (Semester IV)

**Semester V, VI:**

**DISCIPLINE SPECIFIC ELECTIVES (DSE):**

**CREDITS – 6 (4 Credit Theory and 2 Credit Practical)**

DSE-FT 1: Advanced Baking Technology (Theory + Practical) (Semester V)

DSE-FT 2: Advanced Fruit and Vegetable Preservation Technology (Theory +Practical)  
(Semester VI)

## SEMESTER I

### B.A. (Prog.) with Food Technology (FT) as Major

#### Category-II

#### DISCIPLINE SPECIFIC CORE COURSE – DSC-1-FT: BASICS IN FOOD AND NUTRITION

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Basics in Food and Nutrition	4	3	0	1	Class XII Pass	NIL

#### LEARNING OBJECTIVES:

1. To familiarize students with the relationship between food, nutrition, nutrients and health
2. To describe the functions, sources, deficiencies and excess of various nutrients
3. To make students understand the principles and methods of conserving and enhancing nutrients during cooking food
4. Prepare dishes using basic principles of food science and nutrition.

#### LEARNING OUTCOMES:

After completion of the course, the students will be able to:

1. Understand the basic concepts related to of the vibrant field of nutrition
2. Gain theoretical and practical knowledge about balanced diet, energy, macro nutrients and micro-nutrients
3. Judiciously adopt healthier methods of cooking based on the available resources
4. Adopt methods of processing food which would help to conserving/ enhancing nutrients while processing food.

#### THEORY:

## **UNIT I: Basic Concepts and Introduction to Food and Nutrition**

(5 Hours)

- Unit Description: This unit will introduce the vibrant field of nutrition to the students. They will be appraised about the relationship of food with health and basics of a balanced diet.

- Subtopics:

- o Basic terms in food, nutrition and health
- o Functions of food
- o Foods groups
- o Balanced diet

## **UNIT II: Energy and Macronutrients**

(12 Hours)

- Unit Description: The students will learn about the concepts of energy in food and its role in maintain good health. They will also learn about the energy giving macronutrients.

- Subtopics:

- o Energy: definition and units of measurement, factors affecting energy requirements, energy density of foods, energy balance.
- o Macronutrients: Functions, dietary sources and clinical manifestations of deficiency/ excess of carbohydrates, lipids and proteins.

## **UNIT III: Micronutrients**

(16 Hours)

- Unit Description: This unit will help students to learn about the role of micronutrients in maintaining good health, effects of deficient and high intake, food sources.

- Subtopics:

- o Functions, dietary sources and clinical manifestations of deficiency/ excess of the following nutrients:
- o Fat soluble vitamins-A, D, E and K
- o Water soluble vitamins – thiamine, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C
- o Minerals – calcium, iron, zinc and iodine

#### **Unit IV: Theory of Cooking and Enhancing Nutrients**

(12 Hours)

• Unit Description: The basic principles/methods of cooking food and ways of enhancing, conserving nutrients while cooking or processing food.

• Subtopics:

o Methods of cooking food: dry heat, moist heat and combination

o Methods of conserving nutrients

o Methods of enhancing the nutritional quality of foods - supplementation, germination, fermentation, fortification and genetic modification of foods

#### **PRACTICAL:**

No. of Students per Practical Class Group: 10-15

1. Prepare educational aid on balanced diet or food groups (2 Hours)
2. Preparing market order, selection of raw material (2 Hours)
3. Weights and measures (2 Hours)
4. Identification of presence/absence of food groups in given samples of food products/dishes/snacks available in college canteen (2 Hours)
5. Estimation of Edible portion size (peas/cauliflower/bottle gourd, potato, green leafy vegetables, one seasonal fruit) (2 Hours)
6. Pre-preparation Methods I: Washing, Peeling, Cutting, Chopping, Grating (2 Hours)
7. Pre-preparation methods II: blanching, kneading, whipping, whisking (2 Hours)
8. Dry-heat methods of cooking like roasting, grilling, frying (2 Hours)
9. Moist-heat methods of cooking like steaming, boiling, pressure cooking (2 Hours)
10. Planning and preparation of energy rich snack/dish. (3 Hours)
11. Planning and preparation of protein rich snack/dish. (3 Hours)
12. Planning and preparation of micronutrient (Vitamin A, Vitamin C) rich snack/dish. (3 Hours)
13. Planning and preparation of micronutrient (Calcium, iron) rich snack/dish (3 Hours)

#### **ESSENTIAL/ RECOMMENDED READINGS (Theory and Practical):**

1. Suri, S. and Malhotra, A. (2014). Food Science Nutrition and Safety. Delhi: Pearson India Ltd. Online Question Bank and student E Resources :[https://wps.pearsoned.co.in/suri\\_fsns\\_1/Online](https://wps.pearsoned.co.in/suri_fsns_1/Online)  
Instructor Resources: [www.pearsoned.co.in/sukhneetsuri](http://www.pearsoned.co.in/sukhneetsuri)
2. Sethi P, Lakra P.(2015). Aahar Vigyan, poshan evam Suraksha (Hindi);(2015).First Ed; 2015; Delhi: Elite Publishing House (P)Ltd.
3. Srilakshmi B (2018). Food Science, 7th Edition. Delhi: New Age International Ltd.
4. Khanna K, Gupta S, Seth R, Mahna R, Rekhi T. (2004). The Art and Science of Cooking: A Practical Manual, Revised Edition. New Delhi: Elite Publishing House PvtLtd.

