Introduction

Content: Introduction:

B.A. (Programme) with Food Technology aims to respond to the needs of those students are inclined to learn baking and preservation techniques in the widening horizon of food technology and food safety. It attempts to approach new areas of learning, develop competencies of the students for food science and technology and thereby open avenues for academic understanding, skill development, entrepreneurship and employment in food industry. The framework has been developed to allow flexibility, creativity and innovation in programme design and syllabi development, teaching-learning process, as well as assessment of student learning levels.
The contents have been drawn keeping the advancements in the discipline of Food Technology in mind. They reflect the current changing needs of students and the demands of evolving food industry. The option of project/dissertation has been offered to strengthen the knowledge and skills of students. For each paper, the objectives have been listed and the contents divided into units.
Under the Choice Based Credit System the course would be of 3 year duration, divided into 3 parts - Part I, Part II and Part III. Each part would consist of 2 semesters. The course comprises of 4 Discipline Specific Core (DSC) papers, 2 Discipline Specific Electives (DSE), 4 Skill Enhancement Courses (SEC), and 2 Generic Electives (GE). The students will be given a pool of papers in DSE, SEC and GE from which they can choose their options as per their needs and preferences.

Graduate Attributes in Subject
>> Disciplinary knowledge

Content: • Disciplinary knowledge and skills: Capable of demonstrating comprehensive knowledge and understanding of major concepts of food processing and its sub fields

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Graduate Attributes in Subject
>> Communication Skills

Content: Graduate Attributes:
• Communication skills: Ability to express thoughts and ideas effectively in writing and orally and communicate with others using appropriate media.

Graduate Attributes in Subject
>> Critical thinking

Content: • Critical Thinking: Capability to apply analytical thought to a body of knowledge, analyse and evaluate evidence.

Graduate Attributes in Subject
>> Problem solving

Content: • Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one‟s learning to real life situations.

Graduate Attributes in Subject
>> Research-related skills

Content: • Research related skills: Ability to recognize cause and effect relationship, define problems, formulate hypotheses and draw conclusions. Ability to plan, execute, report the results of an experiment or an investigation.

Graduate Attributes in Subject
>> Cooperation/Team work

Content: • Cooperation/ Team work: Ability to work effectively with diverse teams, act together as a group or a team and work efficiently as a member of team.

Graduate Attributes in Subject
>> Scientific reasoning

Content: • Scientific Reasoning: Ability to analyse, interpret and draw conclusions from quantitative/ qualitative data.

Graduate Attributes in Subject
>> Information/digital literacy

Content: • Information/ Digital literacy: Capability to use ICT in a variety of learning situations.

Graduate Attributes in Subject
>> Self-directed learning

Content: • Self directed learning: Ability to work independently, identify appropriate resources required for a project and manage a project.

Qualification Description

Content: Qualification Description:
The qualification description for B.A. (Prog) with Food Technology include:
• Demonstrate an understanding of the academic field of food technology and its linkages with related disciplinary areas.
• Use knowledge, understanding and skills required for identifying food technology related issues and problems and drawing on a wide range of information and its application in addressing those issues.
• Meet one's own aim of setting up an entrepreneurial venture to offer solutions and services.
• Communicate the result of studies undertaken in an academic field accurately.
• Demonstrate subject related and transferable skills that are relevant to job and employment opportunities.

Programme Learning Outcome in course

Content: Programme Learning Outcomes:
• Demonstrate the understanding of fundamentals of food processing, preservation and nutrition.
• Demonstrate the scopes of the food industry especially food preservation and bakery industry.
• Recognise the importance of preservation and food processing to reduce the post-harvest losses and guide them to start their own entrepreneurial ventures.
• Recognise the significance of (i) food safety, food quality, food laws and regulations (ii) technologies for improving food and nutritional security (iii) understanding on food hygiene, GMP, GHP.
• Illustrate the post-harvest changes in fruits and vegetable.
• Demonstrate skills in preparing various baked and preserved products and evaluating the products based on consumer preferences.
• Demonstrate the importance of food labelling, packaging, marketing and costing of prepared products.
• Demonstrate skills in planning and preparing balanced diets for normal persons and in states of malnutrition/ disease.
• Demonstrate entrepreneurship skills for setting up a home-based catering unit.
• Implementation of research based knowledge in producing new food products.
• Demonstrate the Communication skills including ICT Skills.
• Plan and execute food technology related experiments or investigations/analyse and interpret information collected using appropriate methods.

Learning Outcome based approach to Curriculum Planning
>> Nature and extent of the B.Sc/B.A./B.Com Programme

Content: Nature and extent of the B.Sc degree programme:
Food technology is a broad term, in itself, which includes processing, preservation, manufacturing, and packaging of various food items. Food Technology involves food processing and food preservation techniques, where a set of techniques and methods are used to change the raw ingredients into prepared food. The key areas of study within the subject area of food technology comprise: fundamentals of food science and technology, Baking Technology, fruit and vegetable processing and preservation , food safety and hygiene, food product development, entrepreneurship development, confectionery technology, nutrition, Milk and milk product technology, Home based catering etc.

Learning Outcome based approach to Curriculum Planning
>> Aims of Bachelor's degree programme in B.A. Programme - Food technology

Content: Aims of the bachelor's degree programme in B.A. Programme- Food Technology

The overall aims of bachelor's degree programme in food technology are to:
- Provide students with learning experiences that help instill deep interests in learning food technology; develop broad and balanced knowledge and understanding of concepts, principles, and theories related to food technology; and equip students with appropriate tools of analysis to tackle issues and problems in the field of food technology.

- Develop in students the ability to apply the knowledge and skills they have acquired.

- Provide students with the knowledge and skill base that would enable them to be entrepreneur, and take up employment.

Teaching-Learning Process

Content: As a programme of study in food technology is designed to encourage the acquisition of disciplinary/subject knowledge, understanding and skills and academic and professional skills required for food technology -based professions and jobs, learning experiences are designed and implemented to foster active/participative learning. Development of practical skills constitutes an important aspect of the teaching-learning process.A variety of approaches to teaching-learning process, including lectures, seminars, tutorials, workshops, peer teaching & learning, project-based learning, field-based learning, substantial laboratory-based practical component and experiments, open-ended project work, quiz, technology-enabled learning etc. will be adopted to achieve this.

Assessment Methods

Content: The assessment of students' achievement in food technology is aligned with the course/programme learning outcomes and the academic and professional skills that the programme is designed to develop. A variety of assessment methods that are appropriate within the disciplinary area of food technology are to be used. Learning outcomes will be assessed using the following: group discussions, quiz, oral and written examinations, closed-book tests; problem-solving exercises, practical assignment, laboratory reports, observation of practical skills, individual/team project reports, presentation, viva voce.

DSC-FT 1: FUNDAMENTALS OF FOOD SCIENCE AND TECHNOLOGY PART I

SEMESTER: I

CREDITS- THEORY: 4; PRACTICAL: 2

COURSE OBJECTIVES:

· To introduce the students to the vibrant field of food science, food technology and nutrition.
· To sensitize them on issues related to food safety.
· To introduce the concept of weights and measurement of food.
· To provide insights on the uses of various foods and the effect of processing.
· To impart theoretical and practical knowledge about basic processing of cereals, pulses, fruits, vegetables, cocoa and chocolate.

