THE GANDHIGRAM RURAL INSTITUTE-DEEMED TO BE UNIVERSITY

MINISTRY OF EDUCATION (SHIKSHA MANTRALAYA),GOI

ACCREDITED BY NAAC WITH 'A' GRADE 3rd CYCLE

GANDHIGRAM – 624 302, DINDIGUL DISTRICT, TAMIL NADU.

SYLLABUS

(UGC-NSQF- NHEQF/NCrF/UCF & NEP 2020 VERSION)

B.Voc / B.Voc (Honours)

Food Testing and Quality Evaluation

(Effect from July 2024)

DEEN DAYAL UPADHYAY – KAUSHAL KENDRA

THE GANDHIGRAM RURAL INSTITUTE

(DEEMED TO BE UNIVERSITY)

GANDHIGRAM

THE GANDHIGRAM RURAL INSTITUTE-DEEMED TO BE UNIVERSITY
DEEN DAYAL UPADHYAY – KAUSHAL KENDRA
B.VOC.FOOD TESTING AND QUALITY EVALUATION

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
I	GEC (A)	Major-1	24FTVC1101	Laboratory Operation and Maintenance	4	0	4	40	60	100
		Major-2	24FTVC1102	Food Quality Evaluation (P)	0	3	3	60	40	100
		AEC-1		Essential English –I : Basic	3	0	3	40	60	100
		VAC-1		Yoga and Fitness	0	2	2	50	-	50
		Total(A)			**7**	**5**	**12**	**190**	**160**	**350**
	SDC (B)	Major-3	24FTVC1103	Laboratory Techniques	5	0	5	40	60	100
		Major -4	24FTVC1104	Laboratory Techniques (P)	0	5	5	60	40	100
		Major -5	24FTVC1105	Food Science (P)	0	5	5	60	40	100
		OJT-1	24FTVC1106	Internship –I	0	3	3	50	-	50
				Total (B)	**5**	**13**	**18**	**210**	**140**	**350**
	Grand Total (A+B)				**12+18=30**			**400**	**300**	**700**
	NSQF Level			**4**						
	NEP/NCrF Level			**4.5**						
	Job Role / Qualification Pack			**Food Analyst – FIC/Q7607/**						
	Award / Exit Option			**NA**						

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
II	GEC (A)	AEC-2		Essential English – II : Intermediate	3	0	3	40	60	100
		VAC-3	24FTVV1201	Environmental Science	2	0	2	-	50	50
		MD-2		Digital Marketing	0	3	3	60	40	100
		Major – 6	24FTVC1202	Food Hygiene and Sanitation	4	0	4	40	60	100
				Total (A)	**9**	**3**	**12**	**140**	**210**	**350**
	SDC (B)	Major -7	24FTVC1203	Techniques in Food Analysis (T)	5	0	5	40	60	100
		Major-8	24FTVC1204	Food Chemistry (T)	5	0	5	40	60	100
		Major-9	24FTVC1205	Food Microbiology (P)	0	5	5	60	40	100
		OJT-2	24FTVC1206	Internship – II	0	3	3	50	-	50
				Total (B)	**10**	**8**	**18**	**190**	**160**	**350**
				Grand Total (A+B)	**12+18=30**			**330**	**370**	**700**
	NSQF Level			**4**						
	NEP/NCrF Level			**4.5**						
	Job Role / Qualification Pack			**Food Analyst – FIC/Q7607/**						
	Award / Exit Option			**Certificate in Food Testing and Quality Evaluation**						

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
III	GEC (A)	Major-10	24FTVC2301	Food Analysis (T)	4	0	4	40	60	100
		Major-11	24FTVC2302	Food Safety System in Dairy Industries	4	0	4	40	60	100
		Major-12	24FTVC2303	Principles of Food Preservation (T)	4	0	4	40	60	100
				Total (A)	**12**	**0**	**12**	**120**	**180**	**300**
	SDC (B)	Major-13	24FTVC2304	Food Analysis (P)	0	5	5	60	40	100
		Major-14	24FTVC2305	Quality Evaluation of Milk and Milk Products (P)	0	5	5	60	40	100
		Major-15	24FTVC2306	Principles of Food Preservation (P)	0	5	5	60	40	100
		OJT-3	24FTVC2307	Internship –III	0	3	3	50	-	50
				Total (B)	**0**	**18**	**18**	**230**	**120**	**350**
				Grand Total (A+B)	**12+18=30**			**350**	**300**	**650**
	NSQF Level		**5**							
	NEP/NCrF Level		**5**							
	Job Role / Qualification Pack		**Technical Lead – Food Analyst – FIC/Q7605/**							
	Award / Exit Option		**NA**							

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
IV	GEC (A)	Major-16	24FTVC2401	Food Packaging (T)	5	0	5	40	60	100
		Major-17	24FTVC2402	Quality Evaluation of Food Grains and its Products	5	0	5	40	60	100
		VAC-4		Let us Know Gandhi	2	0	2	-	50	50
				Total (A)	**7**	**5**	**12**	**140**	**160**	**300**
	SDC (B)	Major-18	24FTVC2403	Quality Evaluation of Food Grains and its Products (P)	0	4	4	60	40	100
		Major-19	24FTVC2404	Analysis of Food Packaging Materials (P)	0	4	4	60	40	100
		Major-20	24FTVC2405	Quality Evaluation of Bakery and Confectionery Products (P)	0	5	5	60	40	100
		Major-21	24FTVC2406	Training Course in Food Safety System	0	3	3	50	-	50
		OJT-4	24FTVC2407	Internship –IV	0	2	2	50	-	50
				Total (B)	**0**	**18**	**18**	**280**	**120**	**400**
				Grand Total (A+B)	**12+18=30**			**360**	**290**	**650**
	NSQF Level		**5**							
	NEP/NCrF Level		**5**							
	Job Role / Qualification Pack		**Technical Lead – Food Analyst – FIC/Q7605/**							
	Award / Exit Option		**Diploma in Food Testing and Quality Evaluation**							

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
V	GEC (A)	Major-22	24FTVC3501	Entrepreneurship Development	4	0	4	40	60	100
		Major-23	24FTVC3502	Online Swayam Course	0	3	3	50	-	50
		Major-24	24FTVC3503	Food Quality Assurance	5	0	5	40	60	100
		Total (A)			**9**	**3**	**12**	**130**	**120**	**250**
	SDC (B)	Major-25	24FTVC3504	Quality Analysis of Fruits and Vegetables (T)	5	0	5	40	60	100
		Major-26	24FTVC3505	Regulations with Food Additives and Safety	4	0	4	40	60	100
		Major-27	24FTVC35E1/ E2/E3	Elective	4	0	4	40	60	100
		Major-28	24FTVC3506	Field study / Study tour	0	2	2	50	-	50
		OJT-5	24FTVC3507	Internship – V	0	3	3	50	-	50
	Total (B)				**13**	**5**	**18**	**220**	**180**	**400**
	Grand Total (A+B)				**12+18=30**			**350**	**300**	**650**
	NSQF Level		**6**							
	NEP/NCrF Level		**5.5**							
	Job Role / Qualification Pack		**Quality Assurance Manager – FIC/Q7602/**							
	Award / Exit Option		**NA**							

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
VI	GEC (A)	Major-29	24FTVC3601	Design and Development of Food Testing Lab	4	0	4	40	60	100
		Major-30	24FTVC3602	FSSAI Regulations of Food Testing	4	0	4	40	60	100
		Major-31	24FTVC3603	Safety in Foods of Animal Origin	4	0	4	40	60	100
		Total (A)			**12**	**0**	**12**	**120**	**180**	**300**
	SDC (B)	Major-32	24FTVC3604	Quality Analysis of Beverages and Spices (P)	0	5	5	60	40	100
		Major-33	24FTVC3605	Advances in Food Grading System (P)	0	5	5	60	40	100
		Major-34	24FTVC3606	Mini – Project / Case study	0	5	5	60	40	100
		OJT-6	24FTVC3607	Internship - VI / Experiential learning/ Training Course	0	3	3	50	-	50
	Total (B)				**0**	**18**	**18**	**230**	**120**	**350**
	Grand Total (A+B)				**12+18=30**			**350**	**300**	**650**
	NSQF Level		**6**							
	NEP/NCrF Level		**5.5**							
	Job Role / Qualification Pack		**Quality Assurance Manager – FIC/Q7602/**							
	Award / Exit Option		**B.Voc. in Food Testing and Quality Evaluation**							

B.VOC. (Hons)

Seventh Semester-
Research Methodology - 24FTVC4701
Food Marketing - 24FTVC4702
Internship – VII – 24FTVE4711 will be same for two specialization