### **SUGGESTED READINGS:**

1. Bamji MS, Krishnaswamy K, Brahmam GNV (2016). Textbook of Human Nutrition, 4th edition. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd.
2. Chadha R and Mathur P (2015). Nutrition: A Lifecycle Approach. Hyderabad: Orient BlackSwan.
3. Roday, S (2018). Food Science and Nutrition. UK: Oxford University Press.
4. Lanham, SA, Hill, TR, Gallagher, AM, Vorster, HH. (2019). Introduction to Human Nutrition, Third Nutrition, Wiley Blackwell, USA.
5. Whitney, E.N., Rolfes, S.R. (2016). Understanding Nutrition. 14th Edition; USA: Elsevier.
6. Pike, R.L. and Brown, M.L. (1984) An Integrated Approach. Nutrition, John Wiley& Sons, Hoboken,197.
7. Swaminathan, M. (2021). Advanced Textbook on Food and Nutrition. Bangalore Press.
8. Desai. (2019). Handbook of Nutrition and Diet. CRC Pres

**B.A. (Prog.) with Food Technology (FT) as Major and Non Major**

**Category- II & III**

**DISCIPLINE SPECIFIC CORE COURSE – DSC-2-FT: FOOD SCIENCE PART-I**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Food Science Part-I	4	3	0	1	Class XII Pass	NIL

**LEARNING OBJECTIVES:**

1. To introduce the students to the vibrant field of food science and food technology
2. To impart theoretical and practical knowledge about composition, nutritive value and processing of cereals, pulses, fruits, vegetables and meat.
3. To familiarize students with basics of food adulteration.

**LEARNING OUTCOMES:**

After completion of the course, the students will be able to:

1. Define food science and describe its association with other related fields; and understand the role of food science in food and health industry.
2. Describe composition, nutritive value and processing of cereals, pulses, fruits, vegetables, meat, fish and poultry.
3. Justify scientifically the changes occurring in food during processing, handling and storage. Describe enzymatic and non-enzymatic browning reactions in various foods.
4. Describe harmful effects of adulteration on health and will be able to detect presence of common adulterants in food.

**THEORY:**

**UNIT I: Introduction to Food Science and Technology**

(15 Hours)

- Unit Description: This unit will introduce the students to the field of Food Science and Technology. It will also give information on basics of nutrition and food adulteration.

- Subtopics:

- o Definition, scope and current trends in food science and technology.
- o Basic introduction to macro and micronutrients-classification and functions of various nutrients
- o Definitions- food, safe food, nutrient, nutrition, balanced diet
- o Commonly found food adulterants and their effect on health

## **UNIT II: Cereals and Pulses**

(10 Hours)

- Unit Description: The unit will focus on various aspects of composition, nutritive value and processing of cereals, millets and pulses.

- Subtopics:

- o Composition and nutritive value, types of cereals and millets
- o Gelatinization of starch and the factors affecting it, dextrinization, germination and fermentation
- o Toxic constituents in pulses.

## **UNIT III: Fruits and Vegetables**

(12 Hours)

- Unit Description: The unit is about composition, nutritive value and processing aspects fruits and vegetables. It also describes about various browning reactions that take place during food processing.

- Subtopics:

- o Classification of fruits and vegetables, composition and nutritive value; effect of processing on pigments.
- o Browning Reactions- enzymatic & non-enzymatic, role in food preparation and prevention of undesirable browning.

## **UNIT IV: Meat, Fish and Poultry**

(8 Hours)

- Unit Description: The unit will focus on composition, nutritive value and processing aspects of meat, fish and poultry.

- Subtopics:

- o Composition and nutritive value



o Types of meat, fish and poultry and their selection/purchasing criteria, Rigor mortis, Tenderization and Curing.

### **PRACTICAL:**

No. of Students per Practical Class Group: 10-15

- |  |           |
|--|-----------|
| 1. Weights and Measures.   | (2 Hours) |
| 2. Detection of adulterants in food                                  | (2 Hours) |
| 3. Gelatinization of starch and the factors affecting it.            | (2 Hours) |
| 4. Preparation of dish using gelatinization of starch                | (2 Hours) |
| 5. Dextrinization of starch and its application                      | (2 Hours) |
| 6. Germination of pulses and cereals                                 | (2 Hours) |
| 7. Preparation of products using sprouts                             | (2 Hours) |
| 8. Fermentation of cereals and pulses                                | (2 Hours) |
| 9. Preparation of cereal-pulse fermented products                    | (2 Hours) |
| 10. Effect of heat, acid and alkali on water soluble plant pigments. | (2 Hours) |
| 11. Effect of heat, acid and alkali on fat soluble plant pigments.   | (2 Hours) |
| 12. Maillard browning during food preparation.                       | (2 Hours) |
| 13. Enzymatic browning and its prevention.                           | (3 Hours) |
| 14. Caramelization reaction in food.                                 | (2 Hours) |

### **ESSENTIAL/ RECOMMENDED READINGS (Theory and Practical):**

1. Sethi, P. & Lakra, P. (2015). Aahar Vigyan, Poshan Evam Suraksha. Delhi: Elite Publishing House Pvt.Ltd.
  2. Srilakshmi, B. (2012). Food Science. Delhi: New Age International Pvt. Ltd.
  3. Suri, S. & Malhotra, A. (2014). Food Science Nutrition and Safety. Delhi: Pearson India Ltd.
- i. Online Question Bank and student E Resources:  
https://wps.pearsoned.co.in/suri\_fsns\_1/Online Instructor Resources:  
[www.pearsoned.co.in/sukhneetsuri](https://wps.pearsoned.co.in/sukhneetsuri)
4. Potter,N., & Hotchkiss,J.H.(2007). FoodScience.5thEdition.Delhi:CBSPublishers.