COURSE LEARNING OUTCOMES:

After successfully completing the course, the students will be able to:
· Define food science and describe its association with other related fields
· Illustrate the scope and role of food science in food and health industry
· Describe composition, nutritive value and processing of cereals, pulses, fruits, vegetables, cocoa and chocolate
· Justify scientifically the changes occurring in food during processing, handling and storage
· Describe enzymatic and non-enzymatic browning reactions along with the preventive measure and applications
· Weigh and measure food correctly
- Demonstrate the effect of processing on cereals, pulses, fruits and vegetables

THEORY **LECTURES: 60**

UNIT I INTRODUCTION TO FOOD SCIENCE AND TECHNOLOGY **5**

· Definition, scope and current trends in food science and technology

UNIT II INTRODUCTION TO BASIC NUTRITION **15**

· Definitions: food, nutrient, health, balanced diet
· Macro nutrients: classification, sources and functions of carbohydrates, fat, protein
· Micro nutrients: sources and functions of vitamins and minerals (Calcium, Iron and Zinc)
Effect of processing on nutrients

UNIT III BROWNING REACTIONS IN FOODS **8**

· Classification (enzymatic, non-enzymatic and metallic browning), causes and prevention of Browning

UNIT IV CEREALS AND PULSES **12**

· Composition and nutritive value, types of cereals, processing of cereals and pulses (gelatinization of starch and the factors affecting it, germination and fermentation), toxic constituents in pulses, milling of pulses

UNIT V FRUITS AND VEGETABLES **10**

· Classification of fruits and vegetables, composition and nutritive value; effect of processing on pigments

UNIT VI CHOCOLATE AND COCOA PRODUCTS **10**

· Cocoa bean processing, preparation of chocolate liquor, cocoa butter and chocolate

PRACTICAL: **PERIODS: 60**

· Weights and measures, selection of raw material
· Gelatinization of starch and the factors affecting it
· Factors affecting gelatinization in preparation of custard/boiled rice/*halwa*
· Germination of pulses and its applications
· Preparation of products using sprouts – salads/fruit *chaat*/*poha*/others
· Fermentation of cereals and pulses and its applications
· Preparation of cereal-pulse fermented products – *idli/dosa/dhokla*/others
· Effect of heat, acid and alkali on various plant pigments
· Enzymatic browning of fruits and vegetables
· Non-enzymatic browning reactions in food
· Chocolate preparation

COMPULSORY READING:

· Reddy, S.M. (2015). *Basic Food Science and Technology*. Delhi: New Age International Publishers.
· Srilakshmi, B. (2016). *Food Science*. Delhi: New Age International Pvt. Ltd.
· Suri, S. & Malhotra, A. (2014). *Food Science Nutrition and Safety*. Delhi: Pearson India Ltd.

ADDITIONAL RESOURCES:

· Longvah, T., Ananthan, R., Bhaskarchary, K. & Venkaiah, K. (2017). *Indian Food Composition Tabl*es. Hyderabad: National Institute of Nutrition.
· Mahan, K.L. and Raymond, J.L.R. (2016). *Krause's Food and the Nutrition Care Process*., USA: Saunders. 14th Edition.
· McWilliams, M. (2016). *Foods: Experimental Perspectives*. USA: Pearson.
· Potter, N., & Hotchkiss, J.H. (2007). *Food Science.* Delhi: CBS Publishers. 5th Edition
· Staci Nix, M. (2016). *William's Basic Nutrition and Diet Therapy*. USA: Elsevier 15th Edition.
· Vaclavik, V.A. & Elizabeth, C. (2014). *Essentials of Food Science*. New York: Springer 4th Edition.

WEBSITES:

· Central Food Technology Research Institute: http://www.cftri.com
· Food Safety and Standards Authority of India: http://www.fssai.gov.in
· International Food Information Council: http://www.ific.org
· International Union of Food Science and Technology: http://www.iufost.org
· National Institute of Nutrition: http://www.nin.res.in

TEACHING LEARNING PROCESS:

- Use of interactive ICT especially e-graphics (such as powerpoint presentations)

- Lecture
- Group discussions
- Assignments
- MOOCS, Videos etc.
- Interactions with industry (optional)
- Conduct of Practicals

ASSESSMENT METHODS:

As per University of Delhi norms

KEYWORDS:

- Department of Food Technology
- Food Science
- Nutrition
- Cereals and Pulses
- Fruits and Vegetables
- Cocoa and Chocolate

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DSC-FT 2: FUNDAMENTALS OF FOOD SCIENCE AND TECHNOLOGY PART II
SEMESTER: II

COURSE OBJECTIVES:

• To familiarize the students with the composition and processing of milk, egg, meat, sugars and fats
• To impart concept of sugar refining, egg foam stages, milk products, emulsions
• To impart knowledge about food adulteration.

COURSE LEARNING OUTCOMES:

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

· Describe the composition and nutritive value of milk, meat, egg, sugar and fats and their role in cookery
· Develop understanding about basic processing of milk and eggs.
· Illustrate the basic techniques of manufacturing /refining of sugar and demonstrate the behavior of sugar at various temperatures.
· Describe spoilage of fat scientifically, determine the smoke point of different fats and illustrate the ways to prevent fat rancidity. .
· Test common adulterants in food and illustrate the deleterious effects of common adulterants

THEORY **LECTURES: 60**

UNIT I MILK AND MILK PRODUCTS **10**

• Composition and nutritive value
• Introduction to liquid milk technology (clarification, pasteurization, homogenization, fortification, sterilization)
• Types of milk
• Effect of processing on milk,
• Introduction to milk products.

UNIT II EGGS **12**

• Composition and nutritive value
• Structure of an egg

• Egg quality and deterioration
• Green ring formation in boiled egg, preservation of eggs
• Egg foams – stages of preparation and factors affecting them
• Effect of heat on egg proteins; functions of eggs in cookery.

UNIT III MEAT, FISH AND POULTRY **8**

• Composition and nutritive value
• Selection/purchasing criteria for meat, fish and poultry
• Tenderization of meat.

UNIT IV SUGAR **12**

• Composition and nutritive value
• Properties of sugars
• Manufacturing/refining of sucrose
• Sugar cookery – crystalline and non-crystalline candies, sugar-based products.

UNIT V FATS AND OILS **13**

• Composition and nutritive value
• Types of fats/oils and their functions
• Rancidity in fat and its prevention
• Changes in fat during heating
• Care of fat used for frying, emulsions.

UNIT VI INTRODUCTION TO FOOD ADULTERATION **5**

• Adulteration, adulterants and their effects on health.

PRACTICAL: **PERIODS: 60**

· Effect of heat, acid and alkali on coagulation and precipitation of milk.
· Preparation of milk products using prolonged heating/heat and acid technique.
· Determination of pH of different foods.
· Egg white foam formation and factors affecting its stability
· Egg foam products – omelets/meringues/soufflé
· Green ring formation in boiled eggs and its prevention
· Behavior of sugar at various temperatures
· Preparation of crystalline and non-crystalline candies
· Determination of smoke point of various oils and factors affecting the smoke point.
· Preparation of emulsions – mayonnaise
· Detection of adulterants in food

COMPULSORY READING:

• Potter N and Hotchkiss JH. Food Science. 5th Edition 2007. CBS Publishers. Delhi.
• Sethi P and Lakra P. Aahar Vigyan, Poshan Evam Suraksha.2015. Elite Publishing House Pvt. Ltd. Delhi.
• Srilakshmi B. Food Science. 2016. New Age International Pvt. Ltd. Delhi
• Suri S and Malhotra A. Food Science, Nutrition and Safety. Pearson India Ltd. 2014.
• Sharma Avantina. Text book of Food Science and Technology. 2nd Edition 2010. IBDC Publishers.
• Rekhi T and Yadav H. Fundamentals of Food and Nutrition. 2014. Elite Publishing House Pvt. Ltd. Delhi.

