Appendix-11
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INDEX

Department of Home Science

B.A (PROG) WITH FOOD TECHNOLOGY (FT) – SEM(IV/V/VI)

SEMESTER-IV
B.A. (Prog) with Food Technology (FT) as Major
Category-II

DISCIPLINE SPECIFIC CORE COURSE – DSC-7-FT: INTRODUCTION TO FOOD SAFETY

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		
Introduction to Food Safety	4	3	0	1	Class XII	NIL

LEARNING OBJECTIVES:

1. To impart knowledge on basic concepts of food safety.
2. To familiarize the students about common physical, chemical and biological contamination of food.
3. To help students understand the basics of surveillance and sustainability in food processing.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:
1. Explain food safety, principles of hygiene and factors which compromise food safety
2. Appreciate the role of surveillance and sustainability while ensuring food safety
3. Handle food with responsibility
4. Facilitate safe food handling by fellow colleagues in food processing unit

SYLLABUS OF DSC-7-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Unit I: Introduction to Food Safety (15 Hours)

- *Unit Description:* This unit will introduce the students to the concept of food safety and hygiene as well as safety related challenges faced while ensuring processing and handling of food.
- *Subtopics:*
  - Importance of food safety and key terms
  - Factors affecting food safety
  - Emerging concerns of food safety
  - General principles of food hygiene

UNIT III: Biological Hazards in Foods: Microorganisms, Spoilage and its Prevention

(14 Hours)

- *Unit Description:* This unit will help students learn and understand how different types of micro organisms can cause food spoilage which can lead to food poisoning and intoxication to the consumer.
- *Subtopics:*
    - Food hazards of biological origin- bacteria, mold, yeast, viruses and parasites
    - Factors affecting microbial growth in foods.
    - Types of food spoilage, causes and prevention (canned food, milk, water, nuts)
    - Food borne diseases- food infections and food intoxications.
    - Mycotoxins and other toxins produced in foods.

UNIT II: Physical and Chemical Contaminants in Foods (8 Hours)

- *Unit Description:* Contamination is an important cause of unsafe food. In this unit salient physical and chemical contaminants shall be discussed in detail. Secondary contamination shall also be dealt briefly.
- *Subtopics:*
    - Following contaminants and hazards in food and water:
        - Physical Hazards
        - Heavy Metals
        - Pesticide Residues
        - Veterinary Drug Residues
        - Packaging Residues
    - Secondary contamination

Unit IV: National Food Laws and Sustainability (8 Hours)

- *Unit Description:* Governance at national level for ensuring food safety from farm to the consumer's plate will be discussed in this unit. It will also introduce the concept that ensuring food safety is a responsibility which should not compromise the environment.
- *Subtopics:*
    - FSS Act and Regulations (1, 4, 5,7, 13)
    - Consumer Protection Act, 1986
    - Sustainable Hygiene Practices
    - Green Food Processing

PRACTICAL
(Credits 1: 30 Hours)

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

1. Develop a checklist on food hygiene practices.
2. Conduct a survey to study the food hygiene practices in a food processing unit.
3. Develop educational aid on general principles of hygiene as recommended by WHO.
4. College Project by a group of students to maintain good hygiene in college canteen
   OR
   Conduct a food laboratory waste segregation activity by students and demonstration of food waste compost making unit.

5. Identification and removal of physical hazards rice grains, tea leaves, whole wheat flour and pulses.
6. Assessing the pH, TDS and hardness of potable water.
7. Checking the spoilage in milk by making use of MBRT method.
8. Assessing the microbial count by swab method for the workers and cooking surface areas of college canteen.
9. Identification of microbes/parasites by use of prepared slides and specimens.

ESSENTIAL READINGS (Theory and Practical):

- Suri, S and Malhotra, A. (2014). *Food Science, Nutrition and Safety*. Dorling Kindersley Pvt. Ltd. (Pearson) India.
- Mathur, P. (2018). *Food Safety and Quality Control*. Orient Blackswan Private Limited.
- *The Food Safety and Standards Act along with Rules and Regulations*. (2011) Delhi: Commercial Law Publishers (India) Pvt. Ltd.
- Frazier, W.C. and Westhoff, D.C. (2014). *Food Microbiology*. Chennai: Tata McGrawHill Publishing Company Limited.
- Srivastava, S.S. (2006). *Phal Parirakshan*. Lucknow: Kitab Mahal.

SUGGESTED READINGS:

- Boye, J.I. and Arcand, Y. (2012). *Green Technologies in Production and Processing*. First Edition. Springer Nature (USA).
- Kapoor, B., Singh, R., Kapoor, D. and Gautam, V. (2022). *Environmental Sustainability in Food Industry: A Green Perspective*. First Edition. CRC Press (USA).
- Knechtges, L.I. (2012). *Food Safety-Theory and Practice*, USA: Jones and Barlette Learning.

DISCIPLINE SPECIFIC CORE COURSE – DSC-8-FT: BASIC PRESERVATION TECHNOLOGY

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		
Basic Preservation Technology	4	3	0	1	Class XII	Nil

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LEARNING OBJECTIVES:

1. To familiarize the students with food spoilage and their causes.
2. To impart basic knowledge related to principles of food preservation.

3. To introduce the students about applications of food preservation.
4. To develop the skills of processing of chutney, sauces, fruit beverages and pickles.

LEARNING OUTCOMES:

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

1. Describe the purpose and scope of food preservation in Indian economy
2. Explain the different objectives, principles and methods of food preservation
3. Develop safe and hygienic fruits and vegetable-based products like chutneys, sauces, beverages and pickles

SYLLABUS OF DSC-8-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Scope of Food Preservation (6 Hours)

- *Unit Description:* This introductory unit focuses on the scope of food preservation and the objectives of food preservation and processing.
- *Subtopics:*
    - Scope of preservation industry in India
    - Objectives of preservation and processing

UNIT II: Spoilage in Preserved Products (9 Hours)

- *Unit Description:* This unit will lay emphasis on types of food spoilage in different food products as well as factors affecting food spoilage. This unit will also describe various contaminants that can result in food contamination.
- *Subtopics:*
    - Food spoilage and types
    - Causes of spoilage
    - Spoilage in different food products
    - Food contamination

UNIT III: Principles and Methods of Preservation (15 Hours)

- *Unit Description:* This unit will comprise of basic principles and various popular food preservation methods based on these principles.
- *Subtopics:*
    - Basic principles of food preservation
    - Basic Methods of preservation
        - Asepsis
        - Use of low temperature
        - Use of high temperature
        - Removal of moisture

- Removal of air
- Use of preservatives
- Fermentation (Modification of pH)
- Irradiation
- Gas preservation
- Combination of Methods – Hurdle Technology
- Novel Preservation Techniques (HPP, PEF, Ohmic Heating, Irradiation - nomenclature only)

UNIT IV: Basic Fruit and Vegetable Preserved Products (15 Hours)

- *Unit Description:*This unit will describe the preservation methods of different fruits and vegetables based processed products.
- *Subtopics:*
  - Definition, classification, preparation steps and method of preservation of following:
  - Chutneys
  - Sauces
  - Fruit beverages (with special emphasis on pasteurization, use of chemical preservatives, sugar)
  - Pickles

PRACTICAL
(Credits 1: 30 Hours)

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

1. Sterilization of bottles.
2. Market survey of preserved fruit and vegetable products
3. Development of an educational aid on food labelling
4. Preparation, bottling, sensory/objective (TSS, pH) evaluation and costing & Labelling 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*)/ value added beverages
   - Pickles (Lime, Mix Vegetable, Chilli)

ESSENTIAL READINGS (Theory and Practical):

- Rao, E.S., Garg, M. and Barwa, M.S.(2023). *Handbook on Processing and Preservation of Fruits and Vegetables.* 2nd edn. Variety Books Publisher's Distributors, New Delhi
- Frazier, W.C. and Westhoff, D.C. (2014). *Food Microbiology*. Chennai: Tata McGraw Hill Publishing Company Limited.
- Fellows, P.J. (2022). *Food Processing Technology Principles and Practice* (5th ed.). Woodhead Publishing Series in Food Science, Technology and Nutrition. https://doi.org/10.1016/C2019-0-04416-0.
- Rahman, M.S. (Ed.). (2020). *Handbook of Food Preservation* (3rd ed.). CRC Press. https://doi.org/10.1201/9780429091483

- Suri, S. & Malhotra, A. (2014). *Food Science Nutrition and Safety*. Delhi: Pearson India Ltd.
- Sivasankar, B. (2002). *Food Quality, in Food Processing and Preservation*. Prentice-Hall of India Private Limited, New Delhi.
- Srivastava, S.S. (2006). *Phal Parirakshan*. Lucknow: Kitab Mahal.

SUGGESTED READINGS:

- Potter, N.N., and Hotchkiss, J.H. (2012). Food Science (5th ed.). Springer New York, NY. XV, 608. https://doi.org/10.1007/978-1-4615-4985-7.
- Lal, G., Siddhapa, G.S. and Tandon, G.L. (2009). *Preservation of Fruits and Vegetables*. New Delhi: Indian Council of Agriculture Research.
- Subbalakshmi, G., and Udipi, S.A. (2007). *Food Processing and Preservation*. Delhi: New Age International Publishers.
- Khurdia, D.S. (1995). *Preservation of fruits and vegetables*. New Delhi: Indian Council of Agriculture Research.

B.A. (Prog.) with Food Technology (FT) as Non-Major
Category-III

DISCIPLINE SPECIFIC CORE COURSE – DSC-6-FT:
BASIC PRESERVATION TECHNOLOGY

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		
Basic Preservation Technology	4	3	0	1	Class XII	Nil

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LEARNING OBJECTIVES:

1. To familiarize the students with food spoilage and their causes.
2. To impart basic knowledge related to principles of food preservation.
3. To introduce the students about applications of food preservation.
4. To develop the skills of processing of chutney, sauces, fruit beverages and pickles.

LEARNING OUTCOMES:

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

1. Describe the purpose and scope of food preservation in Indian economy
2. Explain the different objectives, principles and methods of food preservation
3. Develop safe and hygienic fruits and vegetable-based products like chutneys, sauces, beverages and pickles

SYLLABUS OF DSC-8-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Scope of Food Preservation (6 Hours)

- *Unit Description:*This introductory unit focuses on the scope of food preservation and the objectives of food preservation and processing.
- *Subtopics:*
  - Scope of preservation industry in India
  - Objectives of preservation and processing

UNIT II: Spoilage in Preserved Products (9 Hours)

- *Unit Description:*This unit will lay emphasis on types of food spoilage in different food products as well as factors affecting food spoilage. This unit will also describe various contaminants that can result in food contamination.

- *Subtopics:*
    - Food spoilage and types
    - Causes of spoilage
    - Spoilage in different food products
    - Food contamination

UNIT III: Principles and Methods of Preservation (15 Hours)

- *Unit Description:*This unit will comprise of basic principles and various popular food preservation methods based on these principles.
- *Subtopics:*
    - Basic principles of food preservation
    - Basic Methods of preservation
        - Asepsis
        - Use of low temperature
        - Use of high temperature
        - Removal of moisture
        - Removal of air
        - Use of preservatives
        - Fermentation (Modification of pH)
        - Irradiation
        - Gas preservation
        - Combination of Methods – Hurdle Technology
        - Novel Preservation Techniques (HPP, PEF, Ohmic Heating, Irradiation - nomenclature only)

UNIT IV: Basic Fruit and Vegetable Preserved Products (15 Hours)

- *Unit Description:* This unit will describe the preservation methods of different fruits and vegetables based processed products.
- *Subtopics:*
    - Definition, classification, preparation steps and method of preservation of following:
    - Chutneys
    - Sauces
    - Fruit beverages (with special emphasis on pasteurization, use of chemical preservatives, sugar)
    - Pickles

PRACTICAL
(Credits 1: 30 Hours)

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

1. Sterilization of bottles.
2. Market survey of preserved fruit and vegetable products
3. Development of an educational aid on food labelling
4. Preparation, bottling, sensory/objective (TSS, pH) evaluation and costing & Labelling 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*)/ value added beverages
- Pickles (Lime, Mix Vegetable, Chilli)

ESSENTIAL READINGS (Theory and Practical):

- Rao, E.S., Garg, M. and Barwa, M.S.(2023). *Handbook on Processing and Preservation of Fruits and Vegetables.* 2nd edn. Variety Books Publisher's Distributors, New Delhi
- Frazier, W.C. and Westhoff, D.C. (2014). *Food Microbiology*. Chennai: Tata McGraw Hill Publishing Company Limited.
- Fellows, P.J. (2022). *Food Processing Technology Principles and Practice* (5th ed.). Woodhead Publishing Series in Food Science, Technology and Nutrition. https://doi.org/10.1016/C2019-0-04416-0.
- Rahman, M.S. (Ed.). (2020). *Handbook of Food Preservation* (3rd ed.). CRC Press. https://doi.org/10.1201/9780429091483
- Suri, S. & Malhotra, A. (2014). *Food Science Nutrition and Safety*. Delhi: Pearson India Ltd.
- Sivasankar, B. (2002). *Food Quality, in Food Processing and Preservation*. Prentice-Hall of India Private Limited, New Delhi.
- Srivastava, S.S. (2006). *Phal Parirakshan*. Lucknow: Kitab Mahal.