5. Rekhi,, T. & Yadav, H. (2014). Fundamentals of Food and Nutrition. Delhi: Elite Publishing House Pvt. Ltd.

### **SUGGESTED READINGS:**

1. Avantina S (2019). Textbook of Food Science and Technology, 3rd Edition, CBS Publishers and Distributors Pvt Limited

2. McWilliams, M. (2016). Foods: Experimental Perspectives. USA: Pearson.

3. Reddy,S.M. (2015).Basic Food Science and Technology. Delhi: New Age International Publishers.

4. Vaclavik, V.A. & Elizabeth, C. (2014). Essentials of Food Science. 4th Edition. New York: Springer.

5. Roday, S. (2018). Food Science and Nutrition. 3rd Edition. Delhi: Oxford University Press.

6. Geoffrey Campbell–Platt. Food Science and Technology. 1st edition (2009). Wiley–Blackwell

7. Sharma A. Textbook of Food Science and Technology 3rd Ed., (2022). CBS Publiher 9789386478009

## **SEMESTER II**

### **B.A. (Prog.) With Food Technology (FT) as Major**

#### **Category- II**

### **DISCIPLINE SPECIFIC CORE COURSE – DSC-3-FT: NUTRITION AND WELL BEING FOR LIFESPAN**

#### **CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Nutrition and Well Being for Lifespan	4	3	0	1	Class XII Pass	DSC-1-FT

### **LEARNING OBJECTIVES:**

1. To make students understand the concept of wellbeing, good health, dietary guidelines and lifestyle management.
2. To familiarize students with the salient physiological changes and nutrition related health concerns during various stages of lifespan.
3. To familiarize students with the dietary guidelines and lifestyle practices which would support overall wellbeing and good health
4. Make students plan and prepare nutritious meals for self, family and the community.

### **LEARNING OUTCOMES:**

After completion of the course, the students will be able to:

1. Appreciate the role of dietary guidelines and lifestyle management in promoting health and well being
2. Adopt a healthy and active lifestyle suitable to each physiological stage in lifespan
3. Enhance ability to make healthy food choices for self, family and the community
4. Develop educational aids to impart nutrition knowledge.

### **THEORY:**

#### **UNIT I: Maternal and Infant Nutrition**

(12 Hours)

- Unit Description: This unit will focus on basic concepts of wellbeing, dietary guidelines as well as maternal and infant nutrition.
- Subtopics:
  - o Basic concepts: well-being, nutritional status, dietary guidelines and lifestyle management
  - o Pregnancy - physiological changes during pregnancy, dietary guidelines, the role of nutrition in the developmental origins of disease
  - o Lactation - factors affecting nutritional requirements, dietary guidelines, breast feeding practices
  - o Infancy - growth and development, growth monitoring, dietary guidelines (advantages of mother's milk, complimentary feeding)

## **UNIT II: Child and Adolescent Nutrition**

(12 Hours)

- Unit Description: This unit will focus on dietary guidelines and lifestyle management of children and adolescents.
- Subtopics:
  - o Childhood Years: growth and development, dietary guidelines during early, middle and late childhood years, common nutrition concerns.
  - o Adolescence: growth and development, eating behavior, dietary guidelines, common health problems during adolescence, eating disorders, lifestyle management.

## **UNIT III: Nutrition during Adulthood**

(12 Hours)

- Unit Description: This unit will focus and reference man as well as woman and nutritional needs of adults.
- Subtopics:
  - o Reference Man and Reference Woman, dietary guidelines, role of nutrition in adulthood in the prevention and development of chronic diseases
  - o Lifestyle management: healthy eating behavior, physical activity, stress management, sleep pattern.

## **Unit IV: Nutrition for the Elderly**

(9 Hours)

- Unit Description: This unit will focus on nutritional needs, lifestyle management, longevity and care for elderly.
- Subtopics:
  - o Introduction to Geriatrics, physiological changes, nutrition and longevity, nutritional concerns, dietary guidelines, Nutrition and chronic Degenerative Diseases, Nutrient-Drug Interactions (basic concept).

## **PRACTICAL: 30 Hours**

No. of Students per Practical Class Group: 10-15

1. Develop a poster/chart on dietary guidelines or lifestyle management for adults (sedentary, moderate, heavy workers) or pregnant woman. (4 Hours)

2. Develop a digital educational aid on importance of colostrum/mother's milk/food behavior/lifestyle management (2 Hours)
3. Develop a questionnaire on common nutrition/health concerns (2 Hours)
4. Learn to fill growth chart for under five years children (case study) (2 Hours)
5. Plan and prepare nutritious snack for Pregnant women (iron and folic acid rich) (2 Hours)
6. Plan and prepare nutritious snack Lactating mother (protein and calcium rich) (2 Hours)
7. Plan and prepare nutritious snack Pre-schooler (Vitamin A rich) (2 Hours)
8. Plan and prepare nutritious tiffin for School going child (energy and protein rich) (2 Hours)
9. Plan and prepare nutritious snack for adolescents (energy and protein rich) (2 Hours)
10. Plan and prepare nutritious snack for Elderly (easy to prepare, protein and micro-nutrient rich) (2 Hours)
11. Plan and prepare premix or complimentary food for infants (2 Hours)
12. Plan and organize a health awareness activity in college for college students (exhibition of model snacks/tiffin's/one dish 2meals) OR Plan and play a skit on the concept of longevity for elderly in a nearby slum or community center or college event (Group activity) (6 Hours)

**ESSENTIAL/ RECOMMENDED READINGS (Theory and Practical):**

1. Chadha, R., & Mathur, P. (Eds.). (2015). Textbook Nutrition: A Lifecycle Approach. Orient Blackswan. ISBN978-8125059301
2. Khanna, K., Gupta, S., Passi, S. J., Seth, R., Mahna, R., & Puri, S. (2013). Textbook of Nutrition and -Dietetics (2nd ed.). Elite Publishing House Pvt. Ltd. ISBN: 978-81- 88901-53-1
3. Srilakshmi, B. (2006). Dietetics. New Age International (P) Limited Publishers. ISBN 81-224-1611-X
4. Wardlaw, G. M., & Smith, A. M. (2015). Contemporary Nutrition (9th ed.). McGraw Hill Education (India) Private Limited.

