

Avinashilingam Institute for Home Science and Higher Education for Women
Coimbatore 641 043, Tamil Nadu, India

B.Voc Food Processing and Engineering
Scheme of Instruction & Examination
(For the students admitted from 2019-20 and onwards)

Part	Subject Code	Name of paper/component	Instruction periods / week		Scheme of Examination				
			Theory	Practical/ Field work	Duration of exam	CIA	CE	Total	Credit
		First Semester							
I		Language							
	19VLEN01	Communicative English	2	0/2	3	50	50	100	3
II		Core Courses							
	19VFPC01	Introduction to Food Science and Technology	2	0/2	3	50	50	100	3
	19VFPC02	Fruit and Vegetable Processing Technology	2	0/2	3	50	50	100	3
	19VFPC03	Bakery and Confectionery Technology	2	0/2	3	50	50	100	3
III		Skill Training							
	19VFPS01	Skill Training In Industry	8	0/20	3	50	50 (SSC)	100	18
		Non Credit Mandatory Course (NMC)							
	19BVNSS1	NSS - I				100	-	100	Remarks
		Second Semester							
I		Language							
	19VLEN02	Professional English	2	0/2	3	50	50	100	3
II		Core Courses							
	19VFPC04	Microbiology in Food Processing and Preservation	2	0/2	3	50	50	100	3
	19VFPC05	Entrepreneurship in Food Processing	2	0/2	3	50	50	100	3
	19VFPC06	Food Standards and Labeling	2	0/0	3	50	50	100	2
	19VFPC07	Food Analysis Practical	0	0/2	3	50	50	100	1
III		Skill Training							
	19VFPS02	Skill Training in Industry	8	0/20	3	50	50 (SSC)	100	18
		Non Credit Mandatory Course (NMC)							
	19BVNSS2	NSS - II				100	-	100	Remarks
		Third Semester							
II		Core Courses							
	19VFPC08	Unit operations in Food Processing	3	0/2	3	50	50	100	4
	19VFPC09	Processing of Cereals, Pulses and Oil seeds	3	0/2	3	50	50	100	4
	19VFPC10	Meat and Poultry Processing Technology	3	0/2	3	50	50	100	4
III		Skill Training							

	19VFPS03	Baking Technology	4	0/10	3	50	50	100	9
	19VFPS04	Skill Training in Industry	4	0/10	3	50	50	100	9
		Non Credit Mandatory Course (NMC)							
	19BVNSS3	NSS - III				100	-	100	Remarks
		Fourth Semester							
II		Core Courses							
	19VFPC11	Fundamentals of Food Engineering	3	0/2	3	50	50	100	4
	19VFPC12	Technology of Plantation Crops and Spices	3	0/2	3	50	50	100	4
	19VFPC13	Food Packaging	3	0/2	3	50	50	100	4
III		Skill Training							
	19VFPS05	Food Preservation Technology	4	0/10	3	50	50	100	9
	19VFPS06	Skill Training in Industry	4	0/10	3	50	50 (SSC)	100	9
		Non Credit Mandatory Course (NMC)							
	19BVNSS4	NSS - IV				100	-	100	Remarks
		Fifth Semester							
II		Core Courses							
	19VFPC14	Dairy Technology	4	0/3	3	50	50	100	6
III		Skill Training							
	19VFPS07	Confectionery technology	6	0/10	3	50	50	100	11
	19VFPS08	Skill Training in Industry	6	0/10	3	100	100	200	11
	19VFPS09	Mini project	-	0/3	3	100	-	100	2
		Non Credit Mandatory Course (NMC)							
	19BVNSS5	NSS - V				100	-	100	Remarks
		Sixth Semester							
II		Core Courses							
	19VFPC15	Convenience Foods and New Product Development	4	0/3	3	50	50	100	6
III		Skill Training							
	19VFPS10	Techniques in food quality analysis	2	0/8	3	50	50	100	6
	19VFPS11	Skill Training in Industry	6	0/11	3	100	100 (SSC)	200	12
	19VFPS12	Project Work	-	0/12	3	100	100	200	6
		Non Credit Mandatory Course (NMC)							
	19BVNSS6	NSS - VI				100	-	100	Remarks

Exit Levels	NSQF Level	Credits earned	Award
At the end of I Semester	4	30	Certificate
At the end of I Year	5	30+30	Diploma
At the end of II Year	6	60+60	Advanced Diploma
At the end of III Year	7	60+60+60	B.Voc Degree
	Total credits	180	

Communicative English

Semester I
19VLEN01

Periods of Instruction/week: 2+2
No. of credits: 3

Objectives

- To facilitate among students fluency in spoken and written English.
- To give exposure to technical writing in English.

Course Outcomes:

At the end of the course, the students will be able to:

- CO1: Listen actively and comprehend the meaning
CO2: Gain knowledge in writing skills
CO3: Make and describe the presentation individually or in groups
CO4: Develop effective communicative skills

Unit I Listening

6

Listening for general information, Comprehending intended meaning, Understanding inferred meaning, Trying to listen for specific purposes.

Unit II Presentation

6

Description of an experience, Item or place individually or in groups, Preparing PPTs and explaining the key points.

Unit III Reading

6

Reading for general and specific purposes, Both silent and loud reading, Understanding words usage, Learning to use those words in conversations and in writing.

Unit IV Writing

6

Writing paragraphs, Notices, Official letters, Reports, E-mails, Understanding writing etiquettes, Making outlines and summaries, Online marketing techniques.

Unit V Language Focus

6

Tenses, Prefixes, Suffixes, Verb usage, Sentence construction, Affirmative and negative sentences, Subject verb congruence, Using right words in the right place and Learning pronunciation techniques.

Total periods: 30

Practical:

1. Listening comprehension exercise through Globarene Software.
2. Preparation and presentation of PPT on specific topics.
3. Reading articles from newspaper clippings.
4. Writing leave/official letter, resume.
5. Pronunciation correction, Sentence correction through reading exercises.