SPECIALIZATION – I – FOOD QUALITY INSIGHT

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
VII	GEC (A)	Major-35	24FTVC4701	Research Methodology	4	0	4	40	60	100
		Major-36	24FTVC4702	Food Marketing	4	0	4	40	60	100
		Major-37	24FTVC4703	Food Traceability (T)	4	0	4	40	60	100
				Total (A)	**12**	**0**	**12**	**120**	**180**	**300**
	SDC (B)	Major-38	24FTVC4704	Computational Approaches in Food Testing Laboratory (P)	0	6	6	60	40	100
		Major-39	24FTVC4705	Food Traceability (P)	0	6	6	60	40	100
		OJT-7	24FTVC4709	Internship – VII	0	6	6	100	-	100
				Total (B)	**0**	**18**	**18**	**220**	**80**	**300**
				Grand Total (A+B)	**12+18=30**			**340**	**260**	**600**

SPECIALIZATION 2 – MODERN FOOD EVALUATION AND PROCESS

VII	GEC (A)	Major-35	24FTVC4701	Research Methodology	4	0	4	40	60	100
		Major-36	24FTVC4702	Food Marketing	4	0	4	40	60	100
		Major-40	24FTVC4706	Food Labeling and Regulation	4	0	4	40	60	100
				Total (A)	**12**	**0**	**12**	**120**	**180**	**0**
	SDC (B)	Major-41	24FTVC4707	Non-destructive Evaluation of Food Quality (P)	0	6	6	60	40	100
		Major-42	24FTVC4708	Food Analytic and Equipment Handling (P)	0	6	6	60	40	100
		OJT-7	24FTVC4709	Internship – VII	0	6	6	100	-	100
				Total	**0**	**18**	**18**	**220**	**80**	**300**
				Grand Total (A+B)	**12+18=30**			**340**	**260**	**600**
	NSQF Level			**7**						
	NEP/NCrF Level			**6**						
	Job Role / Qualification Pack			**Regulatory Food Affairs Manager – FIC/Q9002/**						
	Award / Exit Option			**NA**						

SEM	Category		Course Code	Title of the Subject	Theory	Practical	No. of Credits/ Contact Hours	Mark Distribution		
	Components	NEP-Nomenclature						MID	ESE	Total
VIII	GEC (A)	Major-43	24FTVC4801	Advanced Food Technology	6	0	6	40	60	100
		Major-44	24FTVC4802	Accreditation Procedure of NABL Setup	6	0	6	40	60	100
				Total (A)	**12**	**0**	**12**	**80**	**120**	**200**
	SDC (B)	Major-45	24FTVC4803	Main Project	0	12	12	100	100	200
		OJT – 8	24FTVC4804	Internship - VIII	0	6	6	100	-	100
				Total (B)	**0**	**18**	**18**	**200**	**100**	**300**
				Grand Total (A+B)	**12+18=30**			**280**	**220**	**500**
	NSQF Level		**7**							
	NEP/NCrF Level		**6**							
	Job Role / Qualification Pack		**Regulatory Food Affairs Manager – FIC/Q9002/**							
	Award / Exit Option		**B.Voc. (Hons) in Food Testing and Quality Evaluation**							

ELECTIVE PAPERS OFFERED

SEM	Category	Course Code	Title of the Subject	No. of Credits
V	Elective	24FTVC35E1	Product Development, Testing and Marketing	4
		24FTVC35E2	By Products and Waste Utilization	4
		24FTVC35E3	Processing of Fats and Oil	4

MULTI DISCIPLINARY COURSES FOR INTERDEPARTMENT LEVEL (UG) OFFERED BY B.Voc. FOOD TESTING AND QUALITY EVALUATION PROGRAMME

SEM	Category	Course Code	Title of the Subject	No. of Credits/ Contact Hours	Mark Distribution		
					MID	ESE	Total
I	MD - 1	24FTVM1101	Introduction to Food Science	3	40	60	100
		24FTVM1102	Food Adulteration	3	40	60	100
		24FTVM1103	Food Safety	3	40	60	100
II	MD – 2	24FTVM1201	Food Packaging Materials and their Properties	3	40	60	100
		24FTVM1202	Pre-requisite Programme of Food Safety System	3	40	60	100
		24FTVM1203	Food Allergen Management	3	40	60	100
III	MD -3	24FTVM2301	Food Labelling and Safety Concern	3	40	60	100
		24FTVM2302	Application of Sensory Analysis in Food Industry	3	40	60	100
		24FTVM2303	Food Product Development	3	40	60	100

FIRST SEMESTER

LABORATORY OPERATION AND MAINTENANCE

Code: 24FTVC1101 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Familiarize the students with laboratory organization
- Enable the students to use the theoretical knowledge in operation and maintenance of laboratories

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Design considerations that apply to the lab and to the areas that directly support its operation
- Know the importance of laboratory organization

UNIT I

Design of laboratories: the essential requirements of a typical laboratory, wet lab, hot zone, balance room, hi tech lab, microbial lab, GMO lab, decontamination and wash room, space required, designs of laboratories - fixed and flexible design laboratories, main laboratory in relation to other rooms, benching, surfaces, furniture and storage services, ventilation, lighting, heating and cooling, ventilation, lighting, heating and cooling, flooring and fume cupboards. First aid: Components, treatment of localised injuries, burns, fractures and eye injuries.

UNIT II

Day-to-day management of the laboratories: day-to-day organization, day-to-day cleaning up, day-to-day environmental condition recording, sterilization, disposal of wastes, routine inspection and maintenance of laboratory, maintenance of equipment, apparatus and furniture-prevention of dust, reduction of vibration, prevention of corrosion and rust, prevention of equipment from excessive heat; correct usage of instruction manual; servicing of equipment. Calibration of equipments, methods of recording details of falls, repairs.

UNIT III

Cleaning of laboratories and preparation rooms; colour coding of services, emergencies with services - emergency procedures for flooding and gas leaks; security and vandalism; storing of acids, alcohols and other toxic chemicals and their care; records; stock records, recording loans, recording stock used and misused, record of use of listed poisons, record of use of alcohol, record of breakages; information about equipment serial number, maintenance record, electrical checks and miscellaneous records; accident and incident record. Fire hazards – Fire triangle, sources and types, types of fire extinguishers.

UNIT IV

Files: sources of information- classifying secondary and tertiary information sources, sources of information in the lab or preparation room, Filing systems- aims of filing systems,

classification of files, filing methods, filing system for equipment, filing system for chemicals, filing of printed and written material work sheets/instruction for experiments- Demonstration.

UNIT V

Arranging stock, locating and referencing: shelf arrangement of stock by nomenclature, stock control- the two bin system, the constant cycle system; record keeping- bin cards, order books, inventory, service register; ordering procedure: preparation of list of requirements, inviting quotations, tender, import of equipment procedure, factors deciding purchases, role of purchase committee, purchase of alcohol, placing an order, GST tax and discounts; receipt of goods, taking delivery, processing of bills; accounting: records of expenditure controlling, budget, petty cash and imprest money. Recording details of purchasing hazardous chemicals. Use of computers in laboratory organization and management.

Related Experience

- Study of design and features of a laboratory
- Design and organization of laboratory store
- Demonstration of sterilization, disposal of wastes, cleaning of equipments, using instruction manual for operating equipments
- Demonstration of Gas Leaks, electrical checks, colour coding for services
- Demonstration for stock records
- Writing purchase order for chemical, alcohol etc
- Recording of Cash transaction
- Demonstration of Instrument calibration
- Demonstration of detection and handling hazards
- Studying the use of fire extinguishers and demonstration of first aid
- Generating stock of chemicals and glassware using MS- Excel
- Visit to different food testing laboratory

TEXT BOOKS

1. Rao B.V.S, Operation & Maintenance of Electrical Equipment - Volume I; Media Promoters and Pub Pvt Ltd.
2. Rao B.V.S, Operation & Maintenance of Electrical Equipment - Volume II; Media Promoters and Pub Pvt Ltd.

REFERENCE BOOKS

1. Rao S, Testing Commissioning Operation & Maintenance Of Electrical Equipments; Khanna Publishers.
2. National committee for Clinical laboratory standards. Clinical laboratory manuals, 3rd ed. approved guideline 3P2-3A.Villanova, Pa.