**SUGGESTED READINGS:**

1. Evans, S. (2009). Nutrition: A Lifespan Approach, Wiley-Blackwell. ISBN:978-1-405- 17878 5.
2. Shubhangini A Joshi, S. (2021). Nutrition and Dietetics (5th ed.). McGraw Hill Education (India) Private Limited. ISBN:978-93-90727- 82-7.

3. Bernstein, M. & McMahon, K. (2018). Nutrition Across Life Stages, Jones & Bartlett Publishers. ISBN: 9781284102161

4. Katz, D., Yeh, M. and Levitt, J. (2022). Wolters Kluwer Publishers. ISBN: 9781975161491

**B.A. (Prog.) With Food Technology (FT) as Major and Non Major**

**Category- II & III**

**DISCIPLINE SPECIFIC CORE COURSE – DSC-4-FT: FOOD SCIENCE PART-II**

**CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE**

Course Title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Food Science Part-II	4	3	0	1	Class XII Pass	DSC-2-FT

**LEARNING OBJECTIVES:**

1. To familiarize the students with the composition and processing of milk, egg, sugars, fats and miscellaneous food.
2. To impart concept of properties of fats and oil, sugar, egg foam stages and emulsions.

**LEARNING OUTCOMES:**

After completion of the course, the students will be able to:

1. Describe the composition and nutritive value of milk, egg, sugar and fats and their role in food processing.
2. Develop understanding about basic processing of milk and eggs.
3. Illustrate the behavior of sugar at various temperatures.
4. Describe spoilage of fat scientifically, determine the smoke point of different fats and illustrate the ways to prevent rancidity of fats.

**THEORY:**

**UNIT I: MILK**

(9 Hours)

- Unit Description: This unit is about milk, its nutritive value, processing, types and effect of processing on milk quality.

- Subtopics:

- o Nutritive value

- o Introduction to liquid milk technology (clarification, pasteurization, homogenization, fortification, sterilization)

- o Types of milk

- o Effect of processing on milk

## **UNIT II: EGGS**

(12 Hours)

- Unit Description: This unit is about eggs its composition and nutritive value, structure, quality, foam formation and effect of heat on egg proteins.

- Subtopics:

- o Composition and nutritive value

- o Structure of an egg

- o Egg quality and deterioration

- o Effect of heat on egg proteins: Green ring formation in boiled egg

- o Storage and preservation of eggs

- o Egg foams – stages of preparation and factors affecting them

## **UNIT III: FATS AND OILS**

(12 Hours)

- Unit Description: This unit is about types of fats and oils, their functions, spoilage, precautions to be taken while using, emulsions and RUCO.

- Subtopics:

- o Definitions, types of fats and oils and their functions

- o Rancidity in fat and its prevention

- o Care of fat used for frying (smoke, flash and fire points)

- o Emulsions

- o Repurpose used cooking oil (RUCO).

## **UNIT IV: MISCELLANEOUS FOOD PRODUCTS**

(12 Hours)

• Unit Description: This unit is about miscellaneous food items like sugar and its properties and behavior during cooking, tea and coffee processing and flavoring compounds in spices

• Subtopics:

o Sugar: Properties, sugar behavior during cooking.

o Tea and Coffee: Types of tea and coffee, basic processing of tea and coffee.

o Spices and Herbs: Types and flavoring components

### **PRACTICAL:30 Hours**

No. of Students per Practical Class Group: 10-15

1. Determination of pH of different foods. (2 Hours)
2. Selection and purchase criteria of raw materials (cereal, pulses, vegetables, fruits and eggs) (2 Hours)
3. Effect of heat on milk processing. (2 Hours)
4. Effect of acid and alkali on milk processing. (2 Hours)
5. Egg white foam formation (2 Hours)
6. Factors affecting egg white foam stability (4 Hours)
7. Green ring formation in boiled eggs and its prevention (2 Hours)
8. Determination of the quality of an egg (2 Hours)
9. Behavior of sugar at various temperatures (4 Hours)
10. Preparation of crystalline candies (2 Hours)
11. Preparation of non-crystalline candies (2 Hours)
12. Determination of smoke point of different fats and oil (2 Hours)
13. Preparation of emulsions – mayonnaise (2 Hours)

### **ESSENTIAL/ RECOMMENDED READINGS (Theory and Practical):**

1. Suri, S. & Malhotra, A. (2014). Food Science Nutrition and Safety. Delhi: Pearson India Ltd.

i. Online Question Bank and student E Resources: [https://wps.pearsoned.co.in/suri\\_fsns\\_1/](https://wps.pearsoned.co.in/suri_fsns_1/)

ii. Online Instructor Resources: [www.pearsoned.co.in/sukhneetsuri](http://www.pearsoned.co.in/sukhneetsuri)

2. Sethi, P. & Lakra, P. (2015). Aahar Vigyan, Poshan Evam Suraksha. Delhi: Elite Publishing House Pvt.Ltd.



3. Srilakshmi, B. (2018). Food Science. Delhi: New Age International Pvt.Ltd.
4. Potter, N. & Hotchkiss, J.H. (2007). Food Science. 5th Edition. Delhi: CBSPublishers.
5. Rekhi,, T. & Yadav, H. (2014). Fundamentals of Food and Nutrition. Delhi: Elite Publishing House Pvt.Ltd.
6. Sharma, A. (2010). Textbook of Food Science and Technology. 2nd Edition. Delhi:IBDC Publishers