Total periods: 30

Reference books:

1. *Nitin Bhatnagar and Mamta Bhatnagar, (2010), Communicative English for Engineers and Professionals.*
2. *Mandal (2006), Effective Communication and Public Speaking,* Jaico Publishing House.
3. *Sudharani.D (2011), Advanced Communication Skills Lab.* Pearson Education.
4. *Diana Hopkins and Pauline Cullen Cambridge UP (2007), Grammar for IELTS with answers,* New Delhi.

Introduction to Food Science and Technology

Semester: I

Hours of Instruction/week: 2+2

19VFP C01**No. of credits: 3****Course Objective:**

To enable the students to

- Understand basic composition of food groups
- Learn the changes occurred in food physical and chemical composition during processing

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Classify the foods into groups
CO2 : Explain the composition of foods
CO3 : Identify the basic food processing techniques
CO4 : Interpret the changes in foods during cooking and storage

Unit I Introduction to food science

Basic food groups, structure, chemical and nutritional composition of cereals, cereal products, processing of cereals, changes during processing **6**

Unit II Pulses, Milk and milk products

Structure, chemical and nutritional composition, pulse processing, changes during processing, chemical and nutritional composition of milk, milk processing and products **6**

Unit III Vegetables and Fruits

Classification, composition and nutritive value, pigments, physical and chemical changes during processing **6**

Unit IV Fleshy foods

Structure, composition, nutritive value of egg, nutritive value of fleshy foods, fish, poultry, changes during storage and processing **6**

Unit V Oil seeds, spices and condiments

Nuts and oilseeds, classification, composition and nutritive value, changes during processing and storage, uses of nuts and oilseeds. spices and condiments, uses and function **6**

Total hours 30**Practical**

1. Introduction of food groups and determination of edible portions
2. Dry and moist heating characteristics of starch
3. Experiment on germination and malting of pulses
4. Browning reaction: fruits and vegetables.
5. Experiment on heat treatments
6. Experiment on food processing techniques

Total hours 30**References:**

1. *Shakuntala Manay. N. & M. Shadaksharaswamy (2001), Food Facts and Principles*, New Age International Publishers, New Delhi.
2. *Elizabeth W. Christian and Vickie A. Vaclavik*, Essentials of food science (2014), 4th edition, Springer Berlin Heidelberg, New York.
3. *Mudgil D. and Mudgil S.B.*, Objective of food science and technology (2017), 2nd revised enlarged edition Scientific Publishers, India
4. *Srilakshmi (2003)*, Food Science, New Age International Publisher, New Delhi
5. **Peter Barham**, The Science of cooking, (2012), Springer Berlin Heidelberg, New York

Fruit and Vegetable Processing Technology

Semester I
19VFP C 02

Periods of Instruction/week: 2+2
No. of credits: 3

Objective

- To enable the students to understand the processing of fruits and vegetables
- To understand the processed products from fruits and vegetables.

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Recall the post harvest handling of fruits and vegetables
CO2 : Select appropriate preservation techniques
CO3 : Apply suitable techniques to increase the shelf life of fruits and vegetables
CO4 : Develop new fruit and vegetable products

Unit I Post harvest technology of fruits and vegetables

Post-harvest handling, maturity index of fruits and vegetables, post- harvest handling, packing and transporting, storage.

6

Unit II Fundamentals of fruits and vegetable preservation

Structure and chemical composition of fruits and vegetables, methods of preservation, dehydration, concentration, osmotic dehydration, canning, irradiation

6

Unit V Dehydration and freezing of fruits and vegetables

Dehydration of fruits and vegetables, methods of drying, heat damage, enzyme inactivation. Freezing, selection of fruits and vegetables, freezing methods

6

Unit IV Food preservation by sugar and salt

Preservation by sugar and salt, selection and preparation of fruits, bulk storage of fruits, preparation of pulp, jam, jellies, ketchup, pickling, brine curing, quality analysis

6

Unit V Fruit Beverages

Squashes, cordials, fruit juice concentrates, preliminary preparation of fruits, methods of preparation, fermented beverages, wine, cider, equipment in beverage industry

6

Total hours 30

Practical

1. Preparation of jam
2. Preparation of jelly
3. Preparation of ketchup
4. Preparation of pickle
5. Preparation of fruits squash
6. Preparation of fruit juice

Total hours 30

References:

1. *Shakuntala Manay. N. & M. Shadaksharaswamy (2001), Food Facts and Principal*, New Age International Publishers, New Delhi.
2. *Anuradha Roy (2010)*, Food processing, Yking books publisher, Jaipur
3. *Mahindru, S.N. (2004). Food Additives*. Tata McGraw Hill Publishing Company Ltd, Limited, New Delhi

Bakery and Confectionery Technology

Semester I
19VFP C 03

Periods of Instruction/week: 2+2
No. of credits: 3

Objective

- To Interpret common baking terms in bakery production
- To understand the processing of bakery products

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Define role of ingredients in baking
CO2 : Explain the different methods in mixing ingredients
CO3 : Demonstrate the techniques in product preparation
CO4 : Analyze the quality of finished products

Unit I Introduction

Status of bakery and confectionery industries in India, raw materials for bakery and confectionery products. **6**

Unit II Bakery Products Technology -I

Selection of ingredients, role of ingredients, mixing methods, yeast leavened products, method of preparation of bread, bun, pizza, pie and its varieties **6**

Unit III Bakery Products Technology -II

Selection of ingredients, role of ingredients, chemical based bakery products, method of preparation of cake and cake decoration, biscuits, cookies and its varieties. **6**

Unit IV Confectionery Products

Confectionery products, chocolate, fondant, caramels, fudge and toffee. **6**

Unit V Bakery Equipment, operation and Safety

Weighing equipments, mixer, blender, divider, rounder, proofer, types of oven and its operation, safe practices, plant hygiene, sanitation and standards **6**

Total hours 30

Practical

1. Study on dough rising and bread making.
2. Preparation of different varieties of cakes.
3. Preparation of cookies
4. Preparation of candy
5. Preparation and application of icing
6. Preparation of chocolate.