SUGGESTED READINGS:

- Potter, N.N., and Hotchkiss, J.H. (2012). *Food Science* (5th ed.). Springer New York, NY. XV, 608. https://doi.org/10.1007/978-1-4615-4985-7.
- Lal, G., Siddhapa, G.S. and Tandon, G.L. (2009). *Preservation of Fruits and Vegetables*. New Delhi: Indian Council of Agriculture Research.
- Subbalakshmi, G., and Udipi, S.A. (2007). *Food Processing and Preservation*. Delhi: New Age International Publishers.
- Khurdia, D.S. (1995). *Preservation of fruits and vegetables*. New Delhi: Indian Council of Agriculture Research.

SEMESTER-V
B.A. (Prog) with Food Technology (FT) as Major
Category-II

DISCIPLINE SPECIFIC CORE – DSC-9-FT:

FOOD PROCESSING: TECHNIQUES AND TECHNOLOGIES

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 Processing: Techniques and Technologies	4	2	0	2	Class XII	NIL

LEARNING OBJECTIVES:

4. To impart theoretical and practical knowledge on basic concepts of salient techniques and technologies used in the food processing industry.
5. To familiarize the students regarding the importance of process control for ensuring efficient application of various techniques/technologies.

LEARNING OUTCOMES:

After completion of the course, the students will be able to:
5. Appreciate the significance of using most appropriate pre-preparation and preparation techniques/technologies for processing a food product
6. Develop analytical skills pertaining to application of food processing techniques and technologies in the industry
7. Train staff associated with food handling at various levels
8. Work in food sector such as food manufacturing, packaging, sale and distribution units at mid-level positions

SYLLABUS OF DSC-9-FT

THEORY
(Credits 2: 30 Hours)

UNIT I: Introduction to material handling and pre-preparation techniques (7 Hours)

- *Unit Description:* This unit will briefly discuss several pre-preparation techniques used in the food industry.
- *Subtopics:*
  - Material handling during receiving and storage.

- Cleaning of food and equipment's (dry, wet, others)
- Separating, grading, sorting
- Mixing, blending, binding, beating, whipping, folding, mashing, stuffing.
- Disintegrating and grinding
- Bleeding, singeing, flaying, trussing, de-scaling, skinning, ageing, curing, filleting.
- Pumping, filtration, centrifugation
- Other pre-preparation techniques: cutting, grating, peeling, stringing, soaking,

UNIT II: Food Processing Techniques and Technology (16 Hours)

- *Unit Description:* High temperature is popularly used while processing a variety of foods. This unit will discuss the principle, advantages, disadvantages and salient techniques, machinery required for processing food using high/low temperature, fermentation and irradiation.

- *Subtopics:*
  - High Temperature: principle (TDT, cold point), advantages, disadvantages, salient heat treatments employed in processing food (<100C, ~100C, >100C), process and heating systems – use of heat before and after packaging, ultra high-pressure systems (autoclaves, steamers and heat exchangers), canning
    - Dehydration: principle (heat mass transfer, a_w, drying curve), advantages, disadvantages, treatment of foods before and after drying, techniques (heated air/heated surface dehydrators), methods of dehydration
    - Concentration: principle, advantages, disadvantages, methods (any five)
    - Extrusion: principle, advantages, disadvantages, methods (hot paste, cold paste), extruders.
  - Low temperature: principle, advantages, disadvantages, process – treatment of foods before, during and after refrigeration/freezing, types (common or cellar storage, chilling or cold storage), types of freezing (direct and indirect contact)
  - Fermentation: principle, advantages, disadvantages, production of culture, maintaining activity of cultures, products obtained from fermentation (food products, nutrients, enzymes)
  - Irradiation: principle, advantages, disadvantages, general process

Unit III: Process Control and Post processing Techniques /Technologies (7 Hours)

- *Unit Description:* Process control is being recognized as an important component for enhancing efficiency and quality in food processing. This unit will discuss the significance and scope of process control as well as about packaging, storing, distribution. It will also help students learn about recent advancements in the field of food processing and packaging.
- *Subtopics:*
  - Process control – role of automation
  - Packaging techniques and technologies: passive, active, intelligent, general packaging process (assembly line)
  - Storing, distribution
  - Recent advancements in food processing and packaging

PRACTICAL
(Credits 2: 60 Hours)

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

10. Learn skill (hands on experience) on various pre-preparation techniques.
11. Study/ compare quality characteristics of foods processed by using high temperature, low temperature, fermentation, irradiation or combination methods.
12. Cut-out analysis of canned food(s)
13. Survey on convenience foods available in nearby local market and identification of processing techniques used in manufacturing them.
14. Learn skill of developing food product(s) using low temperature and/or fermentation as principal method of processing and their packaging.
15. Learn skill of developing food product(s) using low temperature and/or fermentation as principal method of processing and their packaging.
16. Presentation on case study of any one processing technique or technology used traditionally in any food sector or any food industry.
17. Presentation/demonstration on innovative food processing technique or technology of a food ingredient (eg; peeling/extrusion equipment, novel technologies).
    OR
    Prepare an educational audio-visual aid on recent trends in food processing industry.
18. Industry visit(s)
    OR
    Train a group of women/students/canteen workers about any one food processing technique through demonstration of any food product that can be followed at home-based level.

ESSENTIAL READINGS (Theory and Practical):

- Fellows, P.J. (2022). *Food Processing Technology Principles and Pra*ctice (5th ed.). Woodhead Publishing Series in Food Science, Technology and Nutrition. ISBN: 9780323857376. https://doi.org/10.1016/C2019-0-04416-0.
- Rahman, M.S. (Ed.). (2020). *Handbook of Food Preservation* (3rd ed.). CRC Press. https://doi.org/10.1201/9780429091483
- Sharif, Z., Mustapha, F., Jai, J., Mohd Yusof, N., and Zaki, N. (2017). Review on methods for preservation and natural preservatives for extending the food longevity. *Chemical Engineering Research Bulletin*, 19, 145–153. https://doi.org/10.3329/cerb.v19i0.33809
- Suri, S.,and Malhotra, A. (2014). *Food Science Nutrition and Safety*. Delhi: Pearson India Ltd.
- Potter, N.N., and Hotchkiss, J.H. (2012). *Food Science* (5thed.). Springer New York, NY.XV, 608.https://doi.org/10.1007/978-1-4615-4985-7.
- Srivastava, S.S. (2006). *Phal Parirakshan*. Lucknow: Kitab Mahal.
- Sivasankar, B. (2002) *Food Quality, in Food Processing and Preservation*. Prentice-Hall of India Private Limited, New Delhi.

SUGGESTED READINGS:

- Alyward, F.E. (1999). *Food Technology Processing and Laboratory Control*. Allied Scientific Publishers.
- Bali, P.S. (2009). *Food: Production Operations*. First Edition. Oxford University Press.
- Clark, S., Jung, S. & Buddhi. (2022). *Food Processing: Principles and Applications*. First Edition. John Wiley and Sons Inc.
- Geoffrey, C.P. (2009). *Food Science and Technology*. First Edition. Willey-Blackwell.
- Green, J.H. (2009). *Food Processing Industries*. AVI Press.
- Kumar, A. (2019). Food Preservation: Traditional and Modern Techniques. *Acta Scientific Nutritional Health* 3(12) : 45-49
- Murano, P.S. (2003). *Understanding Food Science and Technology*. First Edition. Thomsons Pvt. Ltd.
- Prasad, J. (2022). खाद्य प्रसंस्करण और सुरक्षा विषय. First Edition. Kalyani Publishers.
- Singh, M.K. (2007). *Food Processing*. First Edition. Discovery Publishing House.
- Singh, N. & Singh, I.S. (2018). *Food Science and Technology*. First Edition. Woodhead Publishing House.

DISCIPLINE SPECIFIC CORE – DSC-10-FT: ADVANCED BAKING TECHNOLOGY

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		
Advanced Baking Technology	4	2	0	2	Class XII	Basic Baking Technology

LEARNING OBJECTIVES:

1. To impart students with knowledge related to processing of breads and Cookies.
2. To familiarize them with basics of food packaging, marketing, and cost control.

LEARNING OUTCOMES:

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

1. Skill to prepare various kinds of breads and cookies
2. Illustrate various methods of marketing
3. Compare food packaging materials and their characteristics
4. Prepare food labels and conduct sensory evaluation of prepared baked products
5. Entrepreneurial skill related to bakery products

SYLLABUS OF DSE-10-FT

THEORY
(Credits 2: 30 Hours)

UNIT I: Bread Processing (13 Hours)

- *Unit Description:* This unit describes bread processing and various spoilage occurring in bread and different bread products.
- *Subtopics:*
    - Preparation of bread - Ingredients, methods of bread dough preparation (straight, sponge, salt delayed, sour dough) steps in bread processing, evaluation of the baked bread.
    - Staling of bread, spoilage in bread and control measures.
    - Types of breads (variety of breads, pizza base, buns, dinner rolls, sourdough products).

UNIT II: Cookies, Biscuits and Crackers Processing (05 Hours)

- *Unit Description*: The unit will focus on processing and evaluation of cookies and crackers. It also describes the packaging, storage& labelling of the processed products.
- *Subtopics:*
  Ingredients, types, processing, storage and evaluation.
    - Cookies (Sheet, molded and dropped).
    - Biscuits
    - Crackers.

UNIT III: Food Packaging, Marketing and Cost Control (12 Hours)

- *Unit Description*: This unit describes the FSSAI regulations for food packaging, various food packaging materials, food marketing and cost calculation for processed baked food products.
- *Subtopics:*
    - Packaging – its importance, essential features of an ideal package, food packaging materials for baked products.
    - Food Safety and Standard (Packaging) Regulation, 2018, Food Safety and Standard (Labelling and Display) Regulation, 2020.
    - Marketing - definition and importance, marketing strategies (wholesale, retail, digital, swot and market mix) understanding the difference between marketing and sales, 4Ps of marketing (Product, Price, Place, Promotion) and distribution.
    - Cost control – cost components (material cost, labour cost and miscellaneous costs).

PRACTICAL
(Credits 2: 60 Hours)

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

1. Determination of gluten content in refined wheat flour.
2. Determination of dough raising capacity (DRC) of yeast and factors affecting the yeast activity.

3. Designing labels for baked products.
4. Preparation and sensory evaluation, packaging and costing of breads:
    - White and brown bread
    - Buns
    - Dinner rolls
    - Pizza base
5. Preparation and sensory evaluation, packaging and costing of cookies:
    - Dropped cookies
    - Rolled cookies
    - Molded cookies
6. Preparing any of the baked products in bulk and organizing an exhibition-cum sale.

ESSENTIAL READINGS (Theory and Practical):

- 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.
- Kirar, I. (2021). *Textbook of Culinary and Bakery World*, I K International Publishing House Pvt Ltd.
- *Food Safety and Standards Authority of India*: http://www.fssai.gov.in(accessed on 17.3.2023)
- Sethi, M. (2005). *Institutional Food Management*. Delhi: New Age International Publishers.
- Food Safety and Standard (Labeling and Display) Regulation, 2020 https://www.fssai.gov.in/upload/notifications/2020/12/5fd87c6a0f6adGazette_Notification_Labelling_Display_14_12_2020.pdf (accessed on 17.3.2023)
- Food Safety and Standard (Packaging) Regulation, 2018 https://www.fssai.gov.in/upload/uploadfiles/files/Gazette_Notification_Packaging_03_01_2019.pdf (accessed on 17.3.2023)

SUGGESTED READINGS:

- 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.
- Khetrapal, N., Grewal, R.B., and Jood, S. (2005). Bakery Science and Cereal Technology. Delhi: Daya Publishing House.
- Khanna, K., Gupta, S., Seth, R., Mahana, R., and Rekhi, T. (2004). *The Art and Science of Cooking*. Delhi: Phoenix Publishing House Private Limited.
- Potter, N., and Hotchkiss, J.H. (2006). *Food Science*. Delhi: CBS Publishers.
- Raina, U., Kashyap, S., Narula, V., Thomas, S., Suvira, Vir, S., and 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.
- Radhakrishnan, S. (2016). *A Guide To Baking Process:* Write And Print Publications.
- Cauvain, S.P. (2003). *Bread Making Improving Quality*: Elsevier.
- Baking courses: https://www.udemy.com/topic/baking/.(accessed on 17.3.2023)
- Baking guide: http://www.reviewlab.com/baking-guide/.(accessed on 17.3.2023)

B.A. (Prog.) with Food Technology (FT) as Non-Major
Category-III

DISCIPLINE SPECIFIC CORE – DSC-10-FT:
ADVANCED BAKING TECHNOLOGY

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		
Advanced Baking Technology	4	2	0	2	Class XII	Basic Baking Technology

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LEARNING OBJECTIVES:

3. To impart students with knowledge related to processing of breads and Cookies.
4. To familiarize them with basics of food packaging, marketing, and cost control.