FOOD QUALITY EVALUATION - PRACTICAL

Code: 24FTVC1102 Credits: T0+P3 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- Understand and apply techniques for measuring physical, chemical, rheological, and thermal properties of foods
- Conduct sensory evaluations and interpret the results
- Develop skills in using analytical instruments and interpreting data for food quality assessment

Specific Learning Outcome
On Successful Completion of this course, the students will be able to

- Use various instruments and methodologies to evaluate and understand the quality and characteristics of foods

EXPERIMENTS

1. Introduction to quality attributes of food
2. Classify foods based on the sensory attributes
3. Experiment on the textural parameters – mechanical and geometrical characteristics
4. Objective measurement and evaluation of food texture (Compression, cutting, shearing, tensile strength)
5. Determine physical properties of food ingredients
6. Determination of rheological properties of food (Elasticity, plasticity, viscosity) by using dash pot, spring, spring clip and shear pin models
7. Determination of functional properties of food
8. Identify the panel list based on threshold test
9. Experiment on the techniques of sensory evaluation of foods – single sample, paired comparison, duo-trio, triangle, rank order, descriptive and profiling, e-nose
10. Conduct sensory evaluation of the given samples by using hedonic rating scale
11. Visit to small scale industries

TEXT BOOK REFERENCES

1. Rao, M.A and S.S.H. Rizvi, "Engineering Properties of Foods", 4th edition, CRC Press; New York, ISBN-10: 1466556420, ISBN-13: 978-1466556423, 2014
2. Shafiur Rehman, "Food Properties Hand book", 2nd Edition, Special-Indian Edition, CRC Press, New York, ISBN-10: 1138627593, ISBN-13: 978-1138627598, 2016
3. Food Properties and Analysis by S. Suzanne Nielsen
4. Introduction to Food Engineering by R. Paul Singh and Dennis R. Heldman
5. Food Analysis by S. Suzanne Nielsen

WEBOGRAPHY

1. https://egyankosh.ac.in/bitstream/123456789/33856/1/Practical-6.pdf
2. https://egyankosh.ac.in/bitstream/123456789/33567/1/Unit-8.pdf
3. https://egyankosh.ac.in/bitstream/123456789/33570/1/Unit-7.pdf

ESSENTIAL ENGLISH – I

Code: **Credits: T3+P0** **Contact Hours/week: 3** **Marks: 100**

YOGA AND FITNESS

Code: **Credits: T0+P2** **Contact Hours/week: 2** **Marks: 50**

LABORATORY TECHNIQUES

Code: 24FTVC1103 Credits: T5+P0 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable the students to

- Understand basics of laboratory procedures
- Understand the use of various basic laboratory equipments.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Know the basics of analysis.
- Know the use of basic laboratory equipments.

UNIT I

Introduction to laboratory apparatus: introduction, identification of a apparatus, apparatus for heating: bunsen burner, air bath, water bath, oil bath, sand bath, hot plate heating, mantle heating and block immersion heater laboratory; setting up demonstrations, selecting the apparatus, setting up the apparatus, laboratory centrifuge- use and description, rotor heads- advantages and disadvantages; laboratory glass: types of laboratory glass, characteristics of laboratory glass, laboratory glass components, certified glasswares, glass rod and tubing demountable joints valves and stopcocks. Apparatus with interchangeable ground glass joints (Quickfit)

UNIT II

Measurement and measuring devices: introduction, mass and weight, balances: double-pan, analytical balance, single – pan, mechanical analytical balance, single-pan electronic analytical balance, types of volume, measuring devices, approximate devices, accurate devices - burettes, pipettes and volumetric flasks; calibration of measuring devices pH and conductivity: concept.

UNIT III

Solutions: introduction, water: chemical nature of water, water as a Solvent, types of water, water as a material for experiment; solutions, components of a solution, types of solution, solubility, concentration of solutions, percentage of molarity, molality and normality.

UNIT IV

Preparation of solutions: calculation of masses and volumes to prepare solutions- solids and liquids, more concentrated solutions, dilution to requires concentration, preparation of ppm, pbb, accuracy and precision of measurements of solutes; general guidelines for preparation of solutions; methods of preparing solutions, labelling, exceptions to the general method, notes on other solutions, bench reagents and standard solutions. Demonstration of preparative techniques- heating and agitation: heating), refluxing, controlled addition of a reagent, reflux heating with controlled addition and stirring.

UNIT V

Organizational norms and standards followed in work place; care and maintenance of glassware: cleaning methods, selecting the best cleaning method, handling glass apparatus

assembly of glass apparatus, glass tubes in bungs, suck-back gas pressure in glass, storage of glassware, storage of glass apparatus,, possible hazards from glass dangers -cut glass, heating glass; protective clothing, respiratory hazards and first aid in glass working.

TEXT BOOKS

1. Raghuramulu, N., Madhavan Nair, K., and Kalyanasundaram, S. A Manual of Laboratory Techniques. National Institute of Nutrition, ICMR, Hyderabad.
2. Maintenance Manual for laboratory Manual, WHO

REFERENCE BOOKS

1. Ranganna, S. Handbook of Analysis and Quality Control for Fruits and Vegetable Products. Tata McGraw Hill, New Delhi
2. Linden G. Analytical Techniques for Foods and Agricultural Products.
3. VCH Boundless."Acid-Base Properties of Water."Boundless Chemistry.

WEBOGRAPHY

1. https://www.boundless.com/chemistry/textbooks/boundless-chemistry-textbook/acids-and-bases-15/acids-and-bases-107/acid-base-properties-of-water-451-10533/http://www.chem.uiuc.edu/clcwebsite/elec.html

LABORATORY TECHNIQUES – PRACTICAL

Code: 24FTVC1104 Credits: T0+P5 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable the students to

- Understand basics of laboratory procedures
- Understand the use of various basic laboratory glassware's and equipments.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Know the handling practices of laboratory glassware's and apparatus
- Know the basics of laboratory analysis.
- Know the use of basic laboratory equipments.

EXPERIMENTS

1. Identification and understanding the use of various apparatus and glassware
2. Calibration of balance and weighing of chemical using different types of balance
3. Procedures to use various heating apparatus in lab
4. Separation of liquids using filtration and centrifugation techniques
5. Measuring volume of liquids using volumetric flasks, graduated cylinders, pipette and burette
6. Filling, rinsing liquids in burette
7. Methods to use pipette, standard flask
8. Measurement of colour and colourless solution using burette, pipette, volumetric flask
9. Preparation of solution by using various normality, molarity and ppm, ppb
10. Preparation of standard volumetric solution
11. Identification of glassware's required for specific equipments
12. Demonstration of glassware cleaning methods
13. Assembling and disassembling of glass apparatus
14. Sample of record for glassware breakage
15. Visit to food testing laboratory functioning inside the food industries

TEXT BOOKS

1. Raghuramulu, N., Madhavan Nair, K., and Kalyanasundaram, S. A Manual of Laboratory Techniques. National Institute of Nutrition, ICMR, Hyderabad.
2. Maintenance Manual for laboratory Manual, WHO

FOOD SCIENCE - PRACTICAL

Code: 24FTVC1105 Credits: T0+P5 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable the students to

- Describe the importance of various foods and their nutritive value and place in daily diet
- Study the effects of processing conditions on nutritive value of the foods
- Gain knowledge on the quality characteristics of the foods

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Explain the basic concepts of cooking - and processing- methods applied to various types of food
- Describe the science behind the processing and preparation of food products
- Find out the importance and role of each ingredients in food products

UNIT I: Preliminary preparation and experimental cookery

- Display of basic four food groups suggested by ICMR
- Weighs and Measures of the food ingredients
- Cooking foods using different methods

UNIT II: Experiment on Cereals, Pulses and Oilseeds

- Effect of cooking on cereal starch
- Study of intrinsic and induced characteristics of cereals
- Study the gelatinization temperature and factors affecting gelatinization
- Study on germination and fermentation of cereals and pulses
- Study of intrinsic and induced characteristics of pulses
- Study the physio-chemical characteristics of oils and fats and spoilage of fat

UNIT III: Experiment on Fruits and Vegetables

- Effect of enzymatic and non-enzymatic browning of fruits and vegetables
- Study on physical and chemical changes during storage of fruits and vegetables
- Study on effect of cooking acid and alkali on pigments
- Study on maturity index of fruits and vegetables - colour, flavor, texture, pH, moisture and pigments
- Study on the types of beverages and their quality characteristics

UNIT IV: Experiment on Spices, Milk, Egg and Fleshy foods

- Experiment on spice processing
- Analyze the quality of milk and milk products
- Analyze the quality characteristics of egg
- Study on the quality characteristics of meat and poultry
- Study on the quality characteristics of fish

UNIT V: Field Learning

- Visit to cereals, pulses and oil seed processing industries
- Visit to dairy, poultry, meat and fish processing industries
- Visit to beverages and spice processing industries

TEXT BOOKS

1. Srilakshmi, B. Food Science. New Delhi: Chennai: New Age International Private Limited. Publishers.
2. Swaminathan, M. Food Science and Experimental Foods. Madras: Ganesh and Company.