Total hours 30

Reference

1. *NIIR (2009). The complete Technology book on Bakery Products*, National Institute and Industrial Research Board.
2. *Bernard W. Minifie (1989). Chocolate, Cocoa, and confectionery*(Science and Technology, 3rd Edition.An Aspen Publication.
3. <http://fssai.govt.in>
4. *Dubey. S.C. (1980). Basic Baking: Science and Craft*, Dubey. S.C Publisher.

Semester I
19VFP S 01

Periods of Instruction/week: 8+20
No. of credits: 18

Objective

- Inbuilt skill to plan and produce bakery products
- Equip to deal with challenges in product production and management

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Relate the theory with practical applications
CO2 : Compare the industrial preparation of products with laboratory preparations
CO3 : Organise equipments for product preparation
CO4 : Construct skills related to job roles in industry

Unit-I Baking of different products

Preparation of different commercial bakery products, Planning of bakery production, utilisation of machineries, material and man power, organising bakery machines, methods of baking for different products, novel bakery products

Unit –II Bakery equipments

Unit operations of baking, machine capacity, operation procedures, pre and post cleaning and maintenance, problems and remedial measures

Unit-III Food quality management

Food standards for bakery, FSSAI, GMP, HACCP, quality analysis, process parameters, storage of finished products based on FEFO/FIFO, packaging, labelling and standards

Unit-IV Documentation and record keeping –Documentation, maintenance of record keeping of raw materials, production schedule, finished products, sales and revenues, cost economics

Unit –V Safety and hygiene – Food safety and hygienic procedure of industries, selection of raw materials with respect to physical, chemical and microbiological quality , hazard management, industrial safety, fire hazards

Total 420

Semester II
19VLEN02

Periods of Instruction/week: 2+2
No. of credits: 3

Objectives:

To train learners in basic English fluency and to develop English language skills.

Course Outcomes

At the end of the course, the students will be able to:

CO1: Use English skills with reasonable competence

CO2: Know the time management and goal setting in writing

CO3: Develop professional work habits with effective collaboration

CO4: Develop creative and innovative skills through letters, posters and invitation designs.

Unit I Language through reading

6

Basic understanding of passage, Reading newspapers and comprehending Simple reports.

Unit II Focus on Language

6

Prefixes and Suffixes, Synonyms and Antonyms, Tenses, Use of prepositions, Subject-verb agreement, Editing, British and American English.

Unit III Language through Practice

6

Resume writing, Writing instructions and recommendations, Preparing checklists, Formal letters, Writing to officials (leave letter, seeking permission for practical training, asking for certificates, testimonials), Creative writing, Goal setting, Time management.

Unit IV Oral practice

6

Public speaking skills: Complimenting-Introducing a guest to the audience, welcome address, proposing a vote of thanks. Conducting conversations - listening and responding, answering according to situations.

Unit V Creative skills

6

Designing posters, Slogan/caption writing, Creating one's own posters, Designing advertisements.

Total periods: 30

Practicals:

1. Reading & listening Skills- Book review/ Article reading, Listening Comprehension exercise.
2. Oral communication through video lessons, Group Discussion, Mock Interview.
3. Language and vocabulary learning using online grammar exercises, word building etc.,
4. Creative skills - Preparation of advertisement individually on specific product/services.
5. Writing skills - Writing reports on internship experience/ reports on Incident etc.,

Total periods: 30

Reference Books:

1. *Aysha Viswamohan (2008), English for Technical Communication*, Tata McGraw Hill Publishing Co Ltd, New Delhi.
2. *Dr. S. Sumant. (2005), English for Engineers*. Tata McGraw Hill Publishing Co Ltd, New Delhi.
3. *M. Ashref Rizvi. (2005), Effective Technical Communication*. Tata McGraw Hill Publishing Co Ltd, New Delhi.

Microbiology in Food Processing and Preservation

Semester II
19VFP C 04

Periods of Instruction/week: 2+2
No. of credits: 3

Objective

- To understand the role of microorganism in food processing and preservation
- To learn the food borne disease caused by microorganism

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Classify the hierarchy of microorganisms.
CO2 : Explain the relationship between microbes and food industry
CO3 : Execute subject knowledge in the work place.
CO4 : Knowledge on spoilage microbes

Unit I Introduction to Microorganism

Introduction to food microbiology, role of microorganisms in the food processing and preservation, classification, types of microorganisms in foods, structure, functional role of bacteria, yeast in foods. **6**

Unit II Microbial Growth

Growth of microorganism, factors influencing microbial growth in food, techniques of pure culture: serial dilution, pour plate, streak plate, spread plate, slant, broth and enrichment culture. **6**

Unit III Food Spoilage

Microbial food spoilage, causes of spoilage, changes caused by microorganisms, contamination of foods, microbial spoilage of different foods and prevention of spoilage. **6**

Unit IV Fermented Foods

Fermentation and fermented foods, microorganisms used in food fermentation, starter cultures, fermented food products. **6**

Unit V Food borne Disease

Microbial contamination in foods, infections, poisoning, and bacterial toxins, microbial control: source of microorganism, physical and chemical agents used in microbial control, disinfectants and its role **6**

Total hours 30

Practical

1. Preparation & sterilization of specific types of media.
2. Preparation of agar slant
3. Streaking for isolation of organisms.
4. Selective staining techniques - gram positive and gram negative bacteria.
5. Isolation and enumeration of micro-organisms from fermented foods.
6. Isolation and enumeration of micro-organisms from spoiled foods.