ADDITIONAL RESOURCES:

· Roday S. Food Science and Nutrition. 3rd Edition 2018. Oxford University Press.

· Manay N. S and Shadakashraswamy. Foods: Facts and Principles. 3rd Edition. New Age International Pvt Ltd.
· Vaclavik VA and Christian E.W. Essentials of Food Science. 4th Edition 2014. Springer.
· Mc Williams M. Foods: Experimental Perspectives 2016. Pearson.

WEBSITES:

· Central Food Technology Research Institute: http://www.cftri.com
· Food Safety and Standards Authority of India: http://www.fssai.gov.in

TEACHING LEARNING PROCESS:

· Lectures
· Use of Prescribed textbooks and handouts.
· Power Point Presentation
· Technology enabled learning
· Laboratory based practical component.

ASSESSMENT METHODS:

As per University of Delhi norms

KEYWORDS:

· Department of Food Technology
· Nutritive value
· Processing
· Pasteurization
· Meat Tenderization
· Rancidity
· Sugar Cookery
· Adulteration

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DSC FT 3: BASIC BAKING TECHNOLOGY
SEMESTER III

COURSE OBJECTIVES:

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

COURSE LEARNING OUTCOMES:

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

· Describe the present and future trends of the bakery industry.
· Illustrate the basic ingredients and equipment used for baking along with their significance
· Describe the process of cake and pastry preparation, their decoration and evaluation.
· Demonstrate the skills for making cakes and pastries.
· Test wheat flour and conduct labeling, packaging and costing of prepared bakery products.
· Initiate the entrepreneurial journey in the field of bakery.

THEORY **PERIODS: 60**

UNIT I: BAKING INDUSTRY 8

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

UNIT II: WHEAT GRAIN, BAKING INGREDIENTS AND EQUIPMENT 22

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

UNIT III: CAKE TECHNOLOGY 15

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

UNIT IV: PASTRY TECHNOLOGY 15

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

PRACTICAL

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

COMPULSORY READINGS:

- Dubey, S. C. (2007*.) Basic Baking-Science and Craft.* Delhi: Society of Indian Bakers.
- Ketrapaul, N., Grewal, R.B., & Jood, S. (2005) *Bakery Science and Cereal Technology*. Delhi: Daya Publishing House.
- Potter, N., & Hotchkiss, J.H. (2006). *Food Science.* Delhi: CBS Publishers

ADDITIONAL RESOURCES:

- Cornell, Hugh J and Hoveling, Alber W, (1998*) Wheat Chemistry and Utilization*, CRC Press.

· Edward, W. P. (2007).*The Science of Bakery Products*, RSC Publishing.
· Encyclopedia of Food Science and Technology, (1993). Academic Press.
· 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. (1998*) Bakery Technology and Engineering.* CBS Publishers, Delhi.
· Matz A. (2004). *The Chemistry and Technology of Cereals as Food and Feed*. Delhi: CBS Publishers.
· Raina, U., Kashyap, S., Narula,V., Thomas, S., Suvira, Vir, S., & Chopra, S. (2005). *Basic Food Preparation* – A Complete Manual.Orient Longman.
· Mathur, P. (2018). *Food Safety and Quality Control*. Orient Blackswan.
· Srilakshmi B, (2018*). Food Science*. Delhi: New Age International Publishers.

TEACHING LEARNING PROCESS:

· Lectures
· Power point presentations
· Experiential learning through demonstrations
· Market survey
· Experimental learning

ASSESSMENT METHODS:

As per Delhi University norms.

KEYWORDS:

· Department of Food Technology.
· Baking industry
· Wheat milling
· Bakery ingredients
· Bakery equipment
· Cake technology
· Pastry technology

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DSC-FT 4: INTRODUCTION TO FOOD SAFETY & PRESERVATION
SEMESTER IV

COURSE OBJECTIVES:

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

COURSE LEARNING OUTCOMES:

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

· Describe the purpose and scope of the food preservation Industry along with a market survey of preserved products.
· Illustrate the post-harvest changes in fruits and vegetables.
· Explain the different objectives, principles and methods of food preservation

· Demonstrate skills for processing of fruits and vegetable chutneys, sauces and beverages along with labeling
· Prepare safe and hygienic preserves using appropriate techniques of preservation
· Be conversant with FSSAI regulations and functions
· Develop the attitude and values imperative for a micro entrepreneur in food industry.

THEORY **PERIODS: 60**

UNIT I: PURPOSE AND SCOPE OF PRESERVATION **5**

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

UNIT II: POST-HARVEST CHANGES AND SPOILAGE **10**

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

UNIT III: FOOD SAFETY **20**

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

UNIT IV: PRINCIPLES AND METHODS OF PRESERVATION **12**

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

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

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

PRACTICALS

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

COMPULSORY READING:

· Frazier, W.C. & Westhoff, D.C. (2017). *Food Microbiology*. Tata McGraw-Hill Publishing Company Limited.

· Srivastava, S.S.(2006). *Phal Parirakshan*. Lucknow: Kitab Mahal.

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

ADDITIONAL RESOURCES:

· Khurdia, D.S. (1995). *Preservation of fruits and vegetables*. New Delhi: Indian Council of Agriculture Research.

· Knechtges, L.I. (2012). *Food Safety-Theory and Practice*, USA: Jones and Barlette Learning.

· Ramaswamy, H. & Marcott, M. (2005). *Food Processing Principles and Applications*. CRC Press

· Siddhapa GS, Lal G and Tandon.(1998) *Preservation of fruits and vegetables*. Indian Council of Agriculture Research, New Delhi..

· Subbalakshmi, G., & Udipi, S.A. (2007). *Food Processing and Preservation*. Delhi: New Age International Publishers.

· The Food Safety and Standards Act along with Rules and Regulations. (2011) Delhi: Commercial Law Publishers (India) Pvt Ltd.

· Mathur, P. (2018). *Food Safety and Quality Control*. Orient Blackswan.

WEBSITES:

· Food safety and Standards Authority of India. www.fssai.gov.in

· National Center for Home Food Preservation. http://nchfp.uga.edu/

· Ministry of Food Processing Industry website http://mofpi.nic.in/

TEACHING LEARNING PROCESS:

· Lectures

· Power point presentations.

· Market survey

· Experiential learning through demonstrations

· Experimental learning

ASSESSMENT METHODS:

As per Delhi University norms

KEYWORDS:

· Department of Food Technology

· Postharvest changes

· Principles of Preservation

· FSSAI

· HACCP

· Processing of sauces

· Processing of beverages

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DSE FT 1: ADVANCED BAKING TECHNOLOGY
SEMESTER: V/VI

OBJECTIVES:

· To impart students with knowledge related to processing of breads, biscuits and cookies.

· To familiarize them with basics of food packaging, marketing and cost control.

COURSE LEARNING OUTCOMES:

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

THEORY **LECTURES: 60**

UNIT I: BREAD TECHNOLOGY **14**

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

UNIT II: BISCUIT AND COOKIES TECHNOLOGY **12**

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

UNIT III: FOOD PACKAGING **14**

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

UNIT IV: MARKETING AND COST CONTROL **12**

· Marketing - definition, scope, understanding the 4Ps (Product, Price, Place, Promotion), marketing techniques, marketing and distribution of processed products
· Cost control – food cost, labour cost and other costs; costing of processed products

PRACTICAL

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

COMPULSORY READING:

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

ADDITIONAL RESOURCES:

· Athalye AS (1992). *Plastics in Food Packaging*. Tata McGraw Hill Publishing Company, Delhi.
· Booth GR (2003). *Snack Foods*. CBS Publishers, Delhi.