REFERENCE BOOKS

1. Mudambi, R.S. and Rajagopal, M.Y. Fundamentals of Food and Nutrition. Newdelhi: Wiley Eastern Limited.
2. Mudambi, R.S. and Rao. S. Food Science. New Delhi: Wiley Eastern Limited.
3. Potter, N.M. and Birch, G.G. Food Science, AVI, West Port, Conn.
4. Bennion, *et al.*, Introductory Foods. New York: Macmillan.
5. FAO, AGRICULTURAL SERVICES BULLETIN No. 109 on Grain storage techniques Evolution and trends in developing countries.
6. YeshajahnPomeranz, Clifton E. Meloan. Chapman and Hall. Food Analysis, Theory and Practice;

WEBOGRAPHY

1. https://egyankosh.ac.in/bitstream/123456789/11694/1/Unit-1.pdf
2. http://lib.rudn.ru/file/Food_Science_Nutrition_Catalogue_ebook.pdf
3. https://www.slideshare.net/RoshinaRabail/introduction-to-food-science-and-technology-101
4. https://www.slideshare.net/partharoychaudhry/cereals-pulses-36867856
5. https://slideplayer.com/slide/14016092/
6. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147675

INTERNSHIP - I

Code: 24FTVC1106 Credits: T0+P3 Contact Hours/week: 3 Marks: 50

Students have to undergo internship after completing their first semester at an established food testing unit based on their **NSQF level 4 "Food Analyst".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

SECOND SEMESTER

ESSENTIAL ENGLISH – II

Code: **Credits: T3+P0** **Contact Hours/week: 3** **Marks: 100**

ENVIRONMENTAL SCIENCE

Code: 24FTVV1201 Credits: T2+P0 Contact Hours/week: 2 Marks: 50

OBJECTIVES

To enable the students to

- Understand the fundamental concepts of environmental science, including ecosystems, biodiversity, and sustainability
- Develop awareness and knowledge about environmental issues and their impacts on natural and human systems

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Critically analyze environmental issues and propose sustainable solutions
- Gain practical skills in environmental monitoring, assessment, and problem-solving

UNIT I

Multidisciplinary Nature of Environmental Studies: Introduction, Definition and Importance of Environmental Studies, Need for Public Awareness, Sensitization and Participation.

Natural Resources: (1) Types of Natural Resources – Land, Forest, Water, Minerals, Food and Energy, Natural Resource - Conservation, Role of an Individual in Conservation of Natural Resources, Equitable Use of Resources for Sustainable Lifestyles.

UNIT II

Ecosystems: Concept of an Ecosystem, Types of Ecosystem, Structure and Function of an Ecosystem, Producers, Consumers and Decomposers, Energy Flow in the Ecosystem, Food Chains, Food Webs and Ecological Pyramids, Ecological Succession, Types, Characteristic Features

UNIT III

Environmental Pollution: Definition, Causes, Effects and Control Measures of: (a) Air Pollution, (b) Water Pollution, (c) Soil Pollution, (d) Marine Pollution, (e) Noise Pollution, (f) Thermal Pollution, (g) Nuclear Hazards, Solid Waste Management and Disaster Management

UNIT IV

Social Issues and the Environment: Environment from Unsustainable to Sustainable Development, Urban Problems Related to d to Energy Water Conservation, Rainwater Harvesting, Watershed Management, Resettlement and Rehabilitation of People: Its Problems and Concerns, Case Studies, Environmental Ethics: Issues and Possible Solutions, Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust, Case Studies, Wasteland Reclamation, Consumerism and Waste Products

UNIT V

Biodiversity: Introduction – Definition: Genetic, Species and Ecosystem Diversity, Bio-geographical Classification of India, Value of Biodiversity: Consumptive Use, Productive Use, Social Use, Ethical Use, Aesthetic Use and Option Values, Biodiversity at Global, National and Local Levels, India as a Mega diversity Nation, Hotspots of Biodiversity, Threats to Biodiversity, Biological Diversity Act, 2002.

BOOK REFERENCES

1. Environmental Studies: From Crisis to Cure by R. Rajagopalan
2. Environmental Studies by Erach Bharucha
3. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha
4. Environmental Studies by Benny Joseph

WEBOGRAPHY

1. https://deb.ugc.ac.in/Uploads/SelfLearning/HEI-Exempted-U-0497/HEI-Exempted-U-0497_SelfLearning_20220531171724.pdf
2. https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf
3. https://www.hzu.edu.in/bed/E%20V%20S.pdf

DIGITAL MARKETING

Code: **Credits: T0+P3** **Course Hours/week: 3** **Marks: 100**

FOOD HYGIENE AND SANITATION

Code: 24FTVC1202 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Understand and impart knowledge of importance of food hygiene, sanitation, and safety in food processing unit.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Know the principles and applications of sanitation in food industry.
- Know about the various types of Sanitation techniques applicable to the food industry
- Gain an understanding of food hygiene, sanitation and safety in food processing unit operations.

UNIT- I

Sanitation and Health: Definition, importance of sanitation, application of sanitation to food industry and food service establishments.

Food Safety: Factors affecting food safety, Contamination – Types of contamination in food, Food borne diseases, Microorganisms control and microbial growth in food.

UNIT- II

Hygienic and Food Handling Procedures: Purchasing and receiving safe food, food storage – Dry food store, Refrigerated store, Freezer store and Storage of specific foods, sanitary procedures in food preparation, serving and displaying of food, special food operations. Transport vehicles for frozen food transport – insulation transport, chillers, conversion vehicles, semi-freezer vehicles, full freezer vehicles, passive shipping system.

UNIT- III

Environmental Sanitation: Location and layout of premises, constructional details, ventilation, sanitary requirements for equipments, guidelines for cleaning equipments, cleaning procedures – Necessity for efficient cleaning programme, Types of cleaning equipments and cleaning agents, pest control, water supply – quality of water, storage and waste disposal, environmental pollution.

UNIT- IV

Personal Hygiene: Introduction, necessity for personal appearance, personnel hygiene, sanitary practices, protective clothing, management and sanitation, safety at work place – sanitation training and education, planning and implementation of training programme.

UNIT- V

Sanitation regulations and Standards: Introduction, regulatory agencies, control of food quality, local health authority. Food sanitation check lists given by FSSAI, Special responsibilities of food safety, Sanitation Risk Management (SRM), Food Safety Management System (FSMS). Sanitation SOP (SSOPs).

TEXT BOOKS

1. Marriott, Norman, "Principles of Food Sanitation", Springer Science & Business Media Publishing

REFERENCE BOOKS

1. Roday S, "Food Hygiene and Sanitation", McGraw Hill Publishing Company Limited.
2. Lelieveld, John Holah, David Napper, "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.
3. Hygiene Rating Schemes for Food Establishment, 2021, Quality Council of India.

WEBOGRAPHY

1. http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=187&printable=1
2. https://www.sciencedirect.com/topics/food-science/food-hygiene
3. http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=193&printable=1
4. https://www.who.int/foodsafety/areas_work/food-hygiene/en/
5. https://www.fsis.usda.gov/sites/default/files/media_file/2021-11/3_HQ-SPS-11-29-2016.pdf
6. https://www.fsis.usda.gov/sites/default/files/media_file/2021-03/Sanitation-SOP-Guide.pdf

TECHNIQUES IN FOOD ANALYSIS

Code: 24FTVC1203 Credits: T5+P0 Course Hours/week: 5 Marks: 100

OBJECTIVES

- To provide students a conceptual introduction to the various instrumental techniques in food analysis
- To understand the applications, strengths and limitations of the methods in food analysis.

Specific Learning Outcomes

- On completion of the course the student will be able to:
- Demonstrate interaction of food by using different analytical techniques
- Assess physico-chemical properties of foods

Unit - I

Methods of analysis, introduction and scope of various analytical methods for food samples such as food color, pH value, turbidity, etc. Uses and roles of various grinding instruments/machines for preparation of samples for analysis. Modern analytical techniques for food analysis.

Unit-II

Methods of moisture analysis in foods – drying methods, NIR techniques, isothermic technique, PCR, ELISA.

Unit-III

Methods for separations, identification and quantification of various food components, Separation methods – filtration, centrifugation, sedimentation, etc. Electrophoretic methods for protein: gel electrophoresis, paper electrophoresis, high voltage electrophoresis, starch gel electrophoresis.

Unit IV

Basic principles of spectroscopy instruments: UV, visible and fluorescence spectroscopy. Colorimetric methods of analysis for protein, amino acids, carbohydrates, sugars, vitamins, near infrared analytical techniques for moisture proteins, fats, fibre, vitamins, mineral etc Atomic absorption spectrophotometric method for minerals analysis

Unit- V

Uses and basics of HPLC, Gas chromatograph (GC) and Gas Liquid Chromatography (GLC) – types of column and their applications, high pressure pumps, various type of detectors. Mass spectrophotometers and their applications in food analysis. Uses of atomic absorption spectrophotometer (AAS), ICP, NMR in food analysis. Polarimetric and Refractometric techniques (refractive index) and instruments for various food.