Total hours 30

Text Books

1. *Frazier, W. C. and Westhoff. (2005). Food Microbiology*, Tata McGraw Hill Publishing Co. Ltd., New Delhi.
2. *James M. Jay, Martin J. Loessner and David A. Golden (2005). Modern Food Microbiology. 7th Edition*. CBS Publishers & Distributors, New Delhi.
3. *Ray. B. (2004). Fundamentals of Food Microbiology, 3rd Edition*. CRC Press.
4. *Adam M.R. and Moss, M.O(2008). Food Microbiology*, New Age International Pvt. Ltd. Publishers.
5. *Clive de W. Blackburn, Peter J. McClure (2004). Food Borne Pathogens: Hazards, Risk Analysis, and Control*, CRC press

Entrepreneurship in Food Processing

Semester II
19VFP C 05

Periods of Instruction/week:2+2
No. of credits: 3

Objective

- To motivate entrepreneurship in food processing
- To develop entrepreneurial skills

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Describe entrepreneurial qualities and types of entrepreneurship
CO2 : Identify business opportunities and develop marketing strategies
CO3 : Illustrate the food processing plant design
CO4 : Prepare business proposal

Unit I Entrepreneurship in Food processing

Definition, Entrepreneurship and entrepreneur, types of entrepreneurship, qualities of an entrepreneur, identification of opportunities in food processing sector **6**

Unit II Innovation and Product development

Nature of creativity, types of creativity, types of innovation, phases of innovation, product identification, product development cycle, market survey, pricing. **6**

Unit III Marketing

Introduction to marketing, concept of marketing, marketing strategies, e-business **6**

Unit IV Food processing factory and plant lay out

Concept of factory design, factors affecting factory design, plant layout, floor plan sequence in food processing, different types of food industries lay outs, safety measures **6**

Unit V Business plan

Elements of business plan, business plan preparation, break event analysis, preparation of bankable project proposals **6**

Total hours 30

Practical

1. Market Survey
2. Product identification and development
3. Business plan preparation
4. Marketing methods
5. Specific product development and marketing

Total hours 30

References

1. **Poornima M. Charantimath, (2006), *Entrepreneurship Development and Small Business Enterprise*, Dorlingkendersley publisher, Delhi**
2. **SelchoukSami(2013), *The Book on Entrepreneurship and Property: The Guide to Successful Entrepreneurship and Property, Investment*, Author house publisher**

Food Analysis Practical

Semester II
19VFP C 06

Periods of Instruction/week:2+0
No. of credits: 2

Objective

- To understand food laws and standards
- To comprehend standards for food labeling

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Define food laws and standards
CO2 : Explain standards for food labeling
CO3 : Apply the food standards in industry
CO4 : Adopt good manufacturing practice in industry

Unit I Introduction to Food Laws

Laws relating to food processing industries in India: MMPO, APEDA, MPEDA, AGMARK, BIS Quality systems and FSSAI. International Food Standards ISO 9000, 22000, CODEX, GRAS. **6**

Unit II Introduction to Food Labeling **6**

Labeling: Need for labeling, labeling procedures, global labeling standards, Limitations of labeling safety issues.

Unit III Nutritional labeling

Nutrition information facts, labeling with desirable nutrition facts, importance of nutritional labeling, permitted levels of food additives. **6**

Unit IV Food Product Labeling **6**

Irradiated products, organic produce, genetically modified foods, care in labeling for food allergens, barcoding.

Unit V Food Standards and IPR **6**

HACCP, GLP, GMP, intellectual property rights (IPR), patents, copyrights - trade marks.

Total hours 30

References

1. *Ralph Blanchfield, J. 2000 . Food labeling.* Woodhead Publishing.
2. *The Food Safety and Standards Act 2006*
3. *Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].*
4. Sara Mortimore, Carol Wallace. (2013) *HACCP: A Practical Approach*, Springer.
5. Albert (2010). *Innovations in Food Labelling.* CRC Press

Semester II
19VFP C 07

Periods of Instruction/week: 0+2
No. of credits: 1

Objective

- To enable the students to understand the concepts of quality control for various processed products.
- To know the techniques to assess the quality of the food products

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Choose appropriate techniques for quality assessment
CO2 : Demonstrate the quality assessment techniques for different food groups
CO3 : Interpret the food quality assessment experiments
CO4 : Detect adulterants in food items

Practical

1. Quality analysis of vegetable based products
2. Quality Analysis of fruit based products.
3. Quality Analysis of milk and milk products.
4. Quality Analysis of beverages.
5. Determination of textural properties of fruit and vegetables.
6. Quality analysis of Fats and Oils
7. Quality analysis of processed cereal and pulse products
8. Experiment on dough rheology.
9. Methods to detect adulterants in food.
10. Sensory evaluation of food.

Total hours 30

References

1. ***S. Ranganna (1986)***, Handbook of Analysis and Quality Control for Fruit and Vegetable Products Tata McGraw-Hill Education, 1986
2. ***AOAC International. (2003). Official methods of analysis of AOAC International***, 17th Ed. Gaithersburg, MD, USA, Association of Analytical Communities
3. ***Leo ML. (2004). Handbook of Food Analysis. 2nd Ed. Vols. I-III***

Semester II
19VFP S 02

Periods of Instruction/week:8+20
No. of credits: 18

Objective

- Inbuilt skill in commercial production of food products
- Provide exposure in industrial production management

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Relate the theory with commercial preparation of products
CO2 : Define the responsibilities in industrial production
CO3 : Organize resources for product preparation
CO4 : Exhibit cleanliness and hygienic practices in industry

Unit-I Commercial preparation of fruits and vegetable processed products

Preliminary preparation of equipments, selection of ingredients based on orders, oven handling for different products in industry and product production, Quality assessment of products and product delivery

Unit –II Organisation standards and norms

Roles and responsibilities in industry, standard of operating procedure in industry, safety measures required for the industry, Personal hygiene and standards

Unit-III Preparation and maintenance of work area

Equipments utility, materials and procedures for cleaning equipment and work area, maintaining equipments

Unit-IV Food microbiology –types of microbes affect the products, food spoilage, method of prevention

Unit-V Resource management – Resource organisation for product production, Resource management, Risk management and problem solving skills

Total hours 420

Unit Operations in Food Processing

Semester III

19VFPC08

Periods of Instruction/week:3+2

No. of credits: 4

Objective

- To understand the various unit operations in food industry.
- To impart the basic principles and the various applications associated with the operations

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Classify the fundamental units and operations.
CO2 : Assess the operative mode of instruments and their purpose.
CO3 : Design instruments and equipments.
CO4 : Explain the need of instrumentation knowledge in food industries.