LEARNING OUTCOMES:

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

6. Skill to prepare various kinds of breads and cookies
7. Illustrate various methods of marketing
8. Compare food packaging materials and their characteristics
9. Prepare food labels and conduct sensory evaluation of prepared baked products
10. Entrepreneurial skill related to bakery products

SYLLABUS OF DSE-10-FT

THEORY
(Credits 2: 30 Hours)

UNIT I: Bread Processing **(13 Hours)**

- *Unit Description:* This unit describes bread processing and various spoilage occurring in bread and different bread products.
- *Subtopics:*
  - Preparation of bread - Ingredients, methods of bread dough preparation (straight, sponge, salt delayed, sour dough) steps in bread processing, evaluation of the baked bread.
  - Staling of bread, spoilage in bread and control measures.
  - Types of breads (variety of breads, pizza base, buns, dinner rolls, sourdough products).

UNIT II: Cookies, Biscuits and Crackers Processing (05 Hours)

- *Unit Description*: The unit will focus on processing and evaluation of cookies and crackers. It also describes the packaging, storage& labelling of the processed products.
- *Subtopics:*
  Ingredients, types, processing, storage and evaluation.
  - Cookies (Sheet, molded and dropped).
  - Biscuits
  - Crackers.

UNIT III: Food Packaging, Marketing and Cost Control (12 Hours)

- *Unit Description*: This unit describes the FSSAI regulations for food packaging, various food packaging materials, food marketing and cost calculation for processed baked food products.
- *Subtopics:*
  - Packaging – its importance, essential features of an ideal package, food packaging materials for baked products.
  - Food Safety and Standard (Packaging) Regulation, 2018, Food Safety and Standard (Labelling and Display) Regulation, 2020.
  - Marketing - definition and importance, marketing strategies (wholesale, retail, digital, swot and market mix) understanding the difference between marketing and sales, 4Ps of marketing (Product, Price, Place, Promotion) and distribution.
  - Cost control – cost components (material cost, labour cost and miscellaneous costs).

PRACTICAL
(Credits 2: 60 Hours)

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

7. Determination of gluten content in refined wheat flour.
8. Determination of dough raising capacity (DRC) of yeast and factors affecting the yeast activity.
9. Designing labels for baked products.
10. Preparation and sensory evaluation, packaging and costing of breads:
    - White and brown bread
    - Buns
    - Dinner rolls
    - Pizza base
11. Preparation and sensory evaluation, packaging and costing of cookies:
    - Dropped cookies
    - Rolled cookies
    - Molded cookies
12. Preparing any of the baked products in bulk and organizing an exhibition-cum sale.

ESSENTIAL READINGS (Theory and Practical):

- 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.

- Kirar, I. (2021). *Textbook of Culinary and Bakery World*, I K International Publishing House Pvt Ltd.
- *Food Safety and Standards Authority of India*: http://www.fssai.gov.in(accessed on 17.3.2023)
- Sethi, M. (2005). *Institutional Food Management*. Delhi: New Age International Publishers.
- Food Safety and Standard (Labeling and Display) Regulation, 2020 https://www.fssai.gov.in/upload/notifications/2020/12/5fd87c6a0f6adGazette_Notification_Labelling_Display_14_12_2020.pdf (accessed on 17.3.2023)
- Food Safety and Standard (Packaging) Regulation, 2018 https://www.fssai.gov.in/upload/uploadfiles/files/Gazette_Notification_Packaging_03_01_2019.pdf (accessed on 17.3.2023)

SUGGESTED READINGS:

- 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.
- Khetrapal, N., Grewal, R.B., and Jood, S. (2005). Bakery Science and Cereal Technology. Delhi: Daya Publishing House.
- Khanna, K., Gupta, S., Seth, R., Mahana, R., and Rekhi, T. (2004). *The Art and Science of Cooking*. Delhi: Phoenix Publishing House Private Limited.
- Potter, N., and Hotchkiss, J.H. (2006). *Food Science*. Delhi: CBS Publishers.
- Raina, U., Kashyap, S., Narula, V., Thomas, S., Suvira, Vir, S., and 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.
- Radhakrishnan, S. (2016). *A Guide To Baking Process:* Write And Print Publications.
- Cauvain, S.P. (2003). *Bread Making Improving Quality*: Elsevier.
- Baking courses: https://www.udemy.com/topic/baking/.(accessed on 17.3.2023)
- Baking guide: http://www.reviewlab.com/baking-guide/.(accessed on 17.3.2023)

SEMESTER-VI

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

Category-II

DISCIPLINE SPECIFIC CORE – DSC- 11-FT: FOOD JOURNALISM

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 Journalism	4	3	0	1	Class XII	NIL

LEARNING OBJECTIVES:

1. To make students understand the concept food writing and types and role of food media and culture.
2. To familiarize students with the characteristics of a food writer and develop the content writing style.
3. To develop in students the skills required to be a food critic and reviewer.

LEARNING OUTCOMES:

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

1. Write articles for newspaper, magazine, commercial co-operations and social media
2. Develop the skill of being a food critic and reviewer
3. Enhance ability related to food photography and investigative food journalism
4. Communicate about food effectively through writing and multimedia storytelling

SYLLABUS OF DSC-11-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Introduction to Food Journalism **(12 Hours)**

- *Unit Description:* This unit is an introduction to food journalism, its characteristics and discusses about all kinds of food writing, from memoir to blogging to cookbooks.
- *Subtopics:*
  - Food Writing: What is food journalism, types of food writing.
  - Characteristics of a food writer
  - Content writing style
  - Storytelling and creating your own voices.

UNIT II: Reviews and Food Critics **(12 Hours)**

- *Unit Description:* This unit is about food critics, skills required to be a food critic and

reviewer. The unit also has focus on investigative food journalism.

- *Subtopics:*
  - Food critic: Who is a food critic do, types of food critic, skill required for food critic, benefits of being a food critic.
  - Restaurant critics and reviewer
  - Investigative food journalism: food industrialism, Scams and scandals, controversial health studies

UNIT III: Food Media and Culture (12 Hours)

- *Unit Description:* This unit will focus on basic concepts of food writing and photography for various print, social and broadcast media.
- *Subtopics:*
  - Recipe writing (newspaper, magazine, commercial co-operations)
  - Food photography (pixel, camera handling)
  - Technical and Cultural role of social media (Writing on Food Systems and Future, Food in relation with diet and health)
  - Food advertisement, marketing and messaging, business email writing
  - Food TV shows
  - Food trends (Food and Instagram, Blogging and Vlogging)

Unit IV: Media Law and Ethics (9 Hours)

- *Unit Description:* This unit will focus on media pillars, *fssai* food advertisement related regulations and CPA 2019 Act. The unit also discusses media ethics and major acts in media.
- *Subtopics:*
  - Media as 4 pillars and 4 estates
  - Food Advertising Regulation and Consumer Protection in India 2019
  - Food Safety and Standards (Advertising and Claims) Regulations 2018
  - 5 ethics of Journalism (Association of Food Journalists' Code of Ethics)
  - Major Acts in Media

PRACTICAL
(Credits 1: 30 Hours)

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

1. Write a long paragraph about eating a favorite piece of fruit/ passion about food, using all the senses
2. Write a paragraph about food utility objects (e.g. coffee mug: why do you love it, its specialty etc.)
3. Write a recipe for your favorite sandwich/ dish or write a 250-word review of the best restaurant meal you have eaten recently
4. Conduct a survey of a home scale level food business and report writing of the same.
5. Write an article on food fashion/ trends/ food fusion/ we are what we eat/ good eating practices.
6. Food photography (State food/ International and National foods)
7. Conduct an interview of a food blogger/ chef/ restaurant manager/ canteen vendor/ food entrepreneur.

ESSENTIAL READINGS (Theory and Practical):

- Siniauer, P. (2016). *Writing About Food- A Guide to Good Food Journalism. European* Journalism–*Fellowships*. 2014 – 2015, Freie Universität Berlin. https://www.hssaatio.fi/wp-content/uploads/2015/07/Siniauer_WRITE-ABOUT-FOOD-a-guide-to-good-food-journalism.pdf (accessed on 17.3.2023)
- Jacob, D. (2021). *Will Write for Food: The Complete Guide to Writing Cookbooks, Blogs, Reviews Memoir And More*. 4th edition, Da Capo Lifelong Books
- https://www.livelaw.in/columns/food-safety-and-standards-authority-fssai-food-advertising-consumer-protection-act-212421(accessed on 17.3.2023)
- https://www.poynter.org/ethics-trust/2021/association-of-food-journalists-code-of-ethics/(accessed on 17.3.2023)

SUGGESTED READINGS:

- Gabrielle, H. Killingsworth, S. (2021). *The Best American Food Writing*.HarperCollins Publishers LLC. Boston, New York.
- Sanghvi Vir. (2019). *The Indian Pantry: The Very Best of Rude*. Penguin publisher, India https://www.amazon.in/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Sanghvi+Vir&search-alias=stripbooks
- Neelamalar, M. (2010). *Media Law and Ethics*. PHI Learning Pvt Ltd, New Delhi. (ISBN 9788120339743)

DISCIPLINE SPECIFIC CORE – DSC-12-FT: ADVANCED PRESERVATION TECHNOLOGY

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		
Advanced Preservation Technology	4	3	0	1	Class XII Pass	Basic Preservation Technology

LEARNING OBJECTIVES:

1. To impart knowledge about advanced preservation techniques such as dehydration, canning and freezing.
2. To equip the students with knowledge and skills for preparing, packaging, evaluating and marketing of preserved pectin products and preserves.

COURSE OUTCOMES:

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

1. Describe the different principles and methods of fruit and vegetable preservation and processing

2. Compare different advanced preservation techniques such as dehydration, concentration, refrigeration and freezing
3. Describe the various steps in dehydration, freezing, canning, pectin products and preserves
4. Prepare, evaluate, package and market jams, jelly, marmalade, and preserves professionally

SYLLABUS OF DSC-12-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Canning/ Hermetic Preservation (10 Hours)

- *Unit Description:* This unit will focus on the purpose of preservation via canning/hermetic sealing and packaging which is termed as the father of preservation.
- *Subtopics:*
  - Definition and objectives of canning
  - Principle of Preservation, steps of canning of fruits and vegetables (with special emphasis on blanching, exhausting and heat processing)
  - Spoilage of canned foods
  - Packaging

UNIT II: Refrigeration and Freezing (9 Hours)

- *Unit Description*: This unit will focus on the technique of Freezing and Refrigeration as a means of Preservation.
- *Subtopics*:
  - Definition and objectives of Refrigeration and Freezing
  - Principles of Refrigeration and Freezing
  - Methodology of Refrigeration and Freezing of fruits and vegetables
  - Cryogenic Freezing
  - Evaluation of Refrigerated and Frozen foods
  - Cold Storage and Cellars

UNIT III: Dehydration (8 Hours)

- *Unit Description*: This unit will focus on the technique of dehydration and concentration as a means of preservation.
- *Subtopics:*
  - Dehydration- definition and objectives
  - Method of preservation, normal drying curve, water activity, factors affecting rate of drying,
  - Sun drying,
  - Types of dehydration techniques and steps involved.
  - Concentration- definition and objectives, techniques
  - Rehydration

UNIT IV: Fruit and Vegetable Processing –Pectin Products, and Preserves (18 Hours)

- *Unit Description:* This unit will focus on the processing of jam, jelly, marmalades, preserves and pickles.