### **SUGGESTED READINGS:**

1. Manay, N. S. &Shadakashraswamy. (2020). Foods: Facts and Principles. 3rd Edition. New Age International Pvt Ltd.
2. McWilliams, M. (2016). Foods: Experimental Perspectives. USA: Pearson.
3. Roday, S. (2018). Food Science and Nutrition. 3rd Edition. Delhi: Oxford University Press.
4. Vaclavik, V.A. & Elizabeth, C. (2014). Essentials of Food Science. 4th Edition. New York: Springer

### **SEMESTER III (LOCF)**

#### **DSC- FT 3: BASIC BAKING TECHNOLOGY**

**(CREDITS- THEORY: 4; PRACTICAL: 2)**

#### **COURSE OBJECTIVES:**

- To impart students basic knowledge related to the principles of baking
- To introduce them to the techniques and skills of cake and pastry making and their decoration
- To introduce the concept of proximate analysis of wheat flour

#### **COURSE LEARNING OUTCOMES:**

After successfully completing the course, the students will be able to:

- Describe the present and future trends of the bakery industry.
- Illustrate the basic ingredients and equipment used for baking along with their significance
- Describe the process of cake and pastry preparation, their decoration and evaluation.
- Demonstrate the skills for making cakes and pastries.

- Test wheat flour and conduct labeling, packaging and costing of prepared bakery products.
- Initiate the entrepreneurial journey in the field of bakery.

## **THEORY PERIODS: 60 (CREDITS 4)**

### **UNIT I: BAKING INDUSTRY**

(8)

- Baking industry and its scope in the Indian economy
- History of bakery - present trends and prospects
- Nutrition facts about bakery products

[https://shodhganga.inflibnet.ac.in/bitstream/10603/53842/10/10\\_chapter%202.pdf](https://shodhganga.inflibnet.ac.in/bitstream/10603/53842/10/10_chapter%202.pdf)

### **UNIT II: WHEAT GRAIN, BAKING INGREDIENTS AND EQUIPMENT**

(22)

- Wheat grain– its structure
- Milling of wheat, types of refined wheat flour; composition of refined wheat flour (gluten, amylose/ amylopectin, enzyme activity, moisture) and its storage
- Ingredients – flour, sugar, fat, egg, leavening agents and other bakery additives
- Equipment- oven, mixing tools and icing tools

Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers, Chapter 17, pg 381-401

### **UNIT III: CAKE TECHNOLOGY**

(15)

- Preparation of cakes - types of cakes, methods of batter preparation, steps in cake making, balancing of cake formula, evaluation of the baked cake, operational faults in cake processing and the remedial measures.
- Packaging, labeling, and costing
- Cake decoration- different methods

Dubey, S. C. (2016). Basic Baking-Science and Craft. Delhi: Society of Indian Bakers, Unit 2, Chapter 1 – 5, pg 98-121

Dubey, S. C. (2009). Bakery Vighan. Delhi: Society of Indian Bakers, Unit 2, Chapter 1 – 5, pg 117-150

#### **UNIT IV: PASTRY TECHNOLOGY**

(15)

- Preparation of pastry - types of pastries (short crust, puff/flaky and choux pastry), processing and evaluation, faults and remedies.

Dubey, S. C. (2016). Basic Baking-Science and Craft. Delhi: Society of Indian Bakers, Unit 2, Chapter 7, pg 138-143

Dubey, S. C. (2009). Bakery Vighan. Delhi: Society of Indian Bakers, Unit 2, Chapter 7, pg 175-182.

#### **PRACTICAL PERIODS: 60 (CREDITS 2)**

- Quality Testing of Flour
  - Determination of water absorption power (WAP) of refined wheat flour and whole wheat flour
- Determination of ash content in refined wheat flour
- Determination of moisture content of refined wheat flour
- Sensory evaluation (by Hedonic scale) for various processed food products
- Preparation and sensory evaluation of cakes
  - Fatless sponge (pineapple sponge, chocolate sponge and Swiss roll)
  - Shortened cake (plain tea cake, Dundee cake, marble cake, fruit cake and innovative cakes)
    - Eggless cake
- Cake Icing
- Preparation and sensory evaluation of pastry
  - Short crust (jam tarts)
  - Puff/flaky (Bombay khari, vegetable patties)
  - Choux pastry (chocolate Éclairs)

#### **COMPULSORY READINGS:**

- Dubey, S. C. (2016). Basic Baking-Science and Craft. Delhi: Society of Indian Bakers.
- Dubey, S. C. (2009). Bakery Vighan. Delhi: Society of Indian Bakers.

- Ketrappaul, N., Grewal, R.B., & Jood, S. (2005). Bakery Science and Cereal Technology. Delhi: Daya Publishing House.
- Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers.

#### **ADDITIONAL RESOURCES:**

- Cornell, Hugh, J. & Hoveling, Alber. W. (1998). Wheat Chemistry and Utilization, Delhi: CRC Press.
- Edward, W. P. (2007). The Science of Bakery Products. Cambridge: RSC Publishing.
- Kent, N.L. (2004). Technology of Cereals. London: Pergamon Press.
- Khanna, K., Gupta, S., Seth, R., Mahana, R., & Rekhi, T. (2004). The Art and Science of Cooking. Delhi: Phoenix Publishing House Private Limited.
- Mathur, P. (2018). Food Safety and Quality Control. Delhi: Orient Blackswan.
- Matz A. (2004). The Chemistry and Technology of Cereals as Food and Feed. Delhi: CBS Publishers.
- Matz, A. (1998). Bakery Technology and Engineering. Delhi: CBS Publishers.
- Raina, U., Kashyap, S., Narula, V., Thomas, S., Suvira, Vir, S., & Chopra, S. (2005). Basic Food Preparation – A Complete Manual. Delhi: Orient Longman.
- Srilakshmi, B. (2018). Food Science. Delhi: New Age International Publishers.