TEXT BOOKS

1. Suzanne Nielson S, Food analysis, Kluwer Academic Press, New York. Winton AL (1999) Techniques of food analysis, Allied Science, Official methods of analysis, Association
2. Fung, D.Y.C. and Matthews, R: Instrumental Methods for Quality Assurance in Foods, MarcelDekker, Inc. New York

REFERENCES

1. James CS. Analytical chemistry of foods, BlackicAcad, UK. Winton, AL. Techniques of food analysis, Allied Science Publication, New Delhi.
2. Song, DWS Mechanism and theory in food chemistry Champasian and Hall Inc. New York.
3. DeMan, J.M., Voisey, P.W. Rasper, V.F. and Stanley, D.W. Rheology and Texture in Food Quality, the AVI Publishing Co. Inc, West Port.
4. Skoog, D.A., Holler, F.H. and Nieman: Principles of Instrumental Analysis Saunders College Publishing, Philadelphia.
5. Gruenwedel, D.W.; Whitaker, J.R. (editors): Food Analysis Principles and techniques, Volumes 1 to 8, Marcel Dekker, Inc., New York.
6. Pare' J.R.J.,Belanger J.M.R.: Instrumental Methods in Food Analysis, Elsevier Publications
7. Herschdoerfer, S.M. (ed): Quality Control in the Food Industry, Vols. 1 to 4, Academic Press, London.

WEBOGRAPHY

1. https://www.labcompare.com/Food-Testing-Equipment/https://www2.chemistry.msu.eduhttps://www.khanacademy.orghttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC5206469/

FOOD CHEMISTRY

Code: 24FTVC1204 Credits: T5+P0 Course Hours/week: 5 Marks: 100

OBJECTIVES

To enable the students to

- Gain knowledge regarding the physical and chemical properties of the food constituents
- Understand the chemical and physical changes that occur in food during processing

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Name and describe the general chemical structure of major components of foods (water, carbohydrates, protein and lipids)
- Explain how changes in overall composition are likely to change the reactivity of food components.
- Predict how processing conditions are likely to change the reactivity of food components.

UNIT- I

Introduction to food chemistry, food constituents: proximate composition of foods, water in foods; water- structure of water and ice, physical constants of water, types of water, water activity. Estimation of moisture content and water activity present in foods.

UNIT- II

Carbohydrate: introduction, definition, classification; general properties of sugar (physical and chemical) identification of common monosaccharide- structure, disaccharides- structure and polysaccharides- structure, chemistry of starch, glycogen, cellulose, gums and crude fibre. Determination of GTR (Gelatinization Temperature Range) of different starches.

UNIT- III

Protein: physical and chemical properties of amino acids; classification of proteins, and amino acid, Essential amino acids, physical and chemical properties of proteins, molecular weight of proteins, protein denaturation. Functional properties of protein.

UNIT- IV

Lipids: classification of lipids, structure, fatty acid, saturated, mono, poly unsaturated, trans fat, essential fatty acids, saponification and unsaponification number, acid numbers and iodine value. Changes in fats and oils – Rancidity, Lipolysis, Auto-oxidation and preservation. Determination of refractive index and specific gravity of fats and oils.

UNIT-V

Enzymes - Introduction, meaning and importance, classification of enzyme, enzyme kinetics, enzyme activity, factors affecting enzyme activity, immobilized enzymes; pigments- meaning, classification, properties; chlorophyll, carotenoids, anthocyannis, anthoxanthins, flavonoids, tannins, natural flavour constituents. Detection of plant pigments.

TEXT BOOKS

1. Potter,N.N. and Hotchkiss, J.H. Food Science, edition 5, CBS Publishers and Distributors, New Delhi.
2. Damodaran S, K.L. Parkin, and O. Fennema (Eds.), Marcel Dekker, NY, (2007). Fennema's Food Chemistry" 4th Edition.CRC press Taylor &Francis.

REFERENCE BOOKS

1. SeemaYadav, Food Chemistry, Anmol Publications Pvt.Ltd., New Delhi.
2. Meyer, Food Chemistry, AVI Publications, New York.
3. Ronsivalli,.L.J. and Vieira, E.R. Elementary Food Science, 3rdEdition, Chapman and Hall, New York.
4. H.D.Belitz,W.Grosch and P.Schieberie, Food Chemistry 4th edition ,Springer publications
5. SrinivasanDamodaran,KirkL.Parkin and Owen R.Fennema. Food chemistry (4th edition) CRC Press.
6. John M.DeMan. Principles of Food Chemistry, Springer publications.

WEBOGRAPHY

1. http://ecoursesonline.iasri.res.in/course/view.php?id=89
2. http://154.68.126.6/library/Food%20Science%20books/batch1/Principles%20of%20Food%20Chemistry%203rd%20Edition.pdf
3. https://edisciplinas.usp.br/pluginfile.php/4937824/mod_folder/content/0/Hans-Dieter%20Belitz%2C%20Werner%20Grosch%2C%20Peter%20Schieberle%20auth.%20Food%20Chemistry.pdf?forcedownload=1
4. https://agrimoon.com/wp-content/uploads/Food-Chemistry.pdf

FOOD MICROBIOLOGY - PRACTICAL

Code: 24FTVC1205 Credits: T0+P5 Course Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Study of microorganisms that play major roles in food processing and preservation, general food quality, and may even occur naturally within certain food types.
- Understand these microorganisms and their relation to the food industry in terms of food spoilage, food borne illness or food related intoxication.
- Identify factors essential for the growth of micro-organisms.

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Equipped with the knowledge to handle microbes and basic instrumentation used in microbiological laboratory.
- Know the basic techniques to isolate, characterize the microbes morphologically will be known to them.

EXPERIMENTS

1. Microbiological laboratory standards and safety protocols.
2. Standard aseptic conditions of Microbiological laboratory.
3. Operation and working principles of Light/ Compound microscope.
4. Working principles and operations of basic equipments of microbiological laboratory (Autoclave, Incubator, Vortex, Magnetic stirrer).
5. Use and care of laminar air flow chamber.
6. Applications of basic microbiological tools (Pipettes, Micropipette, Bunsen burner, Inoculation loop, Spreader, colony counter, anaerobic chamber).
7. Use of microscope to identify and differentiate bacteria, yeast and mould.
8. Preparation of glassware and media for microbial testing.
9. Preparation of slant, stab and plates using nutrient agar.
10. Culture Media preparation for bacteria and fungi
11. Isolation of pure culture –Pour plate technique, Streak plate and Spread Plate techniques
12. Staining methods:
    a. Simple Staining b. Gram's Staining c. Acid-fast staining c. Spore staining
    d. Fungal staining d. Structural staining
13. Microorganisms and their examination – Visual – colony character, color
    Microscopic – shape, rod, coccal, spiral, vibrio,
    Pathogenic, spoilage and beneficial organisms.
14. Enumeration of yeast and mould in food.
15. Standard Plate count method – cfu/ml.
16. Bacterial count with the help of Haemocytometer

17. Microbiological examination of potable water: Total and coliform count, MPN method.
18. To study the microflora of probiotic foods (curd)
19. Bacteriological analysis of foods: Both fresh and processed fruits & vegetables, cereals, spices, and canned foods using conventional method.
20. Visit to microbiology laboratory.

TEXTBOOKS

1. Frazier. W.C.,and Westhoff D.C. (1992), "Food Microbiology", Tata McGraw Hill Publishing Co., Ltd., New Delhi.
2. Adams ,Martin R, Maurice O Moss, Peter McClure (2015), "Food Microbiology", Royal Society of Chemistry, Cambridge.
3. Jay, James M.(2012), "Modern Food Microbiology", Springer Science & Business Media., Maryland.

REFERENCE BOOKS

1. Ray, Bibek; Arun Bhunia,(2013), "Fundamental Food Microbiology", CRC Press.
2. Bibek Ray. " Fundamental food microbiology". CRC Press. 3rd Edition. 2005.

INTERNSHIP - II

Code: 24FTVC1206 Credits: T0+P3 Course Hours/week: 3 `Marks: 50

Students have to undergo internship after completing their Second semester at an established food analysis lab based on their **NSQF level 4 "Food Analyst".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

THIRD SEMESTER

FOOD ANALYSIS

Code: 24FTVC2301 Credits: T4+P0 Course Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Understand different sampling techniques employed in chemical analysis of foods
- Learn various chemical methods of food analysis and proximate analysis

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Know the methods of sampling and handling equipments fused for food analysis
- Perform nutrient analysis of foods

UNIT- I

Introduction to food analysis**;** Sampling, Population; Proximate Principles**;** Sampling – objectives, Importance of sampling**;** Sampling technique**;** Types of sampling**;** Sampling Plan**;** Preparation of samples and Problems in sampling. Qualitative analysis of Carbohydrate, protein, fat, minerals, vitamins and phytochemicals

UNIT- II

Analysis of foods: Proximate – Importance, Moisture analysis - Oven drying method, distillation method. Total carbohydrate analysis: Alkaline ferric cyanide method, Phenol-sulphuric acid method, starch analysis, gelatinization temperature of starchy grains. Protein analysis: Kjeldahl method, Biuret method, Lowry method, BCA method, Barford's method, Ninhydrin method, Amino acid analysis.