- *Subtopics:*
    - Jam, Jelly and Marmalade- definition, role of pectin and theory of gel formation
    - Method of preservation, steps of preparation and evaluation of jam, jelly and marmalade
    - Preserves- definition of candied, crystallized and glazed fruits.
    - Principle of preservation, steps of preparation and evaluation of candied, crystallized and glazed fruits

PRACTICAL
(Credits 1: 30 Hours)

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

Preparation, packaging, labelling, sensory/objective (TSS, pH and headspace) evaluation and costing of:

1. Jam (apple jam and mixed fruit jam)
2. Jelly (guava jelly)
3. Marmalade (orange marmalade)
4. Preserve (carrot)
5. Dehydration of vegetables (green leafy vegetables, other vegetables and tubers)
6. Rehydration of dehydrated vegetables
7. Freezing of vegetables
8. Preparing any of the preserved product/new product in bulk and organizing an exhibition-cum-sale.

ESSENTIAL READINGS (Theory and Practical):

- Rao, E.S., Garg, M. and Barwa, M.S.(2023). *Handbook on Processing and Preservation of Fruits and Vegetables.* 2nd edn. Variety Books Publisher's Distributors, New Delhi
- Potter, N., and Hotchkiss, J.H. (2006). *Food Science*. Delhi: CBS Publishers.
- Lal, G., Siddhapa, G.S., andTandon, G.L. (2009). *Preservation of Fruits and Vegetables*. New Delhi: Indian Council of Agriculture Research.
- Srivastava, S.S. (2006). *PhalParirakshan*. Lucknow: Kitab Mahal.
- Barba, F. J., Ahrné, L., Xanthakis, E., Landerslev, M. G., andOrlien, V. (2018). Innovative technologies for food preservation. In: *Innovative Technologies for Food Preservation* (pp. 25-51). Academic Press.
- Board, N. P. C. S. (2012). *Modern Technology on Food Preservation*. Asia Pacific Business Press Inc.
- Goyal, MR., Mishra, S.K., and Birwal, P. (2022). *Food Processing and Preservation Technologies – advances, methods and applications*. New York: Apple Academic Press.

SUGGESTED READINGS:

- Khurdia, D.S. (1995). *Preservation of Fruits and Vegetables*. New Delhi: Indian Council of Agriculture Research.
- Hui, Y.H., and Evaranuz, E.O. (2015). *Handbook of Vegetable Processing and Preservation*. 2nd Edition. USA: CRC Press.
- Sharma, S. (2010). *Postharvest Management and Processing of Fruits and Vegetables*: Instant Notes. New India Publishing Agency.
- 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. andUdipi, S.A. (2007). Food Processing and Preservation. Delhi: New Age International Publishers.

B.A. (Prog.) with Food Technology (FT) as Non-Major
Category-III

DISCIPLINE SPECIFIC CORE – DSC-12-FT: ADVANCED PRESERVATION TECHNOLOGY

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		
Advanced Preservation Technology	4	3	0	1	Class XII Pass	Basic Preservation Technology

LEARNING OBJECTIVES:

1. To impart knowledge about advanced preservation techniques such as dehydration, canning and freezing.
2. To equip the students with knowledge and skills for preparing, packaging, evaluating and marketing of preserved pectin products and preserves.

COURSE OUTCOMES:

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

1. Describe the different principles and methods of fruit and vegetable preservation and processing.
2. Compare different advanced preservation techniques such as dehydration, concentration, refrigeration and freezing.
3. Describe the various steps in dehydration, freezing, canning, pectin products and preserves.
4. Prepare, evaluate, package and market jams, jelly, marmalade, and preserves professionally.

SYLLABUS OF DSC-12-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Canning/ Hermetic Preservation (10 Hours)

- *Unit Description:* This unit will focus on the purpose of preservation via canning/hermetic sealing and packaging which is termed as the father of preservation.
- *Subtopics:*
  - Definition and objectives of canning
  - Principle of Preservation, steps of canning of fruits and vegetables (with special emphasis on blanching, exhausting and heat processing)
  - Spoilage of canned foods
  - Packaging

UNIT II: Refrigeration and Freezing (9 Hours)

- *Unit Description*: This unit will focus on the technique of Freezing and Refrigeration as a means of Preservation.
- *Subtopics*:
  - Definition and objectives of Refrigeration and Freezing
  - Principles of Refrigeration and Freezing
  - Methodology of Refrigeration and Freezing of fruits and vegetables
  - Cryogenic Freezing
  - Evaluation of Refrigerated and Frozen foods
  - Cold Storage and Cellars

UNIT III: Dehydration (8 Hours)

- *Unit Description*: This unit will focus on the technique of dehydration and concentration as a means of preservation.
- *Subtopics:*
  - Dehydration- definition and objectives
  - Method of preservation, normal drying curve, water activity, factors affecting rate of drying,
  - Sun drying,
  - Types of dehydration techniques and steps involved.
  - Concentration- definition and objectives, techniques
  - Rehydration

UNIT IV: Fruit and Vegetable Processing –Pectin Products, and Preserves (18 Hours)

- *Unit Description:* This unit will focus on the processing of jam, jelly, marmalades, preserves and pickles.
- *Subtopics:*
  - Jam, Jelly and Marmalade- definition, role of pectin and theory of gel formation
  - Method of preservation, steps of preparation and evaluation of jam, jelly and marmalade
  - Preserves- definition of candied, crystallized and glazed fruits.
  - Principle of preservation, steps of preparation and evaluation of candied, crystallized and glazed fruits.

PRACTICAL
(Credits 1: 30 Hours)

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

Preparation, packaging, labelling, sensory/objective (TSS, pH and headspace) evaluation and costing of:

1. Jam (apple jam and mixed fruit jam)
2. Jelly (guava jelly)
3. Marmalade (orange marmalade)
4. Preserve (carrot)
5. Dehydration of vegetables (green leafy vegetables, other vegetables and tubers)
6. Rehydration of dehydrated vegetables

7. Freezing of vegetables
8. Preparing any of the preserved product/new product in bulk and organizing an exhibition-cum-sale.

ESSENTIAL READINGS (Theory and Practical):

- Rao, E.S., Garg, M. and Barwa, M.S.(2023). *Handbook on Processing and Preservation of Fruits and Vegetables.* 2nd edn. Variety Books Publisher's Distributors, New Delhi
- Potter, N., and Hotchkiss, J.H. (2006). *Food Science*. Delhi: CBS Publishers.
- Lal, G., Siddhapa, G.S., and 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.
- Barba, F. J., Ahrné, L., Xanthakis, E., Landerslev, M. G., and Orlien, V. (2018). Innovative technologies for food preservation. In: *Innovative Technologies for Food Preservation* (pp. 25-51). Academic Press.
- Board, N. P. C. S. (2012). *Modern Technology on Food Preservation*. Asia Pacific Business Press Inc.
- Goyal, MR., Mishra, S.K., and Birwal, P. (2022). *Food Processing and Preservation Technologies – advances, methods and applications*. New York: Apple Academic Press.

SUGGESTED READINGS:

- Khurdia, D.S. (1995). *Preservation of Fruits and Vegetables*. New Delhi: Indian Council of Agriculture Research.
- Hui, Y.H., and Evaranuz, E.O. (2015). *Handbook of Vegetable Processing and Preservation*. 2nd Edition. USA: CRC Press.
- Sharma, S. (2010). *Postharvest Management and Processing of Fruits and Vegetables: Instant Notes*. New India Publishing Agency.
- 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. and Udipi, S.A. (2007). *Food Processing and Preservation*. Delhi: New Age International Publishers.

B.A. (Prog) with Food Technology (FT) as Major & Non-Major
Pool DSE: Odd Semester

DISCIPLINE SPECIFIC ELECTIVE COURSE – DSE-1-FT:
CEREAL AND PULSE TECHNOLOGY

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		
Cereal and Pulse Technology	4	3	0	1	Class XII Pass	NIL

LEARNING OBJECTIVES:

1. To acquaint students with various types of indigenous grains available.
2. To impart knowledge regarding post-harvest technology of various cereals, millets and pulses.
3. To acquaint students with processing of cereals, millets and pulses with principles, mechanism and machinery involved.

COURSE OUTCOMES:

After completion of the course the students will be able to -
1. Understand basic composition and structure of food grains.
2. Understand the basics of milling operations and storage of grains.
3. Learn processing of food grains into value added products.
4. Access the physical and cooking properties of cereals, millets and pulses**.**

SYLLABUS OF DSE-1-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Introduction to Cereals, Millets and Pulses (7 Hours)

- *Unit Description:* This unit will introduce the students to various grains in Indian context with its production, utilization, availability and grading standards.
- *Subtopics:*
  - General introduction
  - Production and utilization trends
  - Grain classification
    - Classification of cereals, pulses and millets
    - Market varieties of various grains available in India

- Grading standards of various grains

UNIT II: Staple Grain Processing (18 Hours)

- *Unit Description:* This unit will focus on various aspects pertaining to the composition and processing of staple cereals with the related processed products.
- *Subtopics:*
  - Structure, physico-chemical properties of staple grains (wheat, rice, corn)
  - Wheat processing
    - Cleaning, tempering, conditioning and milling of wheat
    - Flour treatments (bleaching, maturing) and grading
    - Wheat products (Wheat flour, semolina, dahlia)
  - Rice processing
    - Milling and parboiling of paddy
    - Curing and ageing of paddy and rice; cooking and storage qualities of raw and parboiled rice
    - Rice products (Polished rice, Brown rice, popped, puffs, rice rawa, rice flour)
  - Corn processing
    - Dry and wet milling
    - Starch and its conversion products and processed corn products (popped corn, corn flakes etc.)

UNIT III: Coarse grain and Millet Processing (10 Hours)

- *Unit Description:* This unit describes the composition and processing of coarse grains and millets with their respective products.
- *Subtopics:*
  - Oats Processing
  - Physico-chemical properties and composition of millets
  - Primary processing operations of millets
  - Coarse grain and millet processed products.

UNIT IV: Pulse Processing (10 Hours)

- *Unit Description:* This unit will focus on composition and processing of pulses with its respective products.
- *Subtopics:*
  - Structure, physico-chemical properties and composition of pulses and legumes
  - Traditional and modern milling methods
  - Soybean Processing
  - Products and by-products of pulse milling

PRACTICAL
(Credits 1: 30 Hours)

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

1. Physical properties of staple grains (seed weight, seed volume, seed density and hydration capacity)
2. Physical properties of millets (seed weight, seed volume, seed density and hydration capacity)

3. Cooking parameters of rice (water uptake ratio, gelatinization temperature)
4. Popping of grains (wheat/rice/corn/millets)
5. Product preparation from pulses (cleaning, soaking, drying, de-husking, product preparation)
6. Preparation of amylase rich/malt flour from grains
7. Visit to a cereal/pulse processing plant.

ESSENTIAL READINGS (Theory and Practical):

- Rosentrater, K. A., and Evers, A. D. (2017). *Kent's Technology of Cereals: An Introduction for Students of Food Science and Agriculture*. Woodhead Publishing.
- Rice Milling Manual by IRRI. http://www.knowledgebank.irri.org/ericeproduction/PDF_&_Docs/Teaching_Manual_Rice_Milling.pdf(accessed on 17.3.2023)
- Kate, A. and Singh, A. (2021). Processing Technology for Value Addition in Millets. In: Kumar, A., Tripathi, M.K., Joshi, D., Kumar, V. (eds) *Millets and Millet Technology*. Springer, Singapore. https://doi.org/10.1007/978-981-16-0676-2_11(accessed on 17.3.2023)
- Chapke et al. 2020. Latest millet production and processing technologies. Indian Institute of Millet Research. https://www.millets.res.in/farmer/Latest_Millet_English_Full_Book_2020.pdf
- Potter, N. N., and Hotchkiss, J. H. 2012. *Food Science*. Springer Science and Business Media.
- Williams, P.C.; Nakoul, H. and Singh, K.B. (1983). Relationship between cooking time and some physical characteristics in chickpea (Cicer arietinum L.). *J. Fd. Sci. Agric*. 34: 492-495.
- Oko, A.O., Ubi, B.E., Efisue, A.A. and Dambaba, N. (2012). Comparative analysis of the chemical nutrient composition of selected local and newly introduced rice varieties grown in Ebonyi state of Nigeria. *International Journal of Agriculture and Forestry*. 2(2): 16-23.
- Chandra, S. and Samsher, L. (2013). Assessment of Functional Properties of Different Flours. *African Journal of Agricultural Research*, 8, 4849-4852.
- https://egyankosh.ac.in/bitstream/123456789/45848/1/Experiment-12.pdf(accessed on 17.3.2023)
- http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5933(accessed on 17.3.2023)
- Nwosu, J.N.; Owuamanam, C.I., Omeire, G.C. and Eke, C.C. (2014). Quality parameters of bread produced from substitution of wheat flour with cassava flour using soybean as an improver. *American J. Res. Commu*., 2 (3): 99-118.