Unit I Introduction to Unit operations

Introduction to unit operations in food processing, units and dimensions, basic principles, total mass balance and energy balance **9**

Unit II Evaporation

Evaporation, theory, classification, types, single effect evaporator, multiple effect evaporator, advantages and disadvantages, application. **9**

Unit III Crystallization and filtration

Principle, nuclei formation, equipment and applications in food industries. Filtration principle, equipments, applications. **9**

Unit IV Size reduction processes

Theory, size reduction methods- compression, impact, shear and cutting, applications **9**

Unit V Material handling and transportation

Belt conveyor, screw conveyor, pneumatic conveyor, bucket elevator, grain transportation. **9**

Total hours: 45

Practical

1. Unit conversion
2. Experiment on falling film evaporator.
3. Performance evaluation on vacuum filter.
4. Performance evaluation of willey mill.
5. Experiment on ball mill
6. Experiment on centrifugation.

Total hours: 30

References

1. *Earle, R.L., (1983). Unit Operations in Food Processing.* Pergamon Press Ltd,
2. *Sahay K.M and K.K.Singh (2005) Unit operations of Agricultural Processing.* Vikas house Pvt Ltd
3. *Rao D.G. (2010).Fundamentals of Food Engineering.* PHI learning private limited, New Delhi.
4. *Charm, S.E (1971). The fundamentals of Food Engineering.* The AVI Publishing Co.
5. *Brennan J.G., J.R.Butters., Cowell N.D and Lilley A.E.V (1990). Food Engineering Operations.* Elsevier publishers.

Processing of Cereals, Pulses and Oilseeds

Semester III
19VFP C09

Periods of Instruction/week :3+2
No. of credits: 4

Objective

- To study the processing technology of cereals, pulses and oil seeds.
- To study the storage structures and fumigation.

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Combine various technology for processing cereals, pulses and oilseed
CO2 : Describe the instruments used for processing.
CO3 : Classify the types of cereals, pulses and oilseed.
CO4 : Explain the processing of rice, wheat, corn.

Unit I Processing of Rice

Structure, classification, parboiling, milling of rice, modern rice mill, polishing of rice, processed products from rice, by product utilization from rice mill. **9**

Unit II Processing of Wheat

Structure, types, composition, quality characteristics, cleaning, tempering and conditioning, wheat milling, products from wheat. **9**

Unit III Processing of Corn.

Structure, types, cleaning, steeping, degermination, milling of corn, germ recovery, fibre recovery, starch gluten separation **9**

Unit IV Processing of Pulses and Oil seeds

Varieties of pulses, pre-cleaning, pitting, oil application, conditioning, dehusking and splitting - milling process. Types of oil seeds, extraction methods, refining of oil. **9**

Unit V Storage and standards

Storage, insects, storage and shed, silo, fumigation and aeration, packaging, food standards and regulations of all grain products. **9**

Total hours: 45

Practical

1. Physical parameters of food grains.
2. Experiment on parboiling of paddy.
3. Determination of cooking quality of rice.
4. Analysis of flour quality using solvent retention capacity.
5. Determination of dough raising capacity.
6. Experiment on oil extraction.
7. Experiment on pulse processing.
8. Experiment on storage of grains.

Total hours: 30

References

1. *Chakraverty.A (1995). Post Harvest Technology of Cereals, Pulses and Oilseeds.* Oxford and IBH Publishing Co, Calcutta.
2. *Sahay K.M and K.K.Singh (2005) Unit operations of Agricultural Processing.* Vikas house Pvt Ltd
3. *Samuel A.Matz (1996).The chemistry and Technology of cereals as food and feed.* S.K Jain for CBS Publishers & Distributors, New Delhi.

Meat and Poultry Processing Technology

Semester III
19VFP C10

Periods of Instruction/week:3+2
No. of credits: 4

Objective:

- To understand the handling, processing, preservation of meat and poultry.
- To study the egg processing and meat plant sanitation.

Course Outcomes:

At the end of this course, students will be able to:

CO1: Recall the nutritional profile of meat, poultry and fish

CO2: Explain the post mortem changes in meat

CO3: Apply relevant meat processing techniques

CO4: Compile regulatory laws of meat processing industry

Unit I Introduction

Nutritive value of meat, factors affecting quality of fresh meat, cuts of meat, structure of muscle, postmortem and biochemical changes in meat leading to rigor mortis. **9**

Unit II Meat preservation methods

Low temperature, thermal processing, dehydration, curing and smoking. byproducts from slaughter house. Processed meat products- ham and bacon, sausage, salami, meat loaves, luncheon meat, corned meat, meat bars. **9**

Unit V Poultry Processing

Nutritive value of poultry meat, hygienic processing of poultry, poultry cuts, slaughtering and evaluation of poultry carcasses poultry products. **9**

Unit IV Egg processing

Composition and nutritive value of eggs, grading and preservation of eggs, manufacture of egg powder. **9**

Unit III Meat hygiene and Meat plant sanitation

Zoonotic diseases transferable through meat animals, meat plant sanitation. Regulatory laws for meat industries. **9**

Total hours: 45

Practical

1. Preparation of meat sample
2. Determination of total fat
3. Determination of textural properties of meat
4. Determination of meat swelling Capacity
5. Experiment on of canned meat product.
6. **Quality determination of egg.**

Total hours: 30

References

1. *Fidel Toldrá, A John (2010). Handbook of Meat Processing*, Wiley & Sons, Inc., Publication.
2. *Hui Y.H., A John (2010). Handbook of Poultry Science and Technology, Primary Processing*, Wiley & Sons, Inc., Publication.
3. *Gunter Heinz, Peter Hautzinger (2007). Meat Processing Technology for Small- To Medium-Scale Producers*, Food and Agriculture Organization of the United Nations, Bangkok.