UNIT - III

Fat Analysis: Continuous solvent extraction method, Smoke point, Flash and Fire point, Iodine Value, Saponification Value, unsaponification value. Acid Value, Peroxide Value, FFA.

Fibre Analysis, crude fibre analysis, dietary fibre analysis by AOAC method. Determination of ash and acid insoluble ash content present in food and their importance.

UNIT- IV

Vitamins**:** Vitamin A by Carr-Price method, HPLC**;** Vitamin C- Ascorbic acid dichloroindophenol method**;** Vitamin D- Line test.

Minerals: Analysis, importance and methods of determination, Mineral- Calcium-Gravimetric, EDTA and redox titration; Iron – Redox titration; Phosphorous- colorimetry

UNIT V

Phytochemicals: phenols, alkaloids, tannin, glycosides etc. Antioxidants, antinutritional and toxic constituents of foods, various types and chemical nature of antinutritional factors, their significance and methods of analysis. Various flavour components and additives of food and their chemical nature and analysis. Application of enzymes in food analysis.

TEXT BOOKS

1. Fennema, OR. Food Chemistry, McGraw Hill Publ. Belitz, HD and Grosch, W. Food Chemistry, Springer – VatagePubl

REFERENCE

1. Lab Manual for analysis of foods: FSSAI, 2023.
2. Kalia, M. Food Analysis and Quality Control. Kalyani Publishers, New Delhi. 2002.
3. Winton, A.L and Winton, K.B. Techniques of food analysis. Allied Scientific Publishers, New Delhi.
4. Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett Publishers, Boston, London. 2003.
5. Connell, J.J. Control of fish quality. Blackwell Scientific Publications, Cambridge

WEBOGRAPHY

1. http://www.fao.org/3/Y5022E/y5022e03.htmhttps://www.sciencedirect.com/topics/chemistry/food-analysis
2. http://www.fsis.usda.gov/Science/Hazard_Analysis_%5C%26_Pathogen_Reduction/index.asp

FOOD SAFETY SYSTEM IN DAIRY INDUSTRIES

Code: 24FTVC2302 Credits: T4+P0 Course Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Provide exposure and awareness on food safety systems in dairy industries
- Identify the sources for food standards, regulations and specifications prescribed by different certificate bodies
- Implement strong control systems through different techniques

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Gain knowledge for identifying food safety problems
- Build confidence among the students to handle the food safety projects in dairy industries

UNIT -I

Introduction**:** Current status of dairy industry-production-consumption- total milk production in country and state with reference to global milk production -systems and structures-safety and quality problems in imports and exports, Food safety policies in dairy industry. Dairy development programme implemented in India.

UNIT -II

Dairy Chemistry: Milk Composition – Physico Chemical properties of milk – Animal, Feed and Environmental, A1 vs A2 milk. Factors influencing the composition of milk – Milk lipids, Proteins, Carbohydrate and their biosynthesis, classes and significance – Minerals and Vitamins in Milk – Thermal stability of Milk – Freezing Point depression of Milk.

UNIT- III

Quality Analysis of Milk : Sensory analysis of Milk – Determination of Specific gravity, fat, SNF, TS, Acidity and pH in milk and their significance and interpretation – Determination and significance of MBR Test – SPC – Phosphatase activity in milk – Common adulterants in milk and their detection techniques, melamine detection – Advanced analytical techniques in milk and milk products.

UNIT-IV

Food Safety Processes in Dairy Industry**:** General practices- Reception- chilling-clarification- Pasteurization – LTST, HTST, sterilization- Ultra high temperature treatment-grading of raw milk - prevention of nutritional losses- legal requirements of packaging materials and labeling. Food Safety Legislations and Enforcement Procedures**:** Prevention of food adulteration - Milk and milk product order-agricultural produce act - export quality control and inspection act - live stock importation act

UNIT- V

Consumer Food Safety Management: Development and organization on training programmes for food handler's inspectors- analysts-food borne diseases due to milk hazards,

adulterants and contaminants in milk and milk products. Practices on controlling contaminants in milk-guidelines on good manufacturing practices. Certification Bodies**:** Implementation of hazard analysis critical control point in dairy industry, food quality and safety management system. APEDA -Effluent treatment- international certification for dairy.

TEXT BOOK

1. Vijayendra, S. V. N. "*Food Safety Systems for Dairy Industries".* All India Seminar on Emerging Technologies in Dairy Industry. pp. 19-25.

REFERENCE BOOKS

1. Food safety and standards authority of India expert group milk and milk products, NDDB publication (Edition I)
2. Early R,"*Guide to Quality Management Systems for Food Industries"*. Blackie Academic.
3. Krammer A &Twigg BA, "*Quality Control in Food Industry"*. Vol. I, II. AVI Publication.
4. Dairy Science: Petersen (W.E.) Publisher – Lippincott & Company 2. Outlines of Dairy Technology – Sukumar (De) – Oxford University press 3. Indian Dairy Products – Rangappa (K.S.) &Acharya (KT) – Asia Publishing House.
5. The technology of milk Proceesing – Ananthakrishnan, C.P., Khan, A.Q. and Padmanabhan, P.N. – Shri Lakshmi Publications.

WEBOGRAPHY

1. http://www.fsis.usda.gov/
2. http://www.cfsan.fda
3. https://www.fao.org/infoods/index.en.stm
4. https://www.onlinebiologynotes.com

PRINCIPLES OF FOOD PRESERVATION

Code: 24FTVC2303 Credits: T4+P0 Course Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Understand the types of spoilage occurring in foods
- Gain knowledge and acquire skill on various methods of food preservation.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Understand the concepts and principles of food preservation
- Preserve food products from plant sources

UNIT I

Classification of foods – Perishable, Non-perishable and Semi-perishable, Types of food spoilage, viz. microbiological, enzymatic, chemical and physical spoilages and their effects on food quality.

Food Preservation: Principles and Significance of food processing and preservation, Preservation of food by Physical, Chemical and Biological methods.

UNIT II

High temperature processing: Principles of thermal processing, Pasteurization and Sterilization - microbial destruction in batch and continuous sterilization, Canning of foods - categories of foods for canning, heat penetration into food containers, calculating the process time for canned food, UHT processing, Irradiation and Microwave processing of foods.

UNIT III

Low temperature processing: Low temperature required for different foods, Refrigeration, chilling and Freezing of food, freezing principles, slow and fast freezing, freezing process, determining freezing load, ammonia refrigeration systems, freezing rate, estimation of freezing time of foods, Types of freezers, thawing of frozen food.

UNIT IV

Water activity (aw) in foods: Role of water activity in food preservation

Processing by Moisture Removal: Evaporation, Concentration and Dehydration, Drying operation, Drying of solid and liquid foods, Types of dryers, their advantages and disadvantages, Concentration of liquid food by evaporators, Membrane processes for liquid food concentration – Microfiltration, Nanofiltration, Ultrafiltration and Reverse Osmosis.

UNIT V

Preservation by Osmotic pressure – High concentration of sugar, High concentration of salt

Use of preservatives: Sugar and salt preservation, use of chemical preservatives in food, preservation by fermentation, smoking, sulphating and pickling, purposes and advantages.

Bio-preservation and Preservation by organic acids.

TEXT BOOKS

1. Srilakshmi B. (2018), Food Science, New Age Publisher Pvt Limited, New Delhi.
2. Subbulakshmi G and Shobha A. Udipi. Food Processing and Preservation. New Age International Publishers.

REFERENCE BOOKS

1. Desoresier,W.N. and James,N. The Technology of Food Preservation. New Delhi: CBS Publishers and Distributors.
2. Girdharilal,G.S*et al.*, Preservation of Fruits and Vegetables. New Delhi:
3. Publications and Information Division, ICAR.
4. Sumati. R *et al.*, Fundamentals of Food and Nutrition. Madras: Wiley eastern Limited.