SUGGESTED READINGS:

- Davis, J. G. (1982). *Food Science and Technology*: By Magnus Pyke, revised and enlarged by LelioParducci. John Murray, London, 304 pp
- Chakraverty, A., Raghavan, G. S. V., & Ramaswamy, H. S. (2003). *Handbook of post-harvest technology*. Marcel Dekker, Inc
- Hoseney, R. C. and Delcour J. A. (2010). *Principles of Cereal Science and Technology* (No. Ed. 3). American Association of Cereal Chemists (AACC).
- Dendy DAV and Dobraszczyk BJ. (2001). *Cereal and Cereal Products*. Aspen
- Karl, K. (2000). *Handbook of Cereal Science and Technology*. 2nd Rev. Edition. CRC Press
- Matthews, R. H. (1989). *Legumes: Chemistry, Technology, and Human Nutrition*. American Association of Cereal Chemists (AACC).
- Sethi, P. and Lakra, P. (2015). *Aahar Vigyan, Poshan Evam Suraksha*. Delhi: Elite Publishing House Pvt. Ltd.
- Sahay, K.M. and K.K. Singh. (1994). *Unit Operations in Agricultural Processing*, Vikas Publishing House Pvt. Ltd., New Delhi, p.340.

DISCIPLINE SPECIFIC ELECTIVE – DSE-3-FT: FOOD CULTURAL PERSPECTIVES

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 Cultural Perspectives	4	3	0	1	Class XII Pass	NIL

LEARNING OBJECTIVES:

1. To make students aware of the rich cultural food heritage of India.
2. To make students understand the importance of food in social events and the intercultural communications.

LEARNING OUTCOMES:

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

1. Understand the factors influencing the diversity in diets of India
2. Comprehend the Indian rich cultural parameters related to food during various community and family social occasions and events
3. Have knowledge regarding variation in Indian food as per the religion
4. Get acquainted with the various myths, beliefs and intercultural communications related to diverse Indian food culture

SYLLABUS OF DSE-3-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Introduction: Influences on Food and Food Habits (10 Hours)

- *Unit Description:* This unit is about food culture around the world and the varied factors influencing the Indian food cultural practices.

- *Subtopics:*
  - Introduction, Early food habits, Food around the world – current scenario
  - Agricultural developments over the years
  - Factors influencing diets- geography, environmental factors (water, climate, soil, weather, natural calamities), trade, war and peace.

UNIT II: Cultural Parameters (10 Hours)

- *Unit Description:* This unit is about the importance and type of food offered on various special occasions and events in Indian society.

- *Subtopics:*
    - Birth and Death
    - Architecture/Housing
    - Language
    - Lifestyle
    - Art and literature
    - Immigration/travel
    - Festivals, special occasions and events

UNIT III: Identity of Food - Religion, beliefs, myths (15 Hours)

- *Unit Description:* The unit describes the Indian food cultural diversity according to the varied religions of India and the common food myths and beliefs.

- *Subtopics:*
    - Food habits and practices – Hinduism, Jainism, Buddhism, Muslim, Christianity
    - Common food myths and beliefs

Unit IV: Food - Intercultural Communications (10 Hours)

- *Unit Description:* This unit will discuss the effect of customs, traditions, culture on the way food is cooked, served, consumed and associated with.

- *Subtopics:*
    - Language (mother tongue)
    - Body language and Customs
    - Food attitude and traditions
    - Cultural differences – food-based practices.
    - Food – a mode of communicating at international level/other social functions of food

PRACTICAL
(Credits 1: 30 Hours)

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

1. Preparation of types of questionnaires for interview/ survey.
2. Exploring the menu of various cultural food outlets around your locality.
3. Identify and compare the two diverse Indian regional meals/ cuisines.
4. Identify and present the *PRASADAM* and its cultural importance at various Indian religious places.

   OR

   Prepare a brief report/ Power Point Presentation (PPT) on FSSAI initiative BHOG (Blissful Hygienic Offering to God).
5. Explore and present Food as Medicine in Indian literature.

6. Organize Indian regional cuisine Exhibition/ competition/ Quiz in your institution.
7. Critically evaluate any Indian folk tale/song w.r.t food cultural behaviour.

   OR

   Write a critique on magazine and newspaper articles pertaining to Indian cultural food habits and patterns.
8. Visit to food fair.

ESSENTIAL READINGS (Theory and Practical):

- McWilliams, M. (2015). *Food Around the World: A Cultural Perspective*. Fourth Edition. Pearson Education Inc.
- Srinivas, T. (2011). *Exploring Indian Culture through Food. Food, Culture and Asia*; 16(3): 38-41.
- Sen, C.T. (2004). *Food Culture in India*. Greenwood Press.
- Nandrajog, H. andSuri, S. (2021). *The Saga of Food: Reflections on Technology and Culture*. International Book House.

SUGGESTED READINGS:

- Szanto, D., Battista, A.D. and Knezevic, I. (2022). *Food Studies: Matter, Meaning and Movement*. Food Studies Press.
- Kittler, P.G. andSucher, K.P. (2008). *Food and Culture*. Fifth Edition. Thomson Wadsworth Publishing.
- Albala, K. (2013). *Food: A Cultural Culinary History*. The Great Courses.
- Acharya, K.T. (2000). *Indian Food: A Historical Comparison*. Oxford Press.
- Bhushi, K. (2018). *Farm to Fingers: The Culture and Politics of Food in Contemporary India*. First Edition. Cambridge University Press.
- Lonely, P. (2001). *World Food: India.* Lonely Planet Oakland.
- Ali, E., Naquiah, N. andNizar, A. (2018). *Preparation and Processing of Cultural Food*. First edition. Woodhead Publishing House (Elsevier).

DISCIPLINE SPECIFIC ELECTIVE – DSE-5-FT:
OPERATIONAL LEADERSHIP AND MANAGEMENT: FOOD INDUSTRY

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		
Operational Leadership and Management	4	3	0	1	Class XII Pass	NIL

LEARNING OBJECTIVES:

1. To understand the basic concepts related to operational leadership and management.
2. To know the characteristics of a good leader and effective leadership in variable situations.
3. To be able to conceptualize the role and responsibilities of a manager in various unit operations in food industry.

LEARNING OUTCOMES:

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

1. Gain the skills of operational leadership and management in food handling and processing
2. Develop strategic plan of action which can support principles and framework of operational management
3. Work in a lead role for managing unit operations/assembly lines in food processing units and various food businesses.

SYLLABUS OF DSE-5-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Introduction **(8 Hours)**

- *Unit Description:* This chapter will introduce to the students to the concept of operational leadership and management, the historical background, importance and challenges in the field especially with relevance to the food industry.
- *Subtopics:*

- Introduction to basic concepts: unit operations, management, leadership, operational leadership, operational management, operational thinking.
- Operational leadership and operational management: evolution, scope, emerging concerns.
- Approaches to management of food manufacturing and food service unit.

UNIT II: Operational leadership (12 Hours)

- *Unit Description:* This unit will help students know about the basics of leadership, leadership styles, characteristics and responsibilities of an effective leader viz-a-viz operational leader.
- *Subtopics:*
  - Leadership – concept, qualities of an effective leader
  - Leadership styles, difference between strategic and operational leadership
  - Characteristics or role of operational leaders
  - Communications for effective operational leadership

UNIT III: Basics of Management (10 Hours)

- *Unit Description:* The unit will help student understand the importance, principles and functions of management. It will also help them to understand the work responsibilities of a manger with regards to judicious management of human resources for efficient productivity.

- *Subtopics:*
  - Introduction, significance and scope of management
  - Principles of management
  - Functions of management
  - Role of manager/supervisor in work productivity (vertical/horizontal division of labour, departmentalization, organization chart) with relevance to food industry.
  - Decision making – steps and barriers; importance of decision making in operations management.

Unit IV: Operational Management in food industry (15 Hours)

- *Unit Description:* Through this unit the student will learn about efficient administration of business practices which is the primary responsibility of an operational manager. The chapter will discuss about the various aspects of operational management which can lead to enhanced quality and productivity in an efficient manner.
- *Subtopics:*
  - Importance of operations manager and operational management in food industry (models/process)
  - Job Analysis and description (ergonomics, role of duty rosters and SOP), work design and work measurement
  - Material Management (purchase, store, inventory, standardization)
  - Improving productivity (forecasting, scheduling and controlling production activities) System design and capacity planning
  - Food Safety Management System
  - Role of automation and Artificial Intelligence in operational management

PRACTICAL
(Credits 1: 30 Hours)

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

1. Prepare a summary report on a short film/documentary on manufacturing a food product to study management of assembly lines or during various stages of production.
   or
   Critically review approaches of management in a food enterprise unit through a short film/documentary.
2. Prepare a presentation on the leadership styles and stages of operational management through a short film/documentary on the success story of food enterprise led by a woman leader.
3. Visit a nearby small-scale food production unit such as college canteen and understand the applications of "forecasting" for any 2 food products.
4. As an operation manager, prepare an organizational chart, duty roster and job description for a bakery/food preservation unit.
5. Develop an operational leader assessment worksheet in a food production or food processing unit.
   https://clgm.net/files/pdf/OPERATIONAL%20LGL%20Profile%20November%202014.pdf
6. Prepare a presentation on role of computers, artificial intelligence and CAD currently being used in the food processing industry.
7. Prepare a work flowchart for a food processing unit for material handling.
8. Conduct SWOT analysis in a given case study regarding operational management of a process in a food processing unit.

ESSENTIAL READINGS (Theory and Practical):

- Gupta, S. and Starr, M. (2014). *Production and Operation Management System*. London: CRC press Taylor & Francis Group.
- Kumar, A.S. and Suresh, N. (2008). *Production and Operations Management* (skill Development, Caselets and Cases). Banglore: New Age International (P) Limited Publisher.
- Render, B. (2012). *The Encyclopedia of Operations Management. A field Manual and Glossary of Operations Management Terms and Concepts*. Pearson.
- Stevenson, W.J. (2018). *Operations Management*. (13th edn.). McGraw-Hill Education, New York
- Greasley, A. (2013). *Operations management*. (3rd edn.). John Wiley & Sons, Limited.
- Young, S.T. (2010). *Essentials of Operations Management*. Sage Publications, United State of America.
- Reid, R., and Sanders, N.R. (2010). Chapter 1. Introduction to Operations Management. In: *Operations Management*. (4th edn.). John Wiley & Sons, Inc.
  a. https://catalogimages.wiley. com/images/db/pdf/9781119497332.excerpt.pdf
- Morill, R.L. (2010). *Strategic Leadership*. United Kingdom: Rowman & Little field Publishers.
- Merel, S. (2017). *Leadership Styles in the Context of the Food Processing Industries*. Wageningen Research. https://livrepository.liverpool.ac.uk/3090163/

SUGGESTED READINGS:

- Certified Local Government Manager (CLGM), Society of Local Government Managers of Alberta (SLGM) (2014). Operational local government leader profilehttps://clgm.net/files/pdf/OPERATIONAL%20LGL%20Profile%20November%202014.pdf

- Dittmer, P.R, and Keefe, J.D. (2009). *Principles of Food, Beverage and Labour Cost Controls* (9th edn.). John Wiley & Sons, United State of America.
- Kumar, S.A, Suresh, N. (2009). *Operations Management*. New Age International Publishers. Delhi.
- Palacio, J. and Theis, M. (2009). *Food Service Management: Principles and Practices*. New Jersey: Pearson.
- Russell,R.S., Taylor,B.W (2011). *Operations Management – Creating Value Along the Supply Chain* (7thedn.). John Wiley and Sons, Inc. United States of America.
- Seuring, Stefan, Sarkis, Joseph and Klassesn, Robert 2014. Sustainable operations management: recent trends and future directions [Editorial]. *International Journal of Operations and Production Management* 34 (5) 10.1108/IJOPM-12-2013-0557
- Smith, R.A. and Siquaw, J. (2010). *Strategic Hospitality Leadership*. John Willey & Sons Pte. Ltd.
- Stevenson, W.J. (2018). *Operations Management*. (13th edn.). McGraw-Hill Education, New York.
- Wallis, J. (2016). Operational Leadership. In: Farazmand, A. (eds) *Global Encyclopedia of Public Administration, Public Policy, and Governance*. Springer, Cham. https://doi.org/10.1007/978-3-319-31816-5_1921-1

B.A. (Prog) with Food Technology (FT) as Major & Non-Major
Pool DSE: Even Semester

DISCIPLINE SPECIFIC ELECTIVE – DSE-2-FT:
POST HARVEST TECHNOLOGY

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		
Post Harvest Technology	4	3	0	1	Class XII Pass	NIL

LEARNING OBJECTIVES:

4. To familiarize students with role of post-harvest technology.
5. To impart knowledge regarding the developmental dynamics of agricultural produce.
6. To acquaint students with technological approaches involved in reduction of post-harvest losses.