Baking Technology

Semester III
19VFPS03

Periods of Instruction/week: 4+10
No. of credits: 9

Objective:

- To acquire hands on skill on bakery craft
- To develop entrepreneurial skills in bakery

Course Outcomes:

At the end of this course, students will be able to:

CO1: Relate the theoretical knowledge with practical applications

CO2: Demonstrate the preparation of quality products

CO3: Develop new combination of products

CO4: Identify and rectify the problems in preparation process

1. Preparation of rich cake varieties
2. Cake icing based on themes
3. Cake decoration with fondant
4. Sugar craft
5. Preparation of Brownies
6. Preparation of Bread rolls
7. Doughnut preparation
8. Danish pastry
9. Puff pastry varieties
10. Pizza base and varieties

Total hours 210

Skill Training in Industry

Semester III
19VFP S 04

Periods of Instruction/week: 4+10
No. of credits:9

Objective

- Skill training in relevant food processing industry
- Provide exposure in quality assessment of products

Course Outcomes:

At the end of this course, students will be able to:

CO1:Relate the theoretical knowledge with industrial practices

CO2: Identify the product quality

CO3: Practice food safety procedures in industry

CO4: Organise resources for industrial production

Unit-I Cereal, pulse and oil seed based industries

Processing, Product production, Quality assessment of products and product delivery

Unit –II Organisation standards and norms

Roles and responsibilities in industry, standard of operating procedure in industry, safety measures required for the industry, Personal hygiene and standards

Unit-III Food safety in industry

Quality of products, controlling food safety hazards, Microbial safety, plant sanitation, product assessment

Unit-IV Food safety in finished products –Quality control, Packaging methods and importance of labelling

Unit –V Resource management – Resource organisation for product production, Resource management, Risk management and problem solving skills

Total hours 210

Fundamentals of Food Engineering

Semester IV
19VFP C11

Periods of Instruction/week:3+2
No. of credits: 4

Objective

- To study and acquire the Basic knowledge on food engineering
- To study the heat exchanger, measurement devices, refrigeration, freezing and boilers.

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Summarize the importance of thermal processing used in food industry.
CO2 : List the equipments used in food industry.
CO3 : Combine the parameters for quantity production.
CO4 : Achieve the quality production through trouble shooting.

Unit I Heat Exchangers and dryers

Thermal processing, classification and applications in food industries. Dryers, classification and types, applications in food industries. **9**

Unit II Measurements and Control

Various process parameters, moisture content, water activity, weight, colour, temperature, pressure, pH, Brix, flow of fluids. **9**

Unit III Refrigeration and freezing

Refrigeration, components of refrigeration system, refrigerants, application. Food freezing, types of freezers, applications. Cold storage. **9**

Unit IV Steam generation and Utilization

Properties of steam, classification and types of boilers, maintenance of boiler and utilization steam in food industries. **9**

Unit V Plant Maintenance

Trouble shooting in food industries, operation and maintenance of equipments, energy conservation. **9**

Total hours: 45

Practical

1. Experiment on measurement of moisture content using tray dryer.
2. Experiment on measurement of Pressure.
3. Experiment on measurement of pH.
4. Experiment on measurement of sugar and salt concentration.
5. Experiment on measurement of temperature.
6. Experiment on freezing of foods.
7. experiment on Ash Content.

Total hours: 30

References

1. **R. Paul Singh, Dennis R. Heldman (2009). Introduction to Food Engineering.** Elsevier Publications.
2. **Rao D.G. (2010).Fundamentals of Food Engineering.** PHI learning private limited, New Delhi.
3. **Fellows P J.(2009).Food Processing Technology: Principles and Practice.** Woodhead publishing.

Technology of Plantation Crops and Spices

Semester IV
19VFP C12

Periods of Instruction/week:3+2

No. of credits: 4

Objective

- To study the basic processing of plantation crops.
- To study the processing of spices.

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Plan the plantation of various crops.
CO2 : Able to predict the appropriate harvesting and processing duration.
CO3 : Actualize the farmers for increasing the productivity.
CO4 : Experiment in new equipments for handy uses.

Unit I Coffee Processing

Harvesting, grading, processing of coffee, wet and dry method, process equipments, packaging, soluble /Instant coffee, use of chicory in coffee, decaffeinated coffee. **9**

Unit II Tea Processing

Harvesting; types of tea – green, oolong and CTC; technology of CTC tea; manufacturing process for green tea and black tea. **9**

Unit III Cocoa processing

Processing of cocoa bean; cocoa powder; cocoa butter, cocoa liquor manufacture; preparation of chocolates. **9**

Unit IV Spice processing

Types, production, pre-harvest and post-harvest factors in processing, equipments for processing, drying, storage and packaging **9**

Unit V Major spice processing

Processing of pepper, cardamom, ginger, chilli, tamarind and turmeric, spice powder and paste, spice based food products and storage. **9**

Total hours 45

Practical

1. Experiment on extraction of oleorsin.
2. Experiment on extraction of essential oil.
3. Experiment on roasting of coffee bean.
4. Experiment on drying of ginger.
5. Experiment on Boiling of Turmeric
6. Preparation of chocolates.
7. Preparation of spice based food mix.
8. Experiment on vacuum and gas packaging of spices

Total hours: 30

References

1. *NIIR. 2004. Handbook on Spices. National Institute of Industrial Research Board, Asia Pacific Business Press Inc.*
2. *Banerjee B. 2002. Tea Production and Processing. Oxford Univ. Press.*
3. *Minifie BW (1999). Chocolate, Cocoa and Confectionery Technology. 3rdEd Aspen Publishers.*
4. *Sivetz M & Foote HE (1963). Coffee Processing Technology. AVI Publishers*

Food Packaging

Semester IV
19VFP C13

Periods of Instruction/week:3+2
No. of credits: 4

Objectives

After successful completion of this course the students will be able to :

- Understand the various properties of food packaging materials
- To study suitable packaging material for different food substances.