· Faridi H (2004). *The Science of Cookie and Crackers Production*. CBS Publishers, Delhi.
· Griffin S (1997). *Principles of Food Packaging*. The AVI Publishing Company, Connecticut.
· Ketrapaul N, Grewal RB, Jood S (2005). *Bakery Science and Cereal Technology*. Daya Publishing House, Delhi.
· Khanna K, Gupta S, Seth R, Mahana R, Rekhi T (2004). *The Art and Science of Cooking*. Phoenix Publishing House Private Limited, Delhi.
· Potter N, Hotchkiss JH (2006). *Food Science*. CBS Publishers, Delhi.
· Raina U, Kashyap S, Narula V, Thomas S, Suvira, Vir S, Chopra S (2005). *Basic Food Preparation – A Complete Manual*. Orient Longman.
· S. Sharma, M. Aggarwal & D. Sharma, (2018). *Food Frontiers.* New Delhi Publishers, Delhi, India.

WEBSITES:

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

TEACHING LEARNING PROCESS:

· Lecture
· Demonstration
· Experimental learning
· Market Survey
· Power Point Presentation
· Videos
· Quiz
· Assignments
· Handouts

ASSESSMENT METHODS:

As per University of Delhi norms.

KEYWORDS:

· Department of Food Technology
· Bread Technology
· Biscuits and Cookies Technology
· Food packaging
· Marketing
· Cost control
· Qualitative tests of wheat flour and yeast

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DSE-FT 2: ADVANCED FRUIT AND VEGETABLE PRESERVATION TECHNOLOGY
SEMESTER: V/VI

COURSE OBJECTIVES:

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

COURSE LEARNING OUTCOMES:

- Describe the different principles and methods of fruit and vegetable preservation and processing.
- Compare preservation techniques such as Dehydration versus Concentration, Refrigeration versus Freezing and also processed products such as Jams and Jellies versus Marmalades.
- Describe the various steps in dehydration, freezing, canning, pectin products, preserves and pickles.
- State the importance and challenges of new food product development and state its types.
- Prepare, package and label jams, jelly, marmalade, pickles and preserves professionally.
- Use sensory evaluation and objective evaluation techniques (TSS, pH) to test these products.
- Produce a preserved product in bulk and calculate the cost and organize an exhibition-cum-sale.

THEORY: LECTURES: 60

UNIT I: DEHYDRATION AND CONCENTRATION 16

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

· Concentration- definition and objectives, techniques

UNIT II: REFRIGERATION AND FREEZING 8

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

UNIT III: CANNING 9

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

UNIT IV: INTRODUCTION TO NEW FOOD PRODUCT DEVELOPMENT 6

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

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

· Jam, Jelly and Marmalade- definition, role of pectin and theory of gel formation, method of preservation, steps of preparation, evaluation

· Preserves- definition, method of preservation, steps of preparation, evaluation, candied, crystallized and glazed fruits

· Pickles- definition, classification, method of preservation, steps of preparation of vinegar pickles, evaluation

PRACTICAL:

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

· Jam (apple jam and mixed fruit jam)

· Jelly (guava jelly)

· Marmalade (orange marmalade)

· Pickle (green chilli, lemon, mixed vegetable)
· Preserve (carrot)
· Dehydration of vegetables (green leafy vegetables, other vegetables and tubers)
· Freezing of vegetables.
· Determination of headspace, total soluble solid content and acidity of different preserved foods.
· Preparing any of the preserved product/new product in bulk and organizing an exhibition-cum-sale.

COMPULSORY READING:

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

ADDITIONAL RESOURCES:

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

WEBSITES:

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

TEACHING LEARNING PROCESS:

· Lecture
· Discussion
· Power Point presentation
· Handouts
· Field visits
· Videos
· Demonstration
· Experimental learning

ASSESSMENT METHODS:

As per Delhi University norms

KEYWORDS:

· Department of Food Technology
· Fruit and Vegetable Preservation
· Dehydration
· Freezing
· Canning
· Jam, Jelly and Marmalade
· Preserves
· Pickles

· New Food Product Development

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DSE-FT 3: FOOD SAFETY, HYGIENE AND QUALITY TESTING
SEMESTER: V/VI

COURSE OBJECTIVES:

· To support the supply of safe and wholesome food
· To provide in-depth understanding to students regarding food safety and hygiene
· To increase knowledge related to management and enhancement of quality
· To gain knowledge related to food quality assessment tests using simple techniques and equipment

COURSE LEARNING OUTCOMES:

After studying the paper on Food Safety Hygiene and Quality Testing, the students will be able to:

· Gain basic understanding of food safety and its related issues
· Illustrate risk factors and newer challenges associated with food safety
· Understand and apply general principles of food hygiene
· Relate the relevance of various quality management systems/ approaches and training for weaving the culture of food safety at various levels
· Have knowledge regarding the role of various global and national regulatory agencies in maintaining food quality and harmonizing international trade
· Describe salient physical, sensory and chemical methods of food quality testing.
· Scientifically assess the quality of food using sensory, physical and microbiological methods.

THEORY: **LECTURES: 60**

UNIT I: FOOD LAWS AND REGULATIONS **12**

· Introduction to food acts laws and standards
· National food safety and standard act
· International standards, regulatory agencies
· Consumer protection act

UNIT II FOOD QUALITY MANAGEMENT **12**

· Characteristics of quality
· Quality Control,
· Quality Assurance
· Total Quality Management
· Quality Management System
· Good Manufacturing Practices
· Hazard Analysis Critical Control Point System (HACCP)

UNIT III INTRODUCTION TO FOOD SAFETY AND HYGIENE **10**

· Food hygiene
· Factors affecting food safety
· Food spoilage
· Food handling
· Special requirements for high-risk foods,
· Safe food cooking temperature and storage techniques.

UNIT IV HYGIENE AND SANITATION IN FOOD SERVICE INSTITUTIONS 8

- Cleaning and disinfection
- Personal hygiene
- Pest control
- Waste disposal

UNIT V SENSORY METHODS OF FOOD QUALITY TESTING 8

- Sensation of taste, smell, appearance and flavor, sensory evaluation techniques

UNIT VI OBJECTIVE METHODS OF FOOD QUALITY TESTING 10

- Physical test methods (moisture, acidity, water activity, texture, viscosity, colour)
- Simple methods of chemical analysis (protein, fat, water, ash)
- Microbiological sampling and testing.

PRACTICAL: PERIODS: 60

- Presentation on food hygiene and sanitation practices in any local food outlet.
- Sensory evaluation tests for processed foods
- Determination of the quality of an egg (whole and open egg).
- Determination of the moisture content of various flours
- Determination of viscosity of various food gruels (porridge, custards, batters etc.) using viscometer.
- Assessing the texture of raw and cooked food using penetrometer.
- Measurement of the water activity (a_w) of raw and cooked food using AW – meter.
- Detection of pathogens in food using microbiological detection kits

COMPULSORY READING:

- Mathur P. Food Safety and Quality Control. 2018. Orient Blackswan.
- Srilakshmi B. Food Science. 2016. New Age International Pvt. Ltd.
- Suri S and Malhotra A. Food Science Nutrition and Safety. 2014. Pearson India Ltd.