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:
1. Explain the principles of post-harvest technology
2. Illustrate the physiological and biochemical changes that occur during various stages of fruits and vegetables development and production
3. Understand the causes of post-harvest losses, and remedial methods to reduce them
4. Indicate the importance and the significance of proper post-harvest handling to maintain the quality of agricultural produce

SYLLABUS OF DSE-2-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Introduction to Post-Harvest Technology (9 Hours)

- *Unit Description:* This unit will introduce the students to the relevance and current status of post-harvest technology in global scenario.
- *Subtopics:*
  - Introduction to Post-harvest technology
  - Importance and need.
  - Status of post-harvest: Global scenario

- Factors affecting quality of horticultural produce.
  - Pre-harvest (customization of produce by moulding method)
  - Harvest
  - Post-Harvest

UNIT II: Physiology and Biochemistry of Horticultural Produce (10 Hours)

- *Unit Description:* This unit will focus on various physiological and biochemical changes in horticultural produce after harvest.
- *Subtopics:*
  - Physiology of horticultural produce
  - Respiration rate and associated factors
  - Biochemical and physiological changes during ripening and ethylene biosynthesis
  - Maturity indices in horticultural produce
  - Disorders in horticultural produce

UNIT III: Post-harvest Losses and Treatments for Prevention (17 Hours)

- *Unit Description:* This unit describes the post-harvest losses, associated factors and the treatments involved in reduction of such losses
- *Subtopics:*
  - Introduction and types of post-harvest losses
  - Factors responsible
    - Biological
    - Environmental
  - Post-harvest treatments
    - Pre-cooling
    - Cleaning, washing, dry-cleaning and dressing.
    - Curing, drying, vapor heat treatment and degreening
    - Dys-infection and sprout suppression
    - Wax-coating, astringency reduction and irradiation
    - Regulation of ripening

UNIT IV: Storage and Packaging (9 Hours)

- *Unit Description:* This unit will focus on storage and packaging techniques of horticultural produce.
- *Subtopics:*
  - Principles of storage.
  - Traditional (in situ, sand, coir, pits, clamps, windbreaks, cellars, barns, evaporative cooling, ZECC) and advanced storage methods (Controlled atmosphere Storage, Modified Atmospheric Storage, Cold storage).
  - Packaging of horticultural produce- material, techniques-basic and advanced.

PRACTICAL
(Credits 1: 30 Hours)

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

8. Classify any fruit(ex.-banana) based on physical maturity indices

9. Determination of firmness in fruits by penetrometer
10. Determination of the juice content in different maturity stages of fruit
11. Determination of fruit acids by titration and calculation of the sugar/acid ratio
12. Determination of the starch content of apples/pears using an iodine solution
13. Determination of pesticide residue in fresh farm produce by using chlorine test strips
14. Presentation on post-harvest management of any fruit/vegetable by application of low cost and modern techniques

OR

Visit to a nearby farm.

ESSENTIAL READINGS (Theory and Practical):

- Yahia, E. M., and Carrillo-Lopez, A. (Eds.). (2018). *Postharvest Physiology and Biochemistry of Fruits and Vegetables*. Woodhead Publishing.
- Wills, R., and Golding, J. (2016). *Postharvest: An Introduction to The Physiology and Handling Of Fruit And Vegetables*. UNSW press.
- Siddiq, M., Ahmed, J., Lobo, M. G., and Ozadali, F. (Eds.). (2012). *Tropical and Subtropical Fruits: Postharvest Physiology, Processing and Packaging*. John Wiley & Sons.
- Singh, I.S. (2009). *Post-Harvest Handling and Processing of Fruits and Vegetables*, West vill Publishing House.
- Chakraverty, A., Mujumdar, A. S., and Ramaswamy, H. S. (Eds.). (2003). *Handbook Of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, And Spices* (Vol. 93). CRC press. http://ecoursesonline.iasri.res.in/course/view.php?id=164(accessed on 17.3.2023)
- FAO. Post-harvest system and food losses. https://www.fao.org/3/ac301e/AC301e03.html(accessed on 17.3.2023)
- FAO. Prevention of post-harvest food losses fruits, vegetables and root crops a training manual. https://www.fao.org/3/t0073e/t0073e00.html(accessed on 17.3.2023)

SUGGESTED READINGS:

- Wills, R. B., and Golding, J. (Eds.). (2016). *Advances in Postharvest Fruit and Vegetable Technology*. CRC press.
- Kitinoja, L., and Gorny, J. R. (1999). Postharvest technology for small-scale produce marketers: economic opportunities, quality and food safety. *Postharvest technology for small-scale produce marketers: economic opportunities, quality and food safety*.
- Kadar, A.A. (2002). *Post Harvest Technology of Horticultural Crops,* 2nd Edition, University of California.
- http://postharvest.org/PEF_Training_of_Postharvest_Trainers_Manual_2019_2Ed.pdf
- https://agmarknet.gov.in/Others/CPBANANA.pdf(accessed on 17.3.2023)
- https://www.oecd.org/agriculture/fruit-vegetables/publications/guidelines-on-objective-tests.pdf(accessed on 17.3.2023)

DISCIPLINE SPECIFIC ELECTIVE – DSE-4-FT: FOOD VALUE CHAIN MANAGEMENT

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 Value Chain Management	4	3	0	1	Class XII Pass	NIL

LEARNING OBJECTIVES:

6. To understand the basic concepts related to food value chain management.
7. To know the principles, process and components of value chain management with special reference to the food industry.
8. To learn the scope and challenges associated with sustainable food value chain management.

LEARNING OUTCOMES:

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

9. Appreciate the significance of managing food value chains
10. Develop strategic plan of action which can support the concept of sustainability in food value-addition
11. Manage unit operations/assembly lines in food processing units

SYLLABUS OF DSE-4-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Introduction: Concept and Framework (8 Hours)

- *Unit Description:*This unit will discuss about the concept of food value chain and the basic framework necessary for its application. It will help students understand the difference and association of value chain vis-à-vis food value chain.

- *Subtopics:*
  - Basic Concepts: value chain, food value chain, sustainable food value chain, supply food chain management, sustainable food value chain development.
  - Concept of "value added" in food chains.

- Sustainable food value chain framework.

UNIT II: Principles and Components of Sustainable Food Value Chain Development (12 Hours)

- *Unit Description:* This unit will discuss about the basic principles and components which help in the planning and implementation of food value chain.

- *Subtopics:*
  - Principles of sustainable food value chain development: measuring, understanding and improving
  - Components of sustainable food value chain development

UNIT III: Food Supply Chain Management (15 Hours)

- *Unit Description:* Food supply chain is an important for successful food value chain management. This unit will discuss the basic aspects of supply chain management.

- *Subtopics:*
  - Types of food supply chains
  - Management of operations: manufacturing and processing of food
  - Operational Challenges: food logistics in procurement, distribution, transportation and retailing (case study)

Unit IV: Challenges and Potential in Food Value Chain Management (10 Hours)

- *Unit Description:* This chapter will discuss the future challenges and potential or scope of successful and sustainable food value chain management.

- *Subtopics:*
  - Social and economic aspects
  - Food insecurity (Conserving and enhancing nutrients: food fortification)
  - Carbon footprint, water footprint, toxicity and waste, soil health
  - Food losses and food waste
  - Food innovation
  - Green Technological Approaches in food industry
  - Catering sector as a sustainable value chain (case study)

PRACTICAL
(Credits 1: 30 Hours)

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

19. Critical evaluation on the following case studies:
    - Potato value chain management (Link: https://www.fao.org/3/i3953e/i3953e.pdf, Pg. 28 of Neven (2014)
    - Dairy value chain management (Link: https://averdishome.files.wordpress.com/2017/01/sustainable-value-chains-for-sustainable-food-systems.pdf, Pg. 25 of Maybeck and Redfern (2016).

- Coffee value chain management (Link: https://www.fao.org/3/i3953e/i3953e.pdf, Pg. 49 of Neven (2014))
- Pineapple value chain management (Link: http://sfacindia.com/PDFs/SFAC_Value-Chain-Analysis.pdf)

20. Develop a food value chain flow chart or framework for any farm to plate product such as wheat to bread or tomato to tomato puree.
21. Develop a business proposal for supply chain management of milk or any perishable food.
22. SWOT Analysis of a given food value chain management through a case study (Link: https://averdishome.files.wordpress.com/2017/01/sustainable-value-chains-for-sustainable-food-systems.pdf, Pg. 263 of Maybeck and Redfern (2016)).
23. Methodology for determining food waste in college or school canteen.

ESSENTIAL READINGS (Theory and Practical):

- Neven, D. (2014). *Developing Sustainable Food Value Chains: Guiding Principles. Food and Agricultural Organization (FAO)*. Link: https://www.fao.org/3/i3953e/i3953e.pdf
- Dani, S. (2021). *Food Supply Chain Management and Logistics*. Second Edition. Kogan Page.
- Meybeck, A. and Redfern, S. (2016). *Sustainable value chains for sustainable food systems. Food and Agricultural Organization* (FAO).Link: https://averdishome.files.wordpress.com/2017/01/sustainable-value-chains-for-sustainable-food-systems.pdf
- Stead, V. and Hinkson, M. (2022). *Beyond Global Food Supply Chains: Crisis, Disruption and Regeneration*. First Edition. Palgrave Macmillan Press.
- Pullman, M. and Wu, Z. (2021). *Food Supply Chain Management: Building a Sustainable Future*. Second Edition. Routledge Press.
- Ikavou, E., Bochtis, D., Vlachos, D. and Aidonis, D. (2016). *Supply Chain Management: For Sustainable Food Networks*. First Edition. Wiley Publishers.
- Mena, C. and Stevens, G. (2010). *Delivering Performance in Food Supply Chains*. First Edition. CRC Press.
- Small Farmers Agrobusiness Consortium (SFAC). (2022). *Value Chain Analysis of Select Crops in Northeastern States*. SFAC. Link: http://sfacindia.com/PDFs/SFAC_Value-Chain-Analysis.pdf

SUGGESTED READINGS:

- Mor, R.S., Kamble, S.S. andSangwan, K.S. (2022). *Operations and Supply Chain Management in Food Industry: Farm to Fork*. Springer.
- Lianos, I., Ivanov, A. and Davis, D. (2022). *Global Food Value Chains and Competitive Laws*. First Edition. Cambridge University Press.
- Bourlakis, M.A. and Weightman, P.W.H. (2003). *Food Supply Chain Management*. First Edition. Blackwell Publishing.
- Mukherjee, A., Goyal, T.M., Pal, P. and Deb, S. (2014). *Food Supply Chain in India: Analysing the Situation for International Business*. Academic Foundation.
- Hill, V. (2016). *A Kaizen Approach to Food Safety: Quality Management in the Value Chain from Wheat to Bread*. Springer.

DISCIPLINE SPECIFIC ELECTIVE – DSE-6-FT: RESEARCH METHODS IN HOME SCIENCE

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		
Research Methods in Home Science	4	3	0	1	XII	NIL

LEARNING OBJECTIVES:

1. To provide students understandings about the basic concepts, approaches and methods in conducting Home Science research.
2. To enable learners to appreciate and critique the nuances of designing a research study well. To sensitize students towards ethical concerns while conducting Home Science research.

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:

1. Demonstrate knowledge of the scientific method, purpose and approaches to research in Home Science
2. Compare and contrast quantitative and qualitative research approaches
3. Explain different types of research design and their applicability in Home Science research
4. Understand the key elements of a research process
5. Explain ethical principles, issues and procedures

SYLLABUS OF DSE-6-FT

THEORY
(Credits 3; Hours 45)

UNIT I: Research Purpose and Design **(10 Hours)**

This unit will deal with meaning and importance of research in various areas of Home Science. Exposure to different types of research designs and measurement in Home Science research would also be given.

- Meaning, purpose and significance of research
- Research as a scientific method

- Types of research
- Quantitative, Qualitative and mixed method approaches
- Research Designs –Experimental and Non-Experimental; Descriptive and Observational; Participatory research
- Internal and external validity of research design
- Variables, concepts and measurement in research
- Levels of measurement
- Units of analysis

UNIT II: Sampling and Research tools & techniques (15 Hours)

This unit will introduce the student to the concept of sampling and methods used to draw sample from population using examples from Home Science discipline. Students would also learn about types of data, its collection and reliability and validity concerns.