### **SEMESTER IV (LOCF)**

#### **DSC-FT 4: INTRODUCTION TO FOOD SAFETY & PRESERVATION**

**(CREDITS- THEORY: 4; PRACTICAL: 2)**

#### **COURSE OBJECTIVES:**

- To impart students basic knowledge relating to food safety and principles of preservation
- To introduce them to the concept of processing and preservation of fruits and vegetables
- To familiarize the students with preserved fruit and vegetable products available in the market
- To equip them with skills required for preservation, packaging and evaluation of fruit beverages, ketchup, sauce and chutney

## **COURSE LEARNING OUTCOMES:**

After successfully completing the course, the students will be able to:

- Describe the purpose and scope of the food preservation industry along with a market survey of preserved products.
- Illustrate the post-harvest changes in fruits and vegetables.
- Explain the different objectives, principles and methods of food preservation.
- Demonstrate skills for processing of fruits and vegetable chutneys, sauces and beverages along with labeling.
- Prepare safe and hygienic preserves using appropriate techniques of preservation.
- Be conversant with FSSAI regulations and functions.
- Develop the attitude and values imperative for a micro entrepreneur in food industry.

## **THEORY PERIODS: 60 (CREDITS 4)**

### **UNIT I: PURPOSE AND SCOPE OF PRESERVATION (5)**

- Objectives of preservation and processing
- Scope of preservation industry in India

Srivastava, S.S. (2011). Phal Parirakshan. Lucknow: Kitab Mahal, Chapter 4, pg 72- 88

Srivastava, R.P. & Kumar, S. (2005). Fruit and Vegetable Preservation. Lucknow: International Book Distributing Co. Chapter 3, pg 11- 18

### **UNIT II: POST-HARVEST CHANGES AND SPOILAGE (10)**

- Physical, chemical and microbiological changes in fruits and vegetables
- Factors affecting growth of microorganisms and the control measures

Srivastava, R.P. & Kumar, S. (2005). Fruit and Vegetable Preservation. Lucknow: International Book Distributing Co. Chapter 9, pg 61-72

### **UNIT III: FOOD SAFETY (20)**

- Key terms, factors affecting food safety, recent concerns
- FSSAI: Regulations and functions
- Food additives and contaminants
- Hygiene and Sanitation

- HACCP

Suri, S. & Malhotra, A. (2014). Food Science, Nutrition and Safety. Delhi: Pearson India Ltd, Chapter 20, pg 263-270; Chapter 25, 26, pg 335-357

#### **UNIT IV: PRINCIPLES AND METHODS OF PRESERVATION**

(12)

- Asepsis
- Use of low temperature
- Use of high temperature
- Removal of moisture
- Removal of air
- Use of chemical preservatives
- Fermentation
- Irradiation
- Gas preservation
- Newer methods

Srivastava, R.P. & Kumar, S. (2005). Fruit and Vegetable Preservation. Lucknow: International Book Distributing Co. Chapter 12, pg 85-100

#### **UNIT V: FRUIT AND VEGETABLE PROCESSING – SAUCES AND BEVERAGES** (13)

- Chutney and sauces- definition, method of preservation, steps in preparation of chutney and sauces
- Fruit beverages- definition and classification, method of preservation (with special emphasis on pasteurization, use of chemical preservatives, sugar), role of various ingredients

Srivastava, S.S. (2011). Phal Parirakshan. Lucknow: Kitab Mahal, Chapter 13, pg 339-400; Chapter 17, pg 482-496

Lal, G., Siddhapa, G.S., & Tandon, G.L. (2016). Preservation of Fruits and Vegetables. New Delhi: Indian Council of Agriculture Research, Chapter 9, pg 124-151; Chapter 14, pg 235- 249

**PRACTICALS PERIODS: 60 (CREDITS 2)**

- Sterilization of bottles
- Market survey of preserved fruit and vegetable products
- Preparation, packaging, sensory/objective (TSS, pH) evaluation and costing of:
  - Sauces (chilli sauce and tomato sauce)
  - Ketchup (tomato)
  - Chutney (tomato chutney and imli chutney)
  - Squash (lemon squash, orange squash, pineapple squash)
  - Syrup (rose syrup and almond syrup)
  - Fermented beverage (Kanji)
    - Preparation of labels for preserved foods

#### **COMPULSORY READING:**

- Frazier, W.C. & Westhoff, D.C. (2014). Food Microbiology. Chennai: Tata McGraw-Hill Publishing Company Limited.
- Srivastava, S.S. (2006). Phal Parirakshan. Lucknow: Kitab Mahal.
- Suri, S. & Malhotra, A. (2014). Food Science Nutrition and Safety. Delhi: Pearson India Ltd.

#### **ADDITIONAL RESOURCES:**

- Khurdia, D.S. (1995). Preservation of fruits and vegetables. New Delhi: Indian Council of Agriculture Research.
- Knechtges, L.I. (2012). Food Safety-Theory and Practice, USA: Jones and Barlette Learning.
- Lal, G., Siddhapa, G.S., & Tandon, G.L. (2009). Preservation of Fruits and Vegetables. New Delhi: Indian Council of Agriculture Research.
- Mathur, P. (2018). Food Safety and Quality Control. Delhi: Orient Blackswan.
- Ramaswamy, H. and Marcotte, M. (2009). Food Processing–Principles and Applications. Boca Raton : Taylor and Francis.
- Subbalakshmi, G., & Udipi, S.A. (2007). Food Processing and Preservation. Delhi: New Age International Publishers.
- The Food Safety and Standards Act along with Rules and Regulations. (2011) Delhi:

Commercial Law Publishers (India) Pvt. Ltd.