ADDITIONAL RESOURCES:

- Frazier WC and Wethoff DC. Food Microbiology. 1988. McGraw Hill.
- IFST. Food and Drink – GMP: a guide to its responsible Management. 2012. UK Institute of Food Science and Technology.
- Marriott NG and Gravani RB. Principles of Food Sanitation. 2006. Springer.
- Sethi M and Malhan S. Catering management – an integrated approach. 2018. New Age International Publishers.
- Prabhakar K. A Practical Guide to Food laws and Regulations. 2016. Bloomsburg India.

WEBSITES:

- Codex Alimentarius: http://www.codexalimentarius.org
- Hand Hygiene Resource Center: http://www.handhygiene.org
- Food Safety and Standards Authority of India: http://www.fssai.gov.in
- International Center of Excellence in Food Risk Communication: http://www.foodriskcommunications.com
- International Food Information Council: http://www.ific.org

TEACHING LEARNING PROCESS:

- Use of ICT especially e graphics such as power point presentations
- Lectures
- Group discussions

- Assignment work
- MOOCS, Videos
- Conduct of Practicals by students
- Field visits (optional)

ASSESSMENT METHODS:

As per Delhi University norms

KEYWORDS:

- Food Safety
- Food Hygiene
- FSSAI
- HACCP
- Food Quality Management
- Food Hygiene

DSE-FT 4: PROJECT/ DISSERTATION
SEMESTER-V/VI

COURSE OBJECTIVES:

- To enable students to design and conduct original and ethical research.
- To develop ability among students to do review of literature.
- To develop ability in students to write a dissertation in the APA format.

COURSE LEARNING OUTCOMES:

- Improved analytical skills
- Better understanding regarding data collection
- Greater skills to write scientific work.

PRACTICAL:

FIELD WORK

Write a dissertation in the APA format. The research done can either be empirical/data based (quantitative, qualitative, or mixed-methods) or it can be in the form of a critical review of research and theory.

COMPULSORY READINGS:

- APA manual for dissertation
- Aggarwal, B.L. (2015). Basic Statistics. Sixth Edition. New Age International Private Limited. Delhi.
- Spectrum. (2018). Statistical Analysis, Graph and Diagram (Hindi). Spectrums, Delhi.
- Dharmpalan, B. (2012). Scientific Research Methodology. Alpha Science International Limited. Delhi.

ADDITIONAL RESOURCES:

- Parija, S.C., & Kate, V. (2017). Writing and publishing a Scientific Research Paper. Springer, USA.
- Turabian, K.L. (2018). A Manual for Writers of Research Papers, Theses and Dissertations. Ninth Edition. Chicago Editorial Press, USA.
- Longwah, T., Ananthan, R., Bhaskaracharya, K., & Venkaiah, K. (2017). Indian Food Composition Tables. National Institute of Nutrition (Indian Council of Medical Research) & Department of Health Research, Ministry of Health and Family Welfare, Government of India, Telangana, India.
- Kothari, C.R., & Garg, G. (2019). Research Methodology: Methods and Techniques. New Age International Publishers, Delhi.

· Lovegrove, J.A., Hodson, L., Sharma, S., Lanham-New, S.A., & Krebs, L.J. (2015). Nutrition Research Methodologies. Wiley Blackwell, USA.
· Khanna, K., Gupta, S., Seth, R., Mahna, R., & Rekhi, T. (2005). The Art and Science of Cooking: A practical Manual. Fifth Edition, Elite Publishing House Pvt. Ltd. Delhi.
· Chadha, R., & Mathur, P. (2015). Nutrition: A Lifecycle Approach. Orient Blackswan, Delhi.
· Suri, S., & Malhotra, A. (2014). Food Science, Nutrition and Safety. Pearson India Education Services Pvt. Limited, Delhi.
· Mathur, P. (2017). Food Safety and Quality Control. Orient Blackswan, Delhi.

WEBSITES:

· Codex Alimentarius: http://www.codexalimentarius.org
· Food Safety and Standards Authority of India: http://www.fssai.gov.in

TEACHING LEARNING PROCESS:

· Power point presentation
· Field Work

ASSESSMENT METHOD:

As per University of Delhi norms (Viva jointly by one internal and one external examiner).

KEYWORDS:

· Department of Food Technology
· Dissertation
· APA format

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SEC FT 1: FOOD PRODUCT DEVELOPMENT
CREDITS: PRACTICAL- 4

COURSE OBJECTIVES:

· To understand the concept of development of a new food product.
· To develop new food products scientifically based on special dietary requirements/functionality/convenience/improvisation of existing traditional Indian foods.

COURSE LEARNING OUTCOMES:

· Identify the area/product on which they want to pursue their trials on the basis of their skills, aptitude and acquired knowledge.
· Develop a food product scientifically.
· Understand the concept of market survey and literature review for new product development.
· Standardize a recipe, do packaging and cost analysis of the developed product.
· Write a project report.

PRACTICAL: **PERIODS: 120**

· Development of New Product: Definition, Importance, Objectives & Need of product development, Reasons of failure, Types and Steps of product development, Product development tools and their use.
· Market and literature survey to identify the concepts of new products based on special dietary requirements, functionality, convenience and improvisation of existing traditional Indian foods.
· Screening of product concept on the basis of techno-economic feasibility.
· Development of prototype product and Standardization of formulation process.

· Proximate Analysis of New Product.
· Packaging, labeling and shelf-life studies.
· Cost analysis and Final Project Report.
· Each team/group of students would develop a food product on the basis of above mentioned lines/steps and would submit a project report.

COMPULSORY READING:

· Anil Kumar, S., Poornima, S.C., Abraham, M.K. & Jayashree, K. (2004). *Entrepreneurship Development*. New Age International Publishers.
· Moskowitz, Howard and Saguy, R. I. Sam. (2009). *An Integrated Approach to New Food Product*, CRC Press.
· Fuller, Gordon W. (2004). *New Product Development- From Concept to Marketplace*, CRC Press.

ADDITIONAL RESOURCES:

· Longvah T, Ananthan R, Bhaskarchary K and Venkaiah K. NIN (ICMR), (2017). *Indian Food Composition Tables*.
· S. Sharma, M. Aggarwal & D. Sharma, (2018). *Food Frontiers.* New Delhi Publishers, Delhi, India.
· Fadi Aramouni and Kathryn Deschenes. (2015). *Methods for developing new food products: An instructional guide*. DES Tech Publications Inc.
· Steve Osborn and Wayne Morley. (2016). *Developing Food Products for consumers with specific dietary needs*. Woodhead Publishing, USA.

WEBSITES:

· Food Safety and Standards Authority of India: http://www.fssai.gov.in.
· Central Food Technology Research Institute: http://www.cftri.com.
· Food International Food Information Council: http://www.ific.org.
· International Union of Food Science and Technology: http://www.iufost.org.

TEACHING LEARNING PROCESS:

· Experimental learning
· Lecture
· Demonstration
· Group discussion
· Power Point Presentation
· Videos
· Field visits
· Market survey
· Handouts

ASSESSMENT METHODS:

As per University of Delhi norms.

KEYWORDS:

· Department of Food Technology.
· Food packaging.
· Labeling.
· Cost analysis.
· Shelf life studies.
· Food Product Development.

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SEC FT 2: ENTREPRENEURSHIP DEVELOPMENT
CREDITS: PRACTICAL- 4

COURSE OBJECTIVES:

· To learn techniques for development of entrepreneurial skills.
· To learn basic aspects of preparation of business plan and its assessment.