WEBOGRAPHY

1. http://eagri.org/eagri50/AMBE101/pdf/lec23.pdfhttp://ecoursesonline.iasri.res.in/mod/page/view.php?id=4037
2. https://www.britannica.com/technology/thermal-processing-food-preservationhttps://safefood360.com/free-resources/whitepapers/preview/thermal-processingof-food/
3. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=17055
4. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=4037
5. http://www.uop.edu.pk/ocontents/Lecture%20no%202.pdf
6. https://www.slideshare.net/mohitjindal/principles-and-methods-for-food-preservation-149113723
7. https://www.brainkart.com/article/Principles-and-Methods-of-Food-Preservation_2108/

FOOD ANALYSIS – PRACTICAL

Code: 24FTVC2304 Credits: T0+P5 Course Hours/week: 5 Marks: 100

OBJECTIVES

To enable the students to

- Understand different sampling techniques employed in chemical analysis of foods
- Learn various chemical methods of food analysis and proximate analysis

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Know the methods of sampling and handling equipments fused for food analysis.
- Perform nutrient analysis of foods

UNIT-I

Qualitative Analysis of Carbohydrate, Protein, Lipid, Minerals, Vitamins, and Phytochemicals.

UNIT-II

Quantitative Analysis- Estimation of proximate composition - Moisture, Ash, Acid insoluble ash, Carbohydrate, Protein, Fat, Crude fiber, Dietary fiber, Energy.

UNIT-III

Quantitative Analysis of Vitamins - Vitamins-B and Vitamins-C

Quantitative Analysis of Minerals- Calcium, Phosphorus, Iron

UNIT-IV

Quantitative Analysis- Phytochemicals and Antioxidants

Water analysis – TS, TDS, TSS, hardness, pH, alkalinity, EC

UNIT-V

Miscellenous – Saponification and unsaponification value, Acid Value, Iodine Value, FFA, Peroxide Value, Reducing Sugar, Total sugars.

Visit to food analysis laboratories –National and Regional

REFERENCE BOOKS

1. Lab Manual for analysis of foods: FSSAI 2022

WEBOGRAPHY

1. https://gpadampur.files.wordpress.com/2011/11/6-2-faqc-practicals-08022014.pdf

QUALITY EVALUATION OF MILK AND MILK PRODUCTS – PRACTICAL

Code: 24FTVC2305 Credits: T0+P5 Course Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Understand and apply techniques for evaluating the quality of milk and milk products
- Conduct various tests to determine the safety, nutritional value, and sensory attributes of dairy products
- Develop skills in using analytical instruments and interpreting data for dairy quality assessment

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Be well-equipped with the necessary skills and knowledge to excel in the field of dairy science and technology
- Evaluate and ensure compliance with quality standards, thereby contributing to the production of safe and high-quality dairy products

EXPERIMENTS

1. Quality Specifications of Milk
2. Determination of Activity (Titrable Acidity) of Milk
3. Determination of Density and Specific Gravity of Milk
4. Determination of Viscosity and Turbidity
5. Clot on Boiling Test for Milk
6. Determination of Fat and SNF content in milk
7. Determination of percentage of Total Solids
8. Microbial Analysis- SPC, MBRT, Phosphate activity, coliform count, resazurin test
9. Test for Syneresis in Yoghurt and Curd
10. Detection of Addition of Starch, glucose, water, sodium chloride, urea, cellulose and nitrates in Milk
11. Test for Adulterants in Milk, Ghee and Butter
12. Preparation of flavoured milk and quality analysis
13. Visit to milk processing unit.

REFERENCE BOOKS

1. Lab Manual for analysis of foods: Milk and Milk products, FSSAI 2022

WEBOGRAPHY

1. https://fssai.gov.in/upload/Manual_Dairy_03_10_2022.pdf
2. http://www.fao.org/dairy-production-products/products/quality-and-testing/en/#:~:text=Good%2Dquality%20raw%20milk%20has,the%20quality%20of%20milk%20products.
3. http://www.fao.org/ag/againfo/resources/documents/mpguide/mpguide2.htm
4. https://agriquora.com/blog-details/milk-quality-tests
5. https://old.fssai.gov.in/Portals/0/Pdf/Draft_Manuals/MILK_AND_MILK_PRODUCTS.pdf
6. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=6180
7. https://egyankosh.ac.in/bitstream/123456789/33859/1/Practical-5.pdf

PRINCIPLES OF FOOD PRESERVATION - PRACTICAL

Code: 24FTVC2306 Credits: T0+P5 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Knowledge of various food preservation methods including thermal, chemical, biological, and physical techniques
- Hands-on experience in applying preservation techniques to different types of food

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Evaluate the effectiveness of different preservation methods by analyzing changes in sensory, nutritional, and microbiological properties of food.
- Implement food preservation techniques in a commercial environment, understanding both small-scale and large-scale applications.

EXPERIMENTS

1. Signs and Indicators of food spoilage
2. Demonstration of various machineries used in food preservation.
3. Demonstration on effect of blanching on quality of foods.
4. Preservation of food by pasteurization
5. Demonstration on canning and bottling of fruits and vegetables.
6. Drying of fruit slices in cabinet drier
7. Demonstration on drying of green leafy vegetables
8. Osmotic dehydration of foods e.g. candy
9. Drying of foods using freeze-drying & spray drying process.
10. Reconstitution of dehydrated vegetables
11. Determination of rehydration ratio of dehydrated fruits and vegetables
12. Preservation of food by high concentration of sugar - preparation of squash
13. Preservation of food by using salt - Pickle
14. Preservation of food by using chemicals- jam
15. Preservation of food by fermentation (idli, curd, dhokla etc.)
16. Visit to food preservation industries and small scale industries

REFERENCE BOOKS

1. Hersom AC &Hulland ED.Canned Foods. Chemical Publ. Co.
2. Larousse J & Brown BE. Food Canning Technology. Wiley VCH.
3. Stumbo. Thermo Bacteriology in Food Processing. CRC, Academic Press.
4. Thorne S. Food Irradiation.Elsevier.
5. Zeathen P.Thermal Processing and Quality of Foods. Elsevier.
6. Lab manual for fruits and vegetables, FSSAI, 2023.

WEBOGRAPHY

1. https://frugalfamilyhome.com/food/practical-food-
   https://cfmslibrary.librarika.com/search/detail/1262459http://www.fao.org/3/v5030e/v5030e09.htm
2. https://www.fssai.gov.in/home/food-testing/food-testing-manual.html

INTERNSHIP - III

Code: 24FTVC2307 Credits: T0+P3 Course Hours/week: 3 Marks: 50

Students have to undergo internship after completing their third semester at an established food processing/ food testing unit based on their **NSQF level 5 "Technical Lead – Food Analysis".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

FOURTH SEMESTER

FOOD PACKAGING

Code: 24FTVC2401 Credits: T5+P0 Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Familiarize with different methods and materials used for packaging.
- Understand the technology behind packaging.
- Understand interaction of food with packaging & to do shelf life testing.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- The concepts and functions of food packaging
- Know packaging of food products from primary to tertiary packaging materials and method .

UNIT I

Introduction to food packaging Definition, functions and requirements for effective packaging, packaging criteria Primary, secondary and tertiary packaging. Flexible, rigid and Semi- rigid packaging, packaging machineries.

UNIT II

Materials for food packaging – types, various uses, merits & drawbacks. Paper, Glass, Tin, Aluminium: TFS, Polymer coated tin free steel cans, cellophane, plastics, LDPE, HDPE, LLDPE, HMHDPE, Polypropylene, polystyrene, polyamide, polyester, polyvinyl chloride – thickness, micron size.

UNIT III

Different forms of food containers Boxes, jars, cans, bottle. Packaging requirements for various products - cereals, dairy, fish, meat, spices, vegetables & fruits, beverages, canned foods and dehydrated foods

UNIT IV

Modern concepts of packaging technology. Aseptic packaging, Form–Fill–Seal packaging, Edible Films, shrink wrapping, Retort pouch packaging, Easy-Open–End, Boil–In-Bags, Closures, tetra-pack, vacuum-packaging, MAP & CAP, Hyper baric storage, insect resistant packaging, intelligent packaging

UNIT V

Food packaging and labelling - Laws & Specifications, Quality testing of packaging materials. Paper & paper boards-thickness, bursting strength, puncture resistance, Cobbs test, tearing resistance Flexible packaging materials (plastics)-yield, density, tensile strength, elongation, impact resistance, WVTR, GTR, Overall Migration Rate, seal strength. Transportation hazards and testing, Oxygen interactions, moisture interchanges and aroma, O2 and CO2 permeability.

TEXT BOOK

1. Potter, N. N,. Hotchkiss, J. H. Food Science. CBS Publishers, New Delhi.
2. Robertson, G.L. “Food Packaging: Principles and Practice”. 2nd Edition. Taylor & Francis.