Course Outcomes:

At the end of this course, students will be able to:

CO1: Define the functions of packaging

CO2: Classify different packaging materials

CO3: Identify the packaging material for different types of foods

CO4: List the standards for food packaging

Unit I Introduction to Packaging

Introduction, definition, functions, Types of packaging materials, paper, glass, tin plate, plastics 9

Unit II Properties of Packaging Materials

Mechanical properties, tensile strength, bursting strength, tearing resistance, puncture resistance. Barrier properties of packaging materials, permeability, water vapor transmission rate. 9

Unit III Packaging equipments and machinery

Form and fill sealing machine, filling and capping machine, sealing machine. 9

Unit IV Packaging materials for foods

Packaging system for dehydrated foods, frozen foods, dairy products, fresh fruits and vegetables, meat, fish, poultry, sea foods, fats and oil. 9

Unit V Standards for Packaging Materials

Package laws and regulation, general guidelines, FSSAI standards. 9

Total hours: 45

Practical

1. Experiment on heat sealing
2. Experiment on tensile strength of flexible film
3. Determination of elongation of film.
4. Experiment on tensile strength of paper & paper board.
5. Experiment on testing of plastic film.
6. Experiment on bursting strength of film

Total hours: 30

References

1. *Coles R, McDowell D & Kirwan M.J. 2003. Food Packaging Technology* Oxford Blackwell.
2. *Modern packaging technology. EIRI Board of Consultants and Engineers.*
3. *Crosby NT. 1981. Food Packaging Materials.* Applied Science Publication.
4. *Gordon L Robertson. 2006. Food Packaging: Principles and Practice* 2Ed. CRC Press.

Food Preservation Technology

Semester IV
19VFPS05

Periods of Instruction/week:4 +10
No. of credits :9

Objectives

- To study about the different engineering properties of foods.
- To study the methods of determining the quality and properties of different foods.

Course Outcomes

CO 1: Recall the engineering properties of food materials

CO 2: Demonstrate measurement techniques of engineering properties of foods.

CO 3: Identify the properties of food

CO 4: Apply the processing techniques to design the storage of food

LIST OF EXPERIMENTS

1. Preservation of Cereal products and Malting
2. Preservation of Pulses and Legumes
3. Sugar based Preservation Techniques
4. Preparation of Fruit based products
5. Experiments on controlling Enzymatic reaction in Fruit and Vegetable
6. Preparation of Vegetable based products
7. Preservation using high and low temperature
8. Dehydrated products using different Drying Techniques
9. Preparation of Fermented / Non Fermented products from Milk
10. Preparation of different Spice Mixes
11. Experiments on Packaging of food products and its characteristics
12. Instant, Commercial, Speciality and Traditional foods

Total hours 210

Skill Training in Industry

Semester IV
19VFP S 06

Periods of Instruction/week: 4+10
No. of credits:9

Objective

- Learntotal quality management in food processing industry
- Provide exposure in quality assessment of products

CO 1: Relate the theoretical knowledge with practical applications

CO 2: Demonstrate industrial products production skills

CO 3: Organise resources for process

CO 4: Analyze the quality parameters of the products

Unit I Introduction

Introduction to quality management - Definition, Scope, Significance and Objectives of Quality management, Dimensions of quality in foods, Food quality evaluation techniques, Quality control Vs Quality assurance.

Unit II: Standard Operating Procedures

Preparing scope, quality policy and quality objectives of food processing company, Defining Standard operating procedure, personal hygiene, facility and equipments, Systems in laboratory accreditation

Unit III: Audit Check List

Preparation of HACCP based SOP checklist - personal hygiene, food preparation, food storage and dry storage, cleaning and sanitizing, utensils and equipments, large equipments, garbage storage and disposal and pest control

Unit III Pre-requisite Program

Good Manufacturing Practices, Personal hygiene, occupational health and safety specification, Food Plant Sanitation Management and Storage

Unit IV Food quality and food safety

Quality of raw materials, quality checks of raw materials and work area, routine cleaning programs, microbial and fungal contamination, Ingredients, equipments, product quality assurance, assessing products for quality.

Total hours 210

Dairy Technology

Semester V
19VFP C14

Periods of Instruction/week:4+3
No. of credits: 6

Objectives:

- To study the milk processing
- To study the technology of making milk based products

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : List the milk based products.
CO2 : Tabulate the processing, storage condition for various milk based products.
CO3 : Execute improvised quality control in the industry.
CO4 : Appropriate use of hands on training.

Unit I Composition of milk

Classes of milk, checks for purity of milk, handling of freshly produced milk; Physical and chemical properties of milk. **12**

Unit II Milk process Planning

Process of milk, milk collection and storage, weighing and checking procedures, important measures and controls. Milk handling and transportation. Dairy plant sanitation and clean in place (CIP) procedures for the plant. **12**

Unit III Processing of Milk

Pasteurization and sterilization principles, types, procedures and equipment; Homogenization and centrifugal cream separation. **12**

Unit IV Milk Products

Milk products, procedures for manufacture, sterilized milk, pasteurized milk, condensed milk, spray dried milk powder, infant foods, butter, ghee, cheese, yoghurt, icecream. **12**

Unit V Packaging of various Dairy Products

Packaging of milk and milk products. **12**

Total hours: 60

Practical

1. Organoleptic test.
2. Experiment on sample preparation
3. Determination of SNF using lactometer.
4. Detection and quantification of Starch in Milk
5. Determination of fat content - butyrometer
6. Experiment on cream separator and efficiency of separation
7. Quality determination of icecream.
8. Determination of density of milk

Total hours: 45

References

1. *S Kumer, De. (1980). Outline of Dairy Technology.* Oxford University Press, New Delhi.
2. *TufailAhama (1985). Dairy plant systems Engineering.* KitabMahal, Allahabad.
3. *Ananthakrishnan, C.P. And M.N. Sinha (1987).Technology and Engineering of Dairy plant operations.*Laxmi Publications, New Delhi.