COURSE LEARNING OUTCOMES:

· Describe and identify various case studies of successful entrepreneurs.
· Do SWOT Analysis of a food business.
· Prepare a business plan and project report.
· Do market survey for identification of food business opportunities.
· Generate food business ideas.

THEORY **LECTURES: 60**

UNIT I: ENTREPRENEURIAL DEVELOPMENT **20**

· Case studies of successful entrepreneurs.
· Exercises on ways of sensing opportunities – sources of idea, creating efforts, SWOT Analysis.
· Entrepreneurial skill assessment test.
· Techniques of development of entrepreneurial skills, positive self image and locus of control.

UNIT II: FOOD BUSINESS MANAGEMENT **40**

· Case studies of Food Processing Business and its aspects.
· Business opportunity Identification and Assessment techniques.
· Business Idea Generation and evaluation exercise.
· Market Assessment study Analysis of competitive situation.
· SWOT Analysis for business and for competitors.
· Preparation of business plan.
· Preparation of project report.
· Methods of Arrangement of inputs – finance and material.

COMPULSORY READING:

· Chandra, P. (1996). *Projects, Planning, Analysis, Selection, Implementation and Review*. Tata McGraw-Hill Publishing Company Limited, New Delhi.
· David, H. Holt (2002). *Entrepreneurship – A new Venture Creation*. Prentice Hall of India, New Delhi.
· Vasant, D. (2012). *Fundamentals of Entrepreneurship and Small Business Management*. Himalaya Publishing House Pvt. Ltd., Mumbai.

ADDITIONAL RESOURCES:

· Acharya, S. S. and Agarwal, N. L. (1987). *Agricultural Marketing in India*, Oxford & ISH Publishing Co., New Delhi.
· David, D. and Erickson S. (1987). *Principles of Agri Business Management*, McGraw Hill Book Co., New Delhi.
· Phillip, K. (1994). *Marketing Management*, Prentice Hall of India Private Limited, New Delhi.
· Vasant, D. (2011). *The Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House Pvt. Ltd., Mumbai.

· Rameshwari, P. (2016). *Skill Development & Entrepreneurship in India*, New Century Publications.
· Umesh, S. and Vaibhav, M. (2009). *Entrepreneurship Development & Management*, Abhishek Publications.

WEBSITES:

· Inc. Magazine Guides: https://www.inc.com/.
· Entrepreneur.com/inspiration: https://www.entrepreneur.com/topic/inspiration.
· Bloomberg.com/leaders/ https://www.bloomberg.com/series/high-flyers.
· A Smart Bear: https://blog.asmartbear.com/.

TEACHING LEARNING PROCESS:

· Lecture
· Power Point Presentation
· Videos
· Quiz
· Assignments
· Handouts

ASSESSMENT METHODS:

As per University of Delhi norms.

KEYWORDS:

· Department Food Technology.
· Business Management.
· Entrepreneurial Development.
· Business Plan.
· Project Report.

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SEC FT 3: CONFECTIONERY TECHNOLOGY
CREDITS: PRACTICAL- 4

COURSE OBJECTIVES:

· To learn basic principles of sugar cookery.
· To develop skills for preparation of confectionery products.

COURSE LEARNING OUTCOMES:

· Demonstrate the effect of heat on sugar solutions at different temperatures.
· Show case skills developed for preparation of various crystalline and non-crystalline candies.
· Exhibit skills learnt for preparation of icing and cake decorations.

PRACTICAL:

· **Sugars**- Types and sources, methods of preparation of sugars, jaggery, khandsari, raw and refined sugar. Principles of sugar cookery, crystalline and non- crystalline candies.
· **Confectionary Products**: Cake icings, hard-boiled candies, toffees, fruit drops, chocolates and other confections- ingredients, equipment & processes, product quality parameters, faults and corrective measures.
· Determine the effect of heat on sugar solution and perform the thread and cold water test.
· To study the process of inversion, melting and caramelization in sucrose.
· Preparation of fondant, fudge and brittles.
· Preparation of shakarpara/chenna murki/candied Fruit/rock candy/chocolates.

· Preparation of candy and toffee and to perform quality assessment tests.
· Preparation of icing and other cake decorations.

COMPULSORY READING:

· Manay, S. & Shadaksharaswami, M. (2004). *Foods: Facts and Principles*, New Age Publishers.
· Minifie B.W. (1999). *Chocolate, Cocoa and Confectionary*, Aspen Publication.
· Sethi M, Eram Rao. (2011). Food *Science- Experiments and applications*, 2nd Edition, CBS Publishers and Distributors Pvt. Ltd.

ADDITIONAL RESOURCES:

· Beckette S.T. (2009). *Industrial Chocolate Manufacture*, Blackwell Publishing Ltd.
· Richard W. Hartel, Joachim H. von Elbe, and Randy Hofberger. (2018). *Confectionery Science and Technology*, Springer 1st ed.
· Raina et.al. (2003). *Basic Food Preparation - A complete Manual*. 3rd Ed. Orient Longman Pvt. Ltd.

WEBSITES:

· Icings: https://nios.ac.in/media/documents/bakery/Lesson%204%20Icings.pdf
· Introduction To Confectionery: https://cbseportal.com/sites/default/files/Download-Vocational-e-Books-Bakery-and-Confectionery.pdf
· Bakery and Confectionery: http://www.eiilmuniversity.co.in/downloads/Bakery_&_confectionery.pdf

TEACHING LEARNING PROCESS:

· Experimental learning
· Lecture
· Demonstration
· Power Point Presentation
· Videos
· Quiz
· Assignments
· Handouts

ASSESSMENT METHODS:

As per University of Delhi norms.

KEYWORDS:

· Department of Food Technology
· Effect of heat on sugar
· Confectionary Products
· Candy
· Icing
· Cake decorations

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SEC FT 4: NUTRITION AND WELLBEING
SEMESTER: III/IV/V/VI

COURSE OBJECTIVES:

· To learn basics of meal planning.
· To learn preparation of nutritious snacks

- To learn basics of nutritional labeling and estimation of nutritional status.

COURSE LEARNING OUTCOMES:

- Use Food Composition Tables for identification of food sources for various nutrients.
- Utilize the technique of 24-hour recall for recording diets.
- Use the food exchange system for meal planning.
- Plan and prepare nutritious snacks for different age and income groups.
- Calculate BMI and use other anthropometric methods for assessing nutritional status.
- Read and interpret nutrition information on labels.

PRACTICAL

- Identification of food sources for various nutrients using food composition tables.
- Record diet of self using 24 hour dietary recall and its nutritional analysis.
- Introduction to meal planning, concept of food exchange system.
- Planning of meals for adults of different activity levels for various income groups.
- Planning of nutritious snacks for different age and income groups.
- Preparation of nutritious snacks using various methods of cooking.
- Nutritional labeling of food products.
- Estimation of BMI and other nutritional status parameters.

COMPULSORY READING:

- Wardlaw's *Perspectives in Nutrition*, 10th Edition (2015). Mc Graw- Hill Education.
- NIN (ICMR). Longvah T, Ananthan R, Bhaskarchary K and Venkaiah K (2017). *Indian Food Composition Tables.*
- ICMR (2010). *Nutrient Requirements and Recommended Dietary Allowances for Indians*.