**WEBSITES:**

- Food Safety and Standards Authority of India. [www.fssai.gov.in](http://www.fssai.gov.in)
- National Center for Home Food Preservation. <http://nchfp.uga.edu/>
- Ministry of Food Processing Industry website <http://mofpi.nic.in/>

**SEMESTER V (LOCF)**

**DSE FT 1: ADVANCED BAKING TECHNOLOGY**

**(CREDITS- THEORY: 4; PRACTICAL: 2)**

**COURSE OBJECTIVES:**

- To impart students with knowledge related to processing of breads, biscuits and cookies.
- To familiarize them with basics of food packaging, marketing and cost control.

**COURSE LEARNING OUTCOMES:**

- Describe the role of ingredients and steps of preparation of bread and biscuits.
- Illustrate techniques of marketing and cost control.
- Compare various food packaging materials and their characteristics.
- Justify label regulations and need for nutritional labeling.
- Demonstrate skills to prepare various kinds of breads and biscuits.
- Conduct sensory evaluation of prepared baked products.
- Perform quality tests of wheat flour and yeast.
- Produce bakery products in bulk and organize an exhibition cum sale.

**THEORY PERIODS: 60 (CREDITS 4)**

**UNIT I: BREAD TECHNOLOGY**

(14)

- Preparation of bread - ingredients used, methods of dough preparation, steps in bread processing, evaluation of the baked bread, staling of bread, diseases of bread



Dubey, S. C. (2016). Basic Baking-Science and Craft. Delhi: Society of Indian Bakers. Unit 1, Chapter 1- 8, pg 8-85

Dubey, S. C. (2009). Bakery Vighan. Delhi: Society of Indian Bakers, Unit 1, Chapter 1-8, pg 3-97

## **UNIT II: BISCUIT AND COOKIES TECHNOLOGY (12)**

- Preparation of biscuits and cookies – types, ingredients, processing and evaluation
- Crackers

Dubey, S. C. (2016). Basic Baking-Science and Craft. Delhi: Society of Indian Bakers. Unit 2, Chapter 6, pg 132- 137

Dubey, S. C. (2009). Bakery Vighan. Delhi: Society of Indian Bakers, Unit 2, Chapter 6, pg 166-174

## **UNIT III: FOOD PACKAGING (14)**

- Packaging – its importance, essential features of an ideal package, various food packaging materials and their characteristics
- Recent trends in the field of packaging (active packaging, intelligent packaging, RFID)
- Label regulations and designing labels for packaged foods, nutritional labeling.

Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers, Chapter 21, pg 478-508

Food Safety and Standards Authority of India: <http://www.fssai.gov.in>

## **UNIT IV: MARKETING AND COST CONTROL (20)**

- Marketing - definition, scope, understanding the 4Ps (Product, Price, Place, Promotion), marketing techniques, marketing and distribution of processed products
  - Cost control – food cost, labour cost and other costs; costing of processed products
- Sethi, M. (2005). Institutional Food Management. Delhi: New Age International Publishers. Chapter 22, pg 381-404; Chapter 32, pg 579- 588

**PRACTICAL PERIODS: 60 (CREDITS 2)**

- Determination of gluten content in refined wheat flour.
- Qualitative assessment of bran content in various wheat flours.
- Determination of dough raising capacity (DRC) of yeast and factors affecting the yeast activity.
  - Preparation and sensory evaluation of breads (white and brown bread), buns and dinner rolls, pizza base.
  - Preparation and sensory evaluation of various biscuits and cookies: Dropped biscuits, Rolled biscuits, Moulded biscuits
  - Preparing any of the baked products in bulk and organizing an exhibition-cum-sale.

#### **COMPULSORY READING:**

- Dubey S. C. (2016). Basic Baking: Science and Craft. Delhi: The Society of Indian Bakers.
- Dubey S. C. (2009). Bakery Vigyan. Delhi: The Society of Indian Bakers.
- Matz A. (2008). Bakery Technology and Engineering. 10th Edition. Delhi: CBS Publishers.

#### **ADDITIONAL RESOURCES:**

- Athalye, A.S. (1992). Plastics in Food Packaging. Delhi: Tata McGraw Hill Publishing Company.
- Booth, G.R. (2003). Snack Foods. Delhi: CBS Publishers.
- Faridi, H. (2004). The Science of Cookie and Crackers Production. Delhi: CBS Publishers.
- Griffin, S. (1997). Principles of Food Packaging. Connecticut: The AVI Publishing Company.
- Ketrappaul, N., Grewal, R.B., Jood, S. (2005). Bakery Science and Cereal Technology. Delhi: Daya Publishing House.
- Khanna, K., Gupta, S., Seth, R., Mahana, R., & Rekhi, T. (2004). The Art and Science of Cooking. Delhi: Phoenix Publishing House Private Limited.
- Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers.

- Raina, U., Kashyap, S., Narula, V., Thomas, S., Suvira, Vir, S., & Chopra, S. (2005). Basic Food Preparation – A Complete Manual. Delhi: Orient Longman.
- Sharma, S., Aggarwal, M. & Sharma, S. (2018). Food Frontiers. Delhi: New Delhi Publishers.
- Sethi, M. (2005). Institutional Food Management. Delhi: New Age International Publishers.

#### **WEBSITES:**

- Food Safety and Standards Authority of India: <http://www.fssai.gov.in>.
- Baking courses: <https://www.udemy.com/topic/baking/>.
- Baking guide: <http://www.reviewlab.com/baking-guide/>.