- Role of sampling in research
- Sampling techniques and their applicability, Sample size and sampling error
- Types of data: Primary and Secondary
- Tools of data collection; types, construction and administration- Interview, Questionnaire, Observation, Focus group discussion and other methods
- Validity and reliability of data collection tools

UNIT III: The Research Process (15 Hours)

This unit will elaborate upon the various steps involved in conducting and reporting researches in Home Science.

- Defining the problem, research questions, objectives, hypotheses
- Review of related literature and originality in writing
- Systematic research: concept and methodology
- Planning the research
- Identifying variables and constructing hypothesis
- Selecting appropriate research methodology and tools
- Data analysis: coding and tabulation
- Writing a research report: styles and formats
- Citation formats: in medical sciences, social sciences

UNIT IV: Values, Social Responsibility and Ethics in Research (5 Hours)

This unit will apprise the students about ethical concerns while conducting and reporting research.

- Ethical principles guiding research: from inception to completion and publication of research
- Plagiarism and Academic integrity in research: plagiarism tools and software
- Ethical issues relating to research participants and the researcher
    - Rights, dignity, privacy and safety of participants
    - Informed consent, confidentiality, anonymity of respondents, voluntary participation, harm avoidance

PRACTICAL

(Credits 1; Hours 30)

1. Data visualization
2. Levels of Measurement
3. Types of research designs
   a. Experimental and non-experimental; Descriptive and observational
   b. Qualitative, Quantitative and mixed method
4. Sampling techniques and sample size calculation
   a. Probability sampling method
   b. Non-Probability sampling methods
5. Tools of data collection- Interview schedule, questionnaire and FGD
   - Designing/ Construction
   - Preparation of tools for ethical review
   - Pilot testing/ validity and reliability of the tool\
6. Data collection and analysis process: conducting interviews, administering questionnaire
7. Coding and tabulation of data for analysis
8. Citation formats and Plagiarism
9. Reviewing a research paper from a specific area of specialization in Home Science

ESSENTIAL READINGS (Theory and Practical):

- Kerlinger F. N. and Lee, H.B. (2017). *Foundations of Behavioral Research* 4th Ed. Harcourt College Publishers.
- Kothari, C. R. (2019). *Research Methodology: Methods and Techniques*. New Age International Pvt Ltd, New Delhi.
- Kothari, C. R. (2022). *ShodhPadhati* 1st Ed. New Age International Pvt Ltd, New Delhi.
- Kumar, R. (2019) Research Methodology: A Step-by-Step Guide for Beginners. 5th Ed. Sage Publications, New Delhi.

SUGGESTED READINGS:

- Bernard, H. R. (2000). *Social research methods: Qualitative and quantitative approaches.* Thousand Oaks, CA.: Sage.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches.* Thousand Oaks, CA: Sage Publications.
- Davis, A. M., Treadwell, D. (2019). Introducing Communication Research: Paths of Inquiry. United Kingdom: SAGE Publications.
- Flynn, J.Z., Foster, I.M. (2009). *Research Methods for the Fashion* ***industry.*** **Fairchild** books, Bloomsbury publishing.
- Indian National Science Academy (INSA) (2019). *Ethics in Science Education, Research and Governance*. ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/EthicsBook.pdf
- Jacobsen, K. H. (2020). *Introduction to health research methods: A practical guide*. Jones & Bartlett Publishers.
- UGC (2021) *Academic Integrity and Research Quality*. New Delhi: UGC, Retrieved from https://www.ugc.ac.in/e-book/Academic%20and%20Research%20Book_WEB.pdf

B.A (Prog) Food Technology

GENERIC ELECTIVE COURSES (GE)

GENERIC ELECTIVE – GE-1-FT: BASIC BAKING

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		
Basic Baking	4	3	0	1	Class XII	NIL

LEARNING OBJECTIVES:

7. To impart students with knowledge related to baking technology.
8. To introduce and equip students to the techniques and skills of cakes, biscuits and pastry making.

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:

1. Familiarize themselves with present and future trends of baking industry.
2. Describe the role of ingredients in bakery industry.
3. Demonstrate the skills in preparing cakes, pastries and biscuit, cost control and marketing.
4. Recognize the significance of factors which influence safety of food. Conduct sensory evaluation of bakery products.

SYLLABUS OF GE-1-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Baking Industry **(10 Hours)**

- *Unit Description:* This unit will introduce the students to the field of Food Bakery Science. It will also give information on nutrition facts of Bakery products.
- *Subtopics:*
  - History of bakery - present trends and prospects
  - Nutrition facts about bakery products
  - Food safety aspects of baked products

UNIT II: Cake Processing **(14 Hours)**

- *Unit Description:* The unit is about processing of various types of cakes, their labelling, packaging and evaluation.
- *Subtopics:*
    - Preparation of cakes – Ingredients, 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, labelling, and costing

UNIT III: Pastry Processing (6 Hours)

- *Unit Description:* The unit is about processing of various types of pastries, and their evaluation.
- *Subtopics:*
    - Preparation of pastry – Ingredients, types of pastries (short crust, puff/flaky and choux pastry), processing and evaluation, faults and remedies.

UNIT IV: Biscuit and Cookies Processing (15 Hours)

- *Unit Description:* The unit is about processing of various types of biscuits, cookies and their evaluation.
- *Subtopics:*
    - Preparation of biscuits and cookies – types, ingredients, processing and evaluation.

PRACTICAL
(Credits 1: 30 Hours)

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

1. Weights and measures, selection of raw material.
2. Preparation, sensory evaluation and packaging of cakes.
    - Fatless sponge cakes
    - Shortened cakes
    - Eggless cakes
    - Muffins and brownies
3. Preparation, sensory evaluation and packaging of pastries-
    - Short crust
    - Puff/flaky
    - Choux pastry
4. Preparation, sensory evaluation and packaging of biscuits.

ESSENTIAL READINGS (Theory and Practical):

- Dubey, S. C. (2016). *Basic Baking: Science and Craft*. Delhi: The Society of Indian Bakers.
- Edward, W. P. (2007). *The Science of Bakery Products*. Cambridge: RSC Publishing.
- Faridi, H. (2004). The Science of Cookie and Crackers Production. Delhi: CBS
- Publishers.
- Ketrapaul, N., Grewal, R.B., Jood, S. (2005). Bakery Science and Cereal Technology.

- Delhi: Daya Publishing House.
- Matz, A. (2008). *Bakery Technology and Engineering*, 10th Edition. Delhi: CBS Publishers.
- Suri, S. & Malhotra, A. (2014). *Food Science, Nutrition and Safety.* Delhi: Pearson India Ltd.

SUGGESTED READINGS:

- 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.
- 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.

DISCIPLINE SPECIFIC CORE COURSE – GE-2-FT: FRUIT AND VEGETABLE PRESERVATION TECHNOLOGY

Course Title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Fruit and Vegetable Preservation Technology	4	3	0	1	Class XII	NIL

LEARNING OBJECTIVES:

9. To introduce students to the myriad field of preservation
10. To help students understand the basic principles of fruit and vegetable preservation
11. To help students learn methods and gain skills required for preserving fruits and vegetables
12. To know the regulatory and safety aspects associated with processing preserved products

LEARNING OUTCOMES:

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

12. Explain the principles and methods of preserving fruits and vegetables
13. Appreciate the role of food safety regulations in preservation industry
14. Prepare different types of preserved products from fruits and vegetables

SYLLABUS OF GE-2-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Unit I: Fruit and Vegetable Preservation – an overview (10 Hours)

- *Unit Description:* This unit will introduce the students to the vast field of food preservation and the salient changes which occur post harvest in fruits and vegetables.

- *Subtopics:*
  - Objectives of preservation and processing
  - Scope of preservation industry in India
  - Physical, chemical and microbiological changes in fruits and vegetables
  - Factors affecting growth of microorganisms and the control measures

UNIT II: Principles and methods of preservation (12 Hours)

- *Unit Description:* This unit will explain to the students the principle, advantages and disadvantages of various methods of preservation.

- *Subtopics:*
  - Asepsis
  - Low temperature
  - High temperature
  - Removal of moisture
  - Removal of air
  - Use of chemical preservatives
  - Fermentation
  - Irradiation
  - Newer methods

UNIT III: Fruit and vegetable processing (15 Hours)

- *Unit Description:* This unit will help students learn in detail the methods of preparing safe and good quality preserved products.

- *Subtopics:*
  - Chutney and sauces- Definition, method of preservation, steps in preparation of chutney and sauces.
  - Fruits beverages- Definition and classification, method of preservation (with special emphasis on pasteurization, use of chemical preservatives, sugar), role of various ingredients.
  - Jam, Jelly and Marmalade-definition, role of pectin and theory of gel formation, method of preservation, steps of preparation, evaluation.
  - Preserves- definition, method of preservation, steps of preservation, evaluation, candied, crystallized and glazed fruits
  - Pickles- definition, classification method of preservation steps of preparation of vinegar pickles, evaluation.

Unit IV: Food Safety Regulations and procedures (8 Hours)

- *Unit Description:* This unit will help students learn about the regulatory aspects of preserved food products. The unit will also briefly discuss the practices and programmes which can be adopted to enhance quality of preserved products.

- *Subtopics:*
  - Key terms, factors affecting food safety, recent concerns
  - National food law (FSSA), standards and regulations
  - Food additives and contaminants
  - Good Hygiene Practices
  - HACCP

PRACTICAL
(Credits 1: 30 Hours)

Preparation, packaging, labeling, sensory and objective (TSS, p^H) evaluation of :

1. Sauces and chutnies
2. Ketchup (tomato)
3. Squashes (lemon squash, orange squash, pineapple squash)
4. Syrups (rose syrup and almond syrup)
5. Jams (apple jam and mixed fruits jam)
6. Pickles (green chilli, lemon, mixed vegetable)
7. Preserve (carrot)

ESSENTIAL READINGS (Theory and Practical):

- Rao, E.S., Garg, M. and Barwa, M.S. (2023). *Handbook on Processing and Preservation of Fruits and Vegetables.* 2nd edn. Variety Books Publisher's Distributors, New Delhi
- Frazier, W.C. and Westhoff, D.C. (2014). *Food Microbiology.* Chennai: Tata McGraw Hill Publishing Company Limited.
- Fellows, P.J. (2022). *Food Processing Technology Principles and Practice*. 5th edn. Woodhead Publishing Series in Food Science, Technology and Nutrition. https://doi.org/10.1016/C2019-0-04416-0.
- Rahman, M.S. (Ed.). (2020). *Handbook of Food Preservation.* 3rd edn. CRC Press. https://doi.org/10.1201/9780429091483
- Suri, S. & Malhotra, A. (2014). Food Science Nutrition and Safety. Delhi: Pearson India Ltd.
- Sivasankar, B. (2002). *Food Quality, in Food Processing and Preservation.* Prentice-Hall of India Private Limited, New Delhi.
- Srivastava, S.S. (2006). *Phal Parirakshan.* Lucknow: Kitab Mahal.

SUGGESTED READINGS:

- Potter, N.N., and Hotchkiss, J.H. (2012). *Food Science.* 5th edn. Springer New York, NY. XV, 608. https://doi.org/10.1007/978-1-4615-4985-7.
- Lal, G., Siddhapa, G.S. and Tandon, G.L. (2009). *Preservation of Fruits and Vegetables.* New

Delhi: Indian Council of Agriculture Research.
- Subbalakshmi, G., and Udipi, S.A. (2007). *Food Processing and Preservation.* Delhi: New Age International Publishers.
- Khurdia, D.S. (1995). *Preservation of fruits and vegetables.* New Delhi: Indian Council of Agriculture Research.

GENERIC ELECTIVE – GE-3-FT: ENTREPRENEURSHIP FOR SMALL SCALE CATERING

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		
Entrepreneurship for Small Scale Catering	4	3	0	1	Class XII	NIL

LEARNING OBJECTIVES:

1. To introduce the students to the field of food business and cafeteria management
2. To impart knowledge about different types of food business, types of cafeteria and their management
3. To impart practical skills in preparation of project report for business plans, planning and organization of different cafeterias and quantity food production

LEARNING OUTCOMES:

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

1. Describe various types of food businesses and develop food business plans.
2. Know the government regulations for food business and concept of quality management.
3. Plan and execute menus for different types of cafeterias.
4. Develop business plan to set up a successful small scale food business/cafeteria.

SYLLABUS OF GE-3-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Food Business Management **(15 Hours)**

- *Unit Description:* This unit will introduce students to the concept of different types of food business, business plans, business ethics and food regulations

- *Subtopics:*
    - Case studies of food businesses and its aspects, Types of Food Businesses
    - Market assessment techniques and preparation of a food business plan.
    - FSSAI regulations for Food Businesses
    - Business ethics and Quality Management.