ADDITIONAL RESOURCES:

- Srilakshmi, S. (2007). *Food Science*, New Age International Ltd.
- Gibney et al. (2005). *Introduction to Human Nutrition*, Blackwell Publishers.
- Khanna K, Gupta S, Seth R, Mahna R, Rekhi T. (2004). *The Art and Science of Cooking: A Practical Manual*, Revised Edition. Elite Publishing House Pvt Ltd.
- Bamji M. S., Krishnaswamy K., Brahmam G. N. V. (2009). *Textbook of Human Nutrition*. 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd.
- Seth V., Singh K. (2005). *Diet planning through the Life Cycle: Part 1. Normal Nutrition. A Practical Manual*. Fourth edition, Elite Publishing House Pvt. Ltd.
- Sethi P., Lakra P. (2015). *Aahar Vigyan, Poshan evam Suraksha*. Elite Publishing House Pvt. Ltd.
- Suri .S and Malhotra A. (2014). *Food Science, Nutrition and Safety*. Pearson India Ltd.

WEBSITES:

- For labeling guidelines: Food Safety and Standards Authority of India: http://www.fssai.gov.in.
- National Institute of Nutrition: http://www.nin.res.in.

TEACHING LEARNING PROCESS:

- Experimental learning
- Lecture
- Demonstration
- Power Point Presentation
- Videos
- Quiz
- Assignments

· Handouts

ASSESSMENT METHODS:

As per University of Delhi norms.

KEYWORDS:

· Nutrition & Wellbeing.
· Nutritional Labeling.
· BMI.
· Meal Planning.
· Department of Food Technology.

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SEC FT 5: MILK AND MILK PRODUCT TECHNOLOGY
SEMESTER: III/IV/V/VI

COURSE OBJECTIVES:

· To equip students with skills required to purchase, store, process and distribute milk and milk products
· To help students in understanding the unit operations necessary for working or setting up or running a micro-enterprise related to milk/milk products.

COURSE LEARNING OUTCOMES:

After studying the paper, the student will be able to:

· Conduct sensory and objective analysis of milk and milk product quality
· Determine the effect of various factors on shelf life of milk and milk products
· Showcase skills for preparing and packaging various milk products
· Remain updated with current trends in milk industry.

PRACTICAL: **PERIODS: 120**

· To study the sensory and other quality parameters (SNF and adulterants) of milk
· To study the effect of different temperatures on the keeping quality of pasteurized milk
· To study the factors influencing shelf life of milk products such as paneer, curd, lassi, ice-cream and fermented milk
· To learn the preparation, packaging and storage of following milk products:
· Curd/Yogurt and products
· Cottage Cheese and products
· Khoa, condensed milk and their products
· Butter and Buttermilk
· Ice-cream
· Indian milk based desserts
· To conduct a market survey on milk and milk products with special reference to their packaging, sale and information mentioned on their packs.

COMPULSORY READING:

- FAO. (1979). *Practical Manual of Milk Technology*. AGRIS-FAO, Spain.
- FSSAI. (2015). *Manual of Methods of Analysis of Foods: Milk and Milk Products*. Lab Manual 1. FSSAI, Delhi.
- Khanna, K., Gupta, S., Seth, R., Mahna, R., & Rekhi, T. (2005). *The Art and Science of Cooking: A practical Manual*. Fifth Edition, Elite Publishing House Pvt. Ltd. Delhi.

ADDITIONAL RESOURCES:

· Eram, S. Rao. (2011). *Food Science Experiments and Applications*. CBS Publishers. 2nd Edition.

- Frazier, W.C., & Westhoff, D.C. (1995). *Food Microbiology*. Tata McGraw-Hill Publishing Company Limited.
- Knechtges, L.I. (2012). *Food Safety-Theory and Practice*, USA: Jones and Barlette Learning.
- The Food Safety and Standards Act along with Rules and Regulations. (2011). *The Food Safety and Standards Act along with Rules and Regulations*. Delhi: Commercial Law Publishers (India) Pvt Ltd.
- Rathore, N.S., Chasta, S.S., & Mathur, G.K. (2008). *Fundamentals of Dairy Technology*. Himanshu Publications, Delhi.
- Sacheti, A.K. (1988). *Dairying: Instructional-cum-Practical Manual. Milk and Milk Products.* NCERT, Delhi.
- Board, EIRI. (2009). *Milk Processing and Dairy Products Industries*. Engineers India Research Institute, Delhi.

WEBSITES:

· Indian Dairy Association: http://indairyasso.org/

· Codex Alimentarius: http://www.codexalimentarius.org

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

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SEC FT 6: HOME BASED CATERING

SEMESTER: III/IV/V/VI

COURSE OBJECTIVES:

· To teach students the importance of food safety, hygiene and sanitation in catering business.

· To enable students to plan a food catering unit, developing the ideology behind good teamwork and hierarchical structures for business development.

· To enable students proposal for a catering unit establishment and menu for an event.

COURSE LEARNING OUTCOMES:

· Identify, develop and determine the factors contributing to the growth and planning of food catering unit.

· Describe the importance of menu planning and also factors affecting it in different food service establishments.

· Determine different food purchasing methods, techniques of food preparation, standardization of recipe, portion control and resources management.

· Understand the importance of food safety, hygiene and sanitation in catering business.

· Write proposal for a catering unit establishment and menu for an event.

· Understand the ideology behind good teamwork and hierarchical structures for business development.

THEORY: LECTURES: 60

UNIT I: INTRODUCTION TO FOOD SERVICE 8

· Factors contributing to the growth of food service industry

· Kinds of food service establishments

UNIT II: RESOURCES 8

· Tangible resources- Money, Manpower, Time, Facilities and Equipment, Utilities

UNIT III: FOOD PRODUCTION **10**

· Menu planning: Importance & Functions of menu, Types of Menu, Skills required for Menu Planning, Factors affecting menu planning, Menu planning for different kinds of food service units

UNIT IV: FOOD PURCHASE AND STORAGE **14**

· Food Purchase: Definition, Principles, Function, Process and Methods. Receiving and Inspection of deliveries

· Food Storage: Definition, Storage procedure (Dry & Wet, Perishable & Non Perishable), Organization of Storage

UNIT V: QUANTITY FOOD PRODUCTION **10**

· Definition, Standardization of recipes (percentage method), Recipe adjustments and portion control

· Hygiene and Sanitation

UNIT VI: PLANNING OF A FOOD SERVICE UNIT **10**

· Preliminary Planning: Management process, Define preliminary planning and Planning, Steps and types of plan, Planning guide/ prospectus, identifying clientele, menu, operations and delivery.

COMPULSORY READINGS:

· Sethi, M. (2005). *Institution Food Management*, New Age International Publishers.

· West, B. B. and Wood, L. (1986). Food service Institutions, 6th edition, Mac Millian Publishing Co.

· Taneja, S. and Gupta, S. L. (2001). *Enterpreneurship Development*, Galgotia Publishing.

ADDITIONAL RESOURCES:

· Knight, J. B. & Kotschevar, L.H. (2000). *Quantity Food Production Planning and Management* (3rd edition). John Wiley & Sons.

· Philip, E Thangam. (2008). *Modern Cookery for Teaching and Trade Part I & II*, Orient Longmam.

· Khan, M A. (1987). *Food Service Operations*, AVI Publishing INC, Connecticut.

· Malhotra, R K. (2002). Food Service and Catering Management, Anmol Publication Pvt Ltd.

· Taylor, E. and Taylor, J. (1990). *Mastering Catering Theroy*, Macmilan Press Ltd. London.

· Wood R C. (1994). *Organizational behaviour for Hospitality Management* (First ed.). Oxford , London, Boston.