Confectionery Technology

Semester V
19VFPS 07

Instruction Hours /week: 6+10
No. of credits :11

Objectives

- To study about the different preparation of confectionery products
- To study the methods of determining the quality confectionery products

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Select quality ingredients for confectioneries
- CO2** : Define the stages of sugar cookery
- CO3** : Demonstrate the organized production skills
- CO4** : Develop new confectionery products

LIST OF EXPERIMENTS

1. Stages of sugar cookery
2. Sugar boiled confectionery
3. Different types of sugar candies - zuzups & jellies
4. Crystalline confectionery
5. Fondant
6. Fudge
7. Chocolate confectionaries
8. Milk toffees
9. Fruit toffees
10. Traditional candies

Total Hours:240

Skill Training in Industry

Semester V
19VFP S08

Periods of Instruction/week: 6+10
No. of credits: 11

Objective

- Skill training in relevant food processing industry
- Provide exposure in quality assessment of products

Course out come

At the end of this course, students will be able to:

- CO1** : Recall processing of milk and its quality factors
CO2 : Relate the theoretical knowledge with industrial processing
CO3 : Compare laboratory processing methods with industrial processing techniques
CO4 : Apply industrial processing skills

Unit-I Dairy industry

Processing, Product production, Quality assessment of products and product delivery

Unit –II Organisation standards and norms

Roles and responsibilities in industry, standard of operating procedure in industry, safety measures required for the industry, Personal hygiene and standards

Unit-III Cleaning in place, cleaning and sanitization

Procedure of cleaning in place process - Centralized CIP system - Operation techniques - Sanitization in CIP process - Assessment of effectiveness of cleaning and sanitizations.

Unit-IV Food safety in finished products –Quality control, Packaging methods and importance of labelling

Unit V Standards, product certification and licensing

Preservatives – Neutralizer - Adulterants - Detection methods - Standard specification of Milk and Milk products - Dairy product certification and licensing

Total hours 240

Semester V
19VFP S09

Mini project

Periods of Instruction/week: 0+3
No. of credits: 2

Convenience Foods and New Product Development

Semester VI
19VFP C15

Periods of Instruction/week :4+3
No. of credits: 6

Objectives

- To understand and gain experience in the process of food product development
- To understand techniques and knowledge related to the consumer product development.

Course Outcomes:

At the end of this course, students will be able to:

- CO1** : Experiment in new product studies.
CO2 : Interpret the pros and cons in new product development.
CO3 : Assess the current market trends
CO4 : Describe the strategy to market the new product.

Unit I Phases in New Product Development

Introduction and overview, Phases in new food product development, Generation of new product ideas. **12**

Unit II Ingredients Technology

Ingredients technology – carbohydrates, proteins, fat, Stabilizers, Flavours, Colorants. **12**

Unit III Product Development

Product concepts, Product design, Prototype Development, Process development, Sensory evaluation of products. **12**

Unit IV Market Strategy

Consumer testing, Test marketing – methods and strategy. **12**

Unit V Case Study

Product roll-out, Case studies and presentation of new product development. **12**

Total hours 60

Practical

1. Development of new product from cereals & pulses.
2. Development of new product from vegetables.
3. Development of new product from fruits.
4. Development of new product from milk.
5. Development of fermented new products.
6. Development of dehydrated products.
7. Development of extruded new products.
8. Development of RTE foods.

Total hours 45

References

1. Earle, M., Earle, R., and Anderson, A. (2001). *Food Product Development*. CRC Press.
2. Graf, E., Saguy, and Graf, E. (1991). *Food Product Development: From Concept to the Marketplace*. Kluwer Academic Publishers.

Techniques in Food Quality Analysis

Semester VI
19VFP S10

Periods of Instruction/week :2+8
No. of credits: 6

List of Experiments

1. Quality analysis of fruit products using UV spectrophotometer
2. Quality analysis of milk products
3. Identification of food dyes with UV spectrophotometer
4. Extraction of fat using soxhlet apparatus
5. Estimation of viscosity of vegetable oil by Brookefield viscometer
6. Estimation of viscosity of fruit products using Brookefield viscometer
7. Determination of moisture content of cereals using digital moisture meter
8. Determination of vitamin C content of foods
9. Determination of fat content in food materials
9. Estimation of mineral content in food materials
10. Quality analysis of fermented products

Skill Training in Industry

Semester VI
19VFP S 11

Periods of Instruction/week: 6+11
No. of credits: 12

Objective

- Inbuilt skills to manage production planning and quality assurance of the product.
- Explore new products to increase productivity in industry

At the end of this course, students will be able to:

- CO1** : List the job roles in food processing industries
CO2 : Formulate new value added products
CO3 : Examine the quality of the product
CO4 : Exhibit equipment handling skills in industry

Unit I Introduction

Introduction to plant manager, role and responsibility of plant manager in food industry

Unit II Production management

Production planning and control, Human resource and performance management, Total quality management, Environmental management.

Unit III Development of processing unit

Development and implementation of operational plan, Operation functions, Principle and process involved in business, Methods to improve business process.

Unit IV New product development

Manage new projects/product, Quality analysis of the product, food safety, hygiene and sanitation requirements for organisation and product produced

Unit V Quality management

Implementation of a system for identification of hazards and assessing risk in product- HACCP, Risk analysis, GMP. Implementation of FIFO and FEFO.

Total hours 255

References:

1. Production and Operations Management Paperback – 2007 by Khanna
2. The principles of product development flow, by Donald G Reinertsen, Celeritas Publishing, 2009.
3. <https://www.fda.gov/downloads/Food/GuidanceRegulation/HACCP/UCM077957.pdf>

Project work

Semester VI
19VFP S 12

Periods of Instruction/week: 0+12
No. of credits: 6