### **SEMESTER VI (LOCF)**

#### **DSE-FT 2: ADVANCED FRUIT AND VEGETABLE PRESERVATION TECHNOLOGY (CREDITS- THEORY: 4; PRACTICAL: 2)**

#### **COURSE OBJECTIVES:**

- To impart knowledge about fruit and vegetable preservation techniques such as dehydration, canning and freezing.
- To introduce the concept of food product development.
- To equip the students with knowledge and skills for preparing, packaging, evaluating and selling pectin products, preserves and pickles.

#### **COURSE LEARNING OUTCOMES:**

- Describe the different principles and methods of fruit and vegetable preservation and processing.
- Compare preservation techniques such as Dehydration versus Concentration, Refrigeration versus Freezing and also processed products such as Jams and Jellies versus Marmalades.
- Describe the various steps in dehydration, freezing, canning, pectin products, preserves and pickles.

- State the importance and challenges of new food product development and state its types.
- Prepare, package and label jams, jelly, marmalade, pickles and preserves professionally.
- Use sensory evaluation and objective evaluation techniques (TSS, pH) to test these products.
- Produce a preserved product in bulk, calculate the cost and organize an exhibition cum sale.

**THEORY: PERIODS: 60 (CREDITS 4)**

**UNIT I: DEHYDRATION AND CONCENTRATION (16)**

- Dehydration- definition and objectives, method of preservation, normal drying curve, water activity, factors affecting rate of drying, sun drying, types of dehydrators (air convection, drum, freeze and vacuum driers) steps in dehydration of fruits and vegetables

- Concentration- definition and objectives, techniques

Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers, Chapter 10, pg 200-243

Srivastava, S.S. (2006). Phal Parirakshan. Lucknow: Kitab Mahal, Chapter 10, pg 260-305

**UNIT II: REFRIGERATION AND FREEZING (8)**

- Definition and objectives, difference between freezing and refrigeration, systems of refrigeration, method of preservation, steps in freezing fruits and vegetables, cryogenic freezing of fruits and vegetable, evaluation

Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers, Chapter 9, pg 163-199

Srivastava, S.S. (2006). Phal Parirakshan. Lucknow: Kitab Mahal, Chapter 8, pg 174-196, Chapter 11, pg 306-317

**UNIT III: CANNING (9)**

- Definition and objectives, selection of fruits and vegetables, method of preservation, steps of canning fruits and vegetables (with special emphasis on blanching, exhausting and heat processing), spoilage of canned foods

Lal, G., Siddhapa, G.S., & Tandon, G.L. (2009). Preservation of Fruits and Vegetables. New Delhi: Indian Council of Agriculture Research, Chapter 2 - 3, pg 8- 32; Chapter 7, pg 83- 92  
Srivastava, S.S. (2006). Phal Parirakshan. Lucknow: Kitab Mahal, Chapter 9, pg 197-259

#### **UNIT IV: INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT (6)**

- Need and importance for developing a new product, types of new products, challenges, failure of new product

Fuller, Gordon W. (2004). New Product Development- From Concept to Marketplace. Delhi: CRC Press, Chapter 1, pg 1-30; Chapter 3, pg 67-122

#### **UNIT V: FRUIT AND VEGETABLE PROCESSING –PECTIN PRODUCTS, PRESERVES AND PICKLES**

- Jam, Jelly and Marmalade- definition, role of pectin and theory of gel formation, method of preservation, steps of preparation, evaluation. (9)
- Preserves- definition, method of preservation, steps of preparation, evaluation, candied, crystallized and glazed fruits. (6)
- Pickles- definition, classification, method of preservation, steps of preparation of vinegar pickles, evaluation. (6)

Lal, G., Siddhapa, G.S., & Tandon, G.L. (2009). Preservation of Fruits and Vegetables. New Delhi: Indian Council of Agriculture Research, Chapter 11, 12, pg 156- 205; Chapter 14, pg 249- 269

Srivastava, S.S. (2006). Phal Parirakshan. Lucknow: Kitab Mahal, Chapter 14, 15,16, pg 401- 481

#### **PRACTICAL: PERIODS: 60 (CREDITS 2)**

- Preparation, packaging, labeling, sensory/objective (TSS, pH) evaluation and costing of:

Jam (apple jam and mixed fruit jam)

Jelly (guava jelly)

Marmalade (orange marmalade)

Pickle (green chilli, lemon, mixed vegetable)

Preserve (carrot)

Dehydration of vegetables (green leafy vegetables, other vegetables and tubers)

Freezing of vegetables.

- Determination of headspace, total soluble solid content and acidity of different preserved foods.
- Preparing any of the preserved product/new product in bulk and organizing an exhibition-cum-sale.

### **COMPULSORY READING:**

- Potter, N., & Hotchkiss, J.H. (2006). Food Science. Delhi: CBS Publishers.
- Lal, G., Siddhapa, G.S., & Tandon, G.L. (2009). Preservation of Fruits and Vegetables. New Delhi: Indian Council of Agriculture Research.
- Srivastava, S.S. (2006). Phal Parirakshan. Lucknow: Kitab Mahal.

### **ADDITIONAL RESOURCES:**

- Khurdia, D.S. (1995). Preservation of Fruits and Vegetables. New Delhi: Indian Council of Agriculture Research.
- Hui, Y.H., Evaranuz, E.O. (2015). Handbook of Vegetable Processing and Preservation. 2nd Edition. USA: CRC Press.
- Ramaswamy, H. and Marcotte, M. (2009). Food Processing—Principles and Applications. Boca Raton: Taylor and Francis.
- Srilakshmi, B. (2018). Food Science. Seventh Edition. Delhi: New Age Publications.
- Subbalakshmi, G. & Udipi, S.A. (2007). Food Processing and Preservation. Delhi: New Age International Publishers.

### **WEBSITES:**

- National Center for Home Food Preservation. <http://nchfp.uga.edu/>
- Ministry of Food Processing Industry <http://mofpi.nic.in/>