WEBSITES:

· http://egyankosh.ac.in/bitstream/123456789/33548/1/Unit-2.pdf

· http://ncert.nic.in/textbook/pdf/lehe104.pdf

· http://foodplanning.umich.edu/download/FoodServicePlanningGuidelines.pdf

TEACHING LEARNING PROCESS:

· Power point presentation

· Lecture

· Group discussions

· Assignments

· Videos

ASSESSMENT METHOD:

As per University of Delhi norms.

KEYWORDS:

- Department of Food Technology
- Catering
- Food Service
- Food Production
- Food Purchase Food Storage
- Food Service Unit

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GE-FT-1: BAKING TECHNOLOGY
SEMESTER: V/VI

COURSE OBJECTIVES:

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

COURSE LEARNING OUTCOMES:

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

THEORY: LECTURES: 60

UNIT I: BAKING INDUSTRY 8

Baking industry and its scope in the Indian economy. Present Trends and Prospects.

UNIT II: CAKE TECHNOLOGY 12

Preparation of cakes - types of cakes; ingredients used; 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.

UNIT III: PASTRY TECHNOLOGY 10

Preparation of pastry - types of pastries (short crust, puff/flaky and choux pastry); ingredients; processing and evaluation. Faults and Remedies.

UNIT IV: BISCUIT AND COOKIES TECHNOLOGY 10

Preparation of biscuits and cookies – types; ingredients; processing and evaluation.

UNIT V: FOOD SAFETY 8

- Key terms, factors affecting food safety.
- Food additives used in baking

UNIT VI: MARKETING AND COST CONTROL 12

- Marketing - definition, scope, marketing techniques, marketing and distribution of processed products.
- Cost control – food cost, labour cost and other costs.

PRACTICAL: PERIODS: 60

- Weights and measures, selection of raw material.
- Preparation, sensory evaluation and packaging of cakes.

- Fatless sponge cakes
- Shortened cakes
- Eggless cakes
- Muffins and brownies
- Preparation, sensory evaluation and packaging of pastries-
- Short crust,
- Puff/flaky,
- Choux pastry
- Preparation, sensory evaluation and packaging of biscuits.

COMPULSORY READING:

- Dubey SC. (2007)Basic Baking-Science and Craft. Society of Indian Bakers, Delhi.
- Matz A. (1998) Bakery Technology and Engineering. CBS Publishers, Delhi. Ketrapaul N, Grewal RB, Jood S. (2005) Bakery Science and Cereal Technology. Daya Publishing House, Delhi.
- Faridi H. (2004)The Science of Cookie and Crackers Production. CBS Publishers,Delhi.
- Edward, W P,(2007)The Science of Bakery Products, RSC Publishing,
- Suri S and Malhotra A(2014). Food Science, Nutrition and Safety, Pearson India Ltd.

ADDITIONAL RESOURCES:

- Raina U, Kashyap S, Narula V, Thomas S, Suvira, Vir S, Chopra S.(2005) Basic Food Preparation – A Complete Manual. Orient Longman.
- Khanna K, Gupta S, Seth R, Mahana R, Rekhi T (.2004) The Art and Science of Cooking. Phoenix Publishing House Private Limited, Delhi.
- Kent NL. (2004) Technology of Cereals. Pergamon Press, London.
- Matz A. (1998) Bakery Technology and Engineering. CBS Publishers, Delhi Edward , W P9
- Food safety and Standards Authority of India. www.fssai.gov.in

TEACHING LEARNING PROCESS

- Lectures
- Use of textbooks and handouts Power point presentations Practicum
- Demonstration

ASSESSMENT METHODS:

As per University of Delhi norms.

KEYWORDS:

- Department of Food and Nutrition
- Sponge cake
- Cream cake
- Pastry Biscuits

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GE-FT-2: FRUIT AND VEGETABLE PRESERVATION TECHNOLOGY
SEMESTER: V/VI

COURSE OBJECTIVES:

- To impart students with basic knowledge related to fruit and vegetable preservation.
- To impart knowledge of preservation of fruits and vegetables.

LEARNING OUTCOMES:

After completing this course the learner will be able to:

· Describe the purpose and scope of preservation and processing.

· Have an understanding of the different post-harvest changes in fruits and vegetables.

· Gain knowledge regarding various aspects of food safety including regulations at national level.

· State the principles and methods of processing and preservation of fruits and vegetables.

· Possess skills for preparing, preserving, packaging and evaluating chutneys, sauces, fruit beverages, jam, jelly, marmalade, preserves and pickles.

THEORY **LECTURES: 60**

UNIT I: PURPOSE AND SCOPE OF PRESERVATION **4**

· Objectives of preservation and processing

· Scope of preservation Industry in India

UNIT II FOOD SAFETY REGULATIONS **10**

· Key terms, factors affecting food safety, recent concerns

· National food law (FSSA), standards and regulations

· Food additives and contaminants.

· Hygiene and sanitation.

· HACCP

UNIT III: PRINCIPLS AND METHODS OF PRESERVATION **12**

· Asepsis

· Low temperature

· High temperature

· Removal of moisture

· Use of chemical preservatives

· Fermentation

· Irradiation

· Newer methods

UNIT IV: FRUIT AND VEGETABLE PROCESSING **34**

· Chutney and Sauces- Definition, method of preservation, steps in preparation of chutney and sauces.

· Fruit beverages- Definition and classification, method of preservation (with special emphasis on pasteurization, use of chemical preservatives, sugar) role of various ingredients.

· 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.

PRACTICAL: **PERIODS: 60**

· To equip students with skills required for preservation, packaging and evaluation of fruit and vegetable products.

· Preparation, packaging, labeling, sensory and objective (TSS, pH) evaluation of:

· Sauces and chutnies

· Ketchup (tomato)

· Squashes (lemon squash, orange squash, pineapple squash)
· Syrups (rose syrup and almond syrup)
· Jams (apple jam and mixed fruit jam)
· Pickles (green chilli, lemon, mixed vegetable)
· Preserves (carrot)

COMPULSORY READING:

- Srivastava SS. Phal Parirakshan. Kitab Mahal, Lucknow 2006.
- Potter N, Hotchkiss JH. Food Science. CBS Publishers, Delhi 2006
- Siddhapa GS, Lal G and Tandon. Preservation of fruits and vegetables. Indian Council of Agriculture Research, New Delhi, 1998.

ADDITIONAL RESOURCES:

- Khurdia DS. Preservation of fruits and vegetables. Indian Council of Agriculture Research, New Delhi 1995.
- Subbalakshmi G, Udipi SA. Food Processing and Preservation. New Age International Publishers, Delhi 2007.
- Ramaswamy H and Marcott M. Food Processing Principles and Applications. CRC Press, 2005.
- The Food Safety and Standards Act along with Rules and Regulations. Delhi: Commercial Law Publishers (India) Pvt Ltd, 2011.
- Frazier WC and Westhoff DC. Food Microbiology. Tata McGraw-Hill Publishing Company Limited,1995.
- Knechtges LI. Food Safety-Theory and Practice, USA: Jones and Barlette Learning 2012.
- Srivastava RP and Kumar S. Fruit & Vegetable Preservation. International Book Distributing Co. Lucknow 2005
- Suri S and Malhotra A. Food Science, Nutrition and Safety. Pearson India Ltd. 2014
- वर्मा वी आर। खाद्य संरक्षण सिद्धांत एवं विधियाँ। हिंदी प्रचारक संसथान। वाराणसी

TEACHING LEARNING PROCESS:

· Power point presentation
· Lectures
· Experimental Learning

ASSESSMENT PROCESS:

As per University of Delhi norms.

KEYWORDS:

· Pectin
· Preserves
· Food Safety
· Department of Food Technology

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