UNIT II: Cafeteria Management (15 Hours)

- *Unit Description:* This unit will introduce students to the concept of different types of cafeterias and their management.
- *Subtopics:*
    - Types of Cafeterias and Type of Services
    - Resources- Finance, Human Resource, Equipment, Infrastructure and facilities
    - Organizational goals, structure and salient responsibilities of staff and management
    - Menu Planning- types of menus, factors affecting menu planning.
    - Food Purchase and Storage
    - Quantity Food production

Unit III: Operational Management in food industry (15 Hours)

- *Unit Description:* Through this unit the student will learn about efficient administration of business practices which is the primary responsibility of an operational manager. The chapter will discuss about the various aspects of operational management which can lead to enhanced quality and productivity in an efficient manner.
- *Subtopics:*
    - Importance of operations manager and operational management in food industry (models/process)
    - Job Analysis and description (ergonomics, role of duty rosters and SOP), work design and work measurement
    - Material Management (purchase, store, inventory, standardization)
    - Improving productivity (forecasting, scheduling and controlling production activities) System design and capacity planning
    - Food Safety Management System
    - Role of automation and Artificial Intelligence in operational management

PRACTICAL
(Credits 1: 30 Hours)

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

1. Market Survey for identification of food business opportunities
2. Preparation of a food Business plan
3. Planning and organization for industrial cafeteria
4. Planning and organization for hospital cafeteria

5. Planning and organization for cafeteria in a mall/market
6. Planning and organization for cafeteria in a corporate office/ Airport
7. Setup and display of daily menus
8. Quantity Food Production
9. Management of a Cafeteria

ESSENTIAL READINGS (Theory and Practical):

1. Sethi,M. (2016). *Institutional Food Management*. Delhi, New Age International Publishers, India
2. Taneja,S. & Gupta,S.L. (2017). *Entrepreneur Development.* Galgotia Publishing Company, Delhi, India.
3. Bali, P.S. (2011). *Quantity Food Production Operations and Indian Cuisine.* Oxford University Press, India.
4. Warner, M. (2016). *Industrial Food Service and Cafeteria Management.* Cahners Books, Boston.

SUGGESTED READINGS:

1. Andrews, S. (2008). *Food and Beverage Management*. Tata McGraw-Hill Publishing Company Limited, New Delhi, India.
2. PaynePalacio, J. & Theis, M. (2015). *Food Service Management: Principles and Practices* (13th edition). Pearson.
3. Dessler, G. (2007). *Human Resource Management* (11th edition). Prentice Hall, New Jersey.
4. Luthans, F. (2004). *Organisational Behaviour* (10th edition). McGraw Hill International.

GENERIC ELECTIVE – GE-4-FT:

FOOD QUALITY MANAGEMENT

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

LEARNING OBJECTIVES:

1. To introduce students to the field of food quality management
2. To impart knowledge on basic concepts of quality and safety in the food sector
3. To familiarize the students with the approaches, principles and programs which facilitate food quality management.
4. To help students understand the basics of preparing, evaluating and implementing a food quality policy on an on-going basis.

LEARNING OUTCOMES:

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

1. Explain the association of food quality with food safety.
2. Appreciate the need for having a quality policy and work-specific standard operating guidelines in food-based organizations.
3. Contribute enthusiastically to the food quality management system.
4. Facilitate the development, implementation and evaluation of quality policy.

SYLLABUS OF GE-4-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Food Quality and Food Safety – an overview (18 Hours)

- *Unit Description:* This unit will introduce the students to the vast and emerging field of food quality, managing quality during food handling and its association with food safety.

- *Subtopics:*
  - Introduction to basic terms (quality, food quality, quality control, quality assurance, quality improvement, quality planning, quality assessment, quality management)
  - Characteristics of quality
  - Food quality attributes – Intrinsic and Extrinsic
  - Food quality management – scope (consumer and business perspectives)
  - Role of food safety in food quality
  - Food safety hazards and the role of FSSAI

UNIT III: Approaches to management of food quality (17 Hours)

- *Unit Description:* This unit will explain to the students how a combination of approaches in different situations can help in managing resources and processes to result in achieving, maintaining, enhancing quality of food.

- *Subtopics:*
  - Quality control
  - Quality assurance
  - Total quality management
  - Quality management system

UNIT III: Quality management programs and standards for food industry (10 Hours)

- *Unit Description:* This unit will discuss the principles, procedures which can be followed in principle to maintain and achieve higher standards by the food industry.

- *Subtopics:*
  - HACCP (origin, key terms, principles, development and implementation and maintenance)
  - Codex Alimentarius 12 steps for application of HACCP
  - Quality management standards (ISO quality system standards eg; 9000:2000, 9001:2000, 9004:2000)

- Procedures for auditing and certifications

Unit IV: Food quality policy and strategy (10 Hours)

- *Unit Description:* Every food handling/processing unit must have a quality policy on the basis of which strategic plan of action can be made and implemented. This unit will help students understand how to prepare, evaluate and implement a quality policy.

- *Subtopics:*
  - Quality policy and strategy process (activities and decisions)
  - Quality policy and technological conditions
  - Tools and methods for quality strategy and policy
  - Organizational structure and procedures (crosby's maturity grid, collaboration in food chain)
  - Quality cost analysis
  - Quality policy evaluation
  - Challenges in executing sustainable FQM

PRACTICAL
(Credits 1: 30 Hours)

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

24. Identification and removal of physical hazards rice grains, tea leaves, whole wheat flour and pulses.
25. Identification of microbes/parasites by use of prepared slides and specimens.
26. Develop educational aid on general principles of GMP.
27. Develop HACCP program for college canteen.
28. Project on developing a food quality management system for a bakery or milk/vegetable booth/canteen/food kiosk
29. Case study on quality policy of a multi-national food processing company

ESSENTIAL READINGS (Theory and Practical):

- Alli. I. (2003). Food Quality Assurance – Principles and Practices, CRC Press.
- Suri, S and Malhotra, A. (2014). Food Science, Nutrition and Safety. Dorling Kindersley Pvt. Ltd. (Pearson) India.
- Mathur, P. (2018). Food Safety and Quality Control. Orient Blackswan Private Limited.
- Pieternel A.L and Willem JM. (2020). Food Quality Management – Technological and Managerial Principles and Practices

SUGGESTED READINGS:

- Ronald F. Cichy,and Jae Min Cha. (2009). Food Safety and Quality Management, American Hotel and Lodging Educational Institute.
- Knechtges, L.I. (2012). Food Safety-Theory and Practice, USA: Jones and Barlette

Learning.
- Kalia, M. (2010). *Food quality management*. Agrotech Pub. Academy.

GENERIC ELECTIVE – GE-5-FT: TRADITIONAL INDIAN FOODS

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		
Traditional Indian Foods	4	3	0	1	Class XII	NIL

LEARNING OBJECTIVES:

1. Impart knowledge about the background and benefits of traditional foods of India.
2. Prepare traditional regional Indian dishes using basic principles of cooking.

COURSE OUTCOMES:

After successful completion of the course, the students will:

1. Get appraised to the basic concepts of indigenous Indian foods by ancestors.
2. Have theoretical and practical knowledge about the rich food heritage of India.
3. Based on available resources judiciously adopt cooking healthier traditional foods of India.
4. Be able to work/contribute/ promote the food industry catering to traditional Indian foods.

SYLLABUS OF GE-5-FT

THEORY
(Credits 3: 45 Hours)

UNIT I: Traditional foods of India – An Introduction (5 Hours)

- *Unit Description:* This unit would help students learn about the rich food culture/ background of traditional foods, the concepts of common food beliefs and the journey of traditional foods over the years.
- *Subtopics:*
  - Ancestral food legacy
  - Historical Background (Aryans, Vedic and Harappans)

- Common food beliefs
- Roots to routes – future prospects

UNIT II: Traditional Cooking Methods and Equipment (10 Hours)

- *Unit Description:* This unit will help students understand the traditional Indian equipments and methods used to cook food; their advantages and disadvantages.
- *Subtopics:*
  - Common traditional equipments and utensils
  - Common traditional cooking methods

UNIT III: Traditional Regional Cuisines (20 Hours)

- *Unit Description:* The unit is based on the diverse traditional regional cuisines/ foods. It will help student understand that the traditional food as available today has evolved over the year as a result of various socio-demographic, political and other factors.
- *Subtopics:*

  Traditional menus, meals, snacks and desserts of following:
  - Northern India
  - Southern India
  - Central India
  - Eastern India
  - Western India

UNIT IV: Traditional Foods – Health and Disease (10 Hours)

- *Unit Description:* The unit will discuss about the health-promotive properties of salient indigenous foods of India as well as the concepts of traditional dietary regimes.
- *Subtopics:*
  - Spices, herbs and condiments
  - Hot and cold foods
  - Satvik, Rajsik,Tamsik
  - Fasting and feasting.

PRACTICAL
(Credits 1: 30 Hours)

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

5. Weights, measures and common food hygiene practices.
6. Basic cooking terminologies and market order preparation.
7. Visit to state houses/bhawans/dilli haat
8. Northern Region:
   - **2 snacks: kathi kebab/galouti kebab/moong daal kachori/samosa/palak pakoras**
   - **1 main dish: sarso ka saag, makka ki roti/ bajre ki khichdi singhri ki sabzi/Jammu rajma/bedmi poori**

- 1 dessert: kheer/laddoo/pinni/phirni/ halwa

9. Eastern region:
   - **2 snacks: bhujia/puchka/pitthas/dhuska**
   - **1 main dish: littichokha/macher jhol/luchi/potala rasa/**
   - **1 dessert: rajbhog/thekua/sandesh/khaja/pitha/kakara.**
10. North-Eastern region:
   - **2 snacks: pitha/sanpiau/momos/zan/sha phaley/koatpitha**
   - **1 main dish: steamed fish/gyathuk/chamthong/panchphoran tarkari**
   - **1 dessert: pukhlein/kabok/guroorpayash/xutulipitha/sel roti**
11. Central region:
   - **2 snacks: bafauri/faraa/moong-bara/muthia/indori poha**
   - **1 main dish: dubki-kadhi/suran/dal-bafla**
   - **1 dessert: tilgur/indori jalebi/khurma/pooran-poli**

12. **Western region:**
   - **2 snacks: fafda/batata vada/vada pav/mirchivada/bonda**
   - **1 main dish: Gujrati kadhi/khaman with curry/dal bati**
   - **1 dessert: basundi/shrikhand/kulkul/choorma laddoo**

13. **Southern region:**
   - **2 snacks: murukku/idli/elaada/ribbon sev**
   - **1 main dish: idiyappam/dosa/avial/rasam/uttapam/ Hyderabadi biryani/bisibele bath**
   - **1 dessert: moong dal payasam/sweet pongal/boorelu/ khubani- ka-meetha**

ESSENTIAL READINGS (Theory and Practical):

- Acharya, K.T. (2000). Indian Food: A Historical Comparison. Oxford Press.
- Nandrajog, H. & Suri, S. (2021). The Saga of Food: Reflections on Technology and Culture. International Book House.
- 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 Pvt Ltd.
- Raina, U., Kashyap, S., Narula,V., Thomas, S., Suvira, Vir, S., & Chopra, S. (2005). Basic Food Preparation – A Complete Manual. Delhi: OrientLongman.

SUGGESTED READINGS:

- Sen, C.T. (2005). Food Culture in India. Greenwood Press.
- Davidar, R.N. (2001). Indian Food Science: A Health and Nutrition Guide to Traditional Recipes. East West Books.
- Sanghvi, V. (2019). The Indian Pantry: The Very Best of Rude Food. Penguin Publishers.
- Ayushman Systems of Medicine. Traditional Food Recipes. Ayushman Bharat. Ministry of Ayush. Government of India.
  Website: https://ayushportal.nic.in/pdf/Food_Recipes_From_AYUSH.pdf.
- Garg, A.K., Chouhan, P. & Adlakha, M.K. (2018). Traditional Dietary Pattern of Indian Food & it's Scientific Basis: Diversity in Indian Cuisine and its Health Benefits. LAP Lambert Academic Publishing.

- Food Safety and Standards Authority of India (FSSAI). (2020). The Eat Right India Handbook. First Edition. Website: http://www.indiaenvironmentportal.org.in/files/file/The-Eat-Right-India-Handbook.pdf.
- Spencer, S. (2018). Totally Indian: Quick and Easy Traditional Indian Food Recipes (Flavors of the World). The Cookbook Publisher.
- Sen, CT. (2016). Feast and Fasts: A History of Food in India. Speaking Tiger.
- Basic Food Preparation – A Complete Manual. Delhi: Orient Longman.