REFERENCE BOOKS

1. Sacharow, S., Griffin, R.C. (2000). Food Packaging. AVI Publishing Company, West Port, Connecticut.
2. Davis, E.G. (2004). Evaluation of tin & plastic containers for foods. CBS Publishers, New Delhi.
3. Cruess, W.V. (2003). Commercial Fruit & Vegetable Products. Allied Scientific Publishers, Delhi.
4. Raj, G .D. Encyclopaedia of Food Science, Vol 2. Anmol Publications PVT Ltd, New Delhi.
5. Ahvenainen, Raija. (2003). “Novel Food Packaging Techniques”. Wood Head Publishing. 6. Mathlouthi, M. “Food packaging and Preservation. Aspen Publications,
6. Paine, F.A. and Paine, H.Y. A Handbook of Food Packaging.Leonard Hill, Glasgow, UK.

WEBOGRAPHY

1. http://www.ift.org/knowledge-center/read-ift-publications/science-reports/scientific-statussummaries/food-packaging.aspxhttps://gscpackaging.com/blog/the-importance-of-food-packaging/http://www.fnbnews.com/Top-News/importance-of-food-packaging-in-food-industry-39233
2. https://www.emballagecartier.com/en/article/primary-secondary-and-tertiary-packaging-whats-the-difference/
3. https://www.eagri.org
4. https://icpe.in
5. https://www.dotugo.com/blog/92-packaging/283-different-types-of-packaging-materials.html
6. https://matmatch.com/learn/material/materials-used-in-food-packaging
7. https://content.ces.ncsu.edu/packaging-requirements-for-fresh-fruits-and-vegetables
8. https://archive.fssai.gov.in

QUALITY EVALUATION OF FOOD GRAINS AND ITS PRODUCTS

Code: 24FTVC2402 Credits: T5+P0 Course Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Create awareness about the processing of major cereals like paddy, maize
- Study the storage and handling techniques of cereals
- Gain knowledge on processing and milling of cereals

UNIT- I

Introduction, to Grain quality and their importance, factors affecting grain quality, Grain structure- Wheat, Rice and Millets, Grain Quality Parameters – Intrinsic and Induced characteristics, Length and Width, Aspect Ratio, Texture, Chalkiness, Whiteness, Damaged/discolored grains, Breakage and cracking, Immature, Yellowing, Adulteration, Yield, Technical Terms used in grain analysis

UNIT- II

Manual Techniques for Grain Analysis, Grain analysis methods - Approximately circular seed and Non-Circular seed, Grain size analysis, Sieving Method - Manual and mechanical sieving: Single sieve and Sieve set sieving: Sieving Techniques – Vibrating, Horizontal, Tap and Air jet sieving: Conventional Image Based Grain Analysis Techniques – Online and Offline Image Based Analyzer

UNIT-III

Grain Analysis Standards, Importance of standards, Fair Average Quality Standards (FAQ), Rice standard organizations, Bureau of Indian Standards (BIS), Directorate of Marketing & Inspection (DMI), Department of Food & Public Distribution (DFPD), CODEX Standards, The African Organisation for Standardisation Standards (ARSO : ARS 464 (English) : Milled Rice Specification 2012), Cambodia milled rice standards(CS053:2014-Rev.1) (Intenational Financial Corporation 2014), United States standards for rice by USDA, Food and Agriculture Organisation of United Nations

UNIT IV

Biodeterioration: Moulds and mycotoxins, The significance of mycotoxins. The interaction mycotoxins, The control of mycotoxins, Sampling and analysis. Role of rodents and pests in grain biodeterioration. Detection and identification of pest infestation of storage grains – Prevention and Control strategies: Integrated Pest Management (IPM) and Chemical control techniques, Drying of grains

UNIT- V

Quality evaluation of grain products: Microscopic structure of grain starches, Physical, Chemical, Thermal and Rheological properties of grain and grain flours, quality standards for processing of grain (Milling, Baking and Cooking), Shelf-life analysis and stability testing of grain flours, Determination of intentional and unintentional adulterants in grain flours and its products.

TEXT BOOKS

1. Boxall, R.A. and Gough, M.C. Investigation of technical problems associated with the distribution of food grain from temperate to tropical regions. NRI Report 4: A study of a shipment of food-aid maize to Angola. Chatham, UK: Natural Resources Institute. 71pp

REFERENCE BOOKS

1. Boxall, R.A. and Gough, M.C. Investigation of technical problems associated with the distribution of food grain from temperate to tropical regions.
2. NRI Report 5: A study of a second shipment of food-aid maize to Angola. Chatham, UK: Natural Resources Institute. 40pp.
3. Conway, J.A., Daplyn, P.F., Clarke, P.A. and Twiddy, D.R. A study in the determination of quality/value relationships in rice. NRI Bulletin 55: Chatham, UK: Natural Resources Institute. 45pp.
4. Foster, G.H. Drying Cereal Grains. In Storage of Cereal Grains and Their Products. C M Christensen, Ed. St Paul: American Association of Cereal Chemists Inc. 79116.
5. Jewers, K., Coker, R.D., Jones, B.D., Cornelius, J., Nagler, M.J., Bradburn, N., Tomlins, K., Medlock, V., Dell, P., Blunden, G., Roch, O.G. and Sharkey, A. Methodological developments in the sampling of foods and feeds for mycotoxin analysis. Journal of Applied Bacteriology Symposium Supplement: 105S-116S.

WEBOGRAPHY

1. https://pdfs.semanticscholar.org/94e1/4d258349e588ff4cbe7f89a445c419467581.pdf
2. https://www.sciencedirect.com/topics/food-science/grain-quality
3. https://www.sciencedirect.com/science/article/abs/pii/S0956713517301329
4. http://www.fao.org/3/x5036e/x5036E17.htm
5. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147675
6. http://www.fao.org/3/t0567e/T0567E0a.htm
7. http://www.goenfoods.com/wheat-grain-structure/
8. https://www.researchgate.net/figure/General-structure-of-millet-grain_fig1_318921493
9. https://www.fao.org/4/t1838e/T1838E0h.htm#Quality%20characteristics%20of%20grains
10. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwi804PF2eqGAxVC8DgGHfS0DhQQFnoECBEQAw&url=https%3A%2F%2Fwww.fao.org%2F4%2Ft1838e%2FT1838E1e.htm%23%3A~%3Atext%3DIntegrated%2520pest%2520control%2520can%2520be%2Cand%2520acceptable%2520into%2520that%2520system.&usg=AOvVaw0OY8Me9rVTNbKA3AiByyPb&opi=89978449

LET US KNOW GANDHI

Code: **Credits: T2+P0** **Contact Hours/week: 2** **Marks: 50**

QUALITY EVALUATION OF FOOD GRAINS AND ITS PRODUCTS - PRACTICAL

Code: 24FTVC2403 Credits: T0+P4 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Understand and apply methods for determining the functional properties of grain flours
- Detect and quantify foreign matter and contaminants in grains
- Evaluate the physical and chemical properties of grain flours
- Perform nutrient analysis and determine the presence of adulterants in grain products.

EXPERIMENTS:

1. Sampling of grains – Different sampling methods.
2. Determination of functional properties of the various grain flours
3. Microscopic structure of grains
4. Determination of foreign matter present in grains
5. Determination of: Refractions foreign matter – organic, inorganic, insect, damaged grains, discolored, immature grains
6. Determination of Ergot in Food grains
7. Measurement of Rice Grain Dimensions: Length, Breadth, Length/Breadth Ratio
8. Cooking analysis: Cooking time, Volume Expansion Ratio and Kernel Elongation Ratio and index, gruel losses
9. Flour analysis: Microscopic shape, sieving
10. Determination of sedimentation power of flour
11. Study of Physical and Chemical properties of flours
12. Nutrient quality of grain flours-protein, fat, carbohydrate, fiber, ash and vitamins
13. Estimation of Moisture in grains
14. Estimation of Gluten Content of flour.
15. Determination of Total Starch Content: Enzymatic Method
16. Determination of Amylose Content of Rice Spectrophotometric Method
17. Determination of adulterants in grain and grain flour
18. Visit to rice and millet processing units and regional institutes

REFERENCE

1. FSSAI Manual of Methods of Analysis of Foods – Cereal and Cereal Products -2nd edition – June 2023

WEBOGRAPHY

1. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=90220
2. https://rfssh.wordpress.com/2014/09/25/estimation-of-crude-fibre/
3. https://discoverfoodtech.com/soxhlet-extraction-method/
4. https://discoverfoodtech.com/protein-estimation-by-kjeldahl-method/
5. https://cwsimons.com/determination-of-ash-content/#:~:text=Ash%20content%20represents%20the%20inorganic,at%20500%20%E2%80%93%20600%20oC.&text=Ash%20content%20determination%20is%20widely,quality%20measure%20for%20flour%20extraction
6. http://egyankosh.ac.in/bitstream/123456789/33675/1/Practical%208.pdf
7. https://egyankosh.ac.in/bitstream/123456789/33867/1/Practical-1.pdf

ANALYSIS OF FOOD PACKAGING MATERIALS - PRACTICAL

Code: 24FTVC2404 Credits: T0+P4 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

1. Acquire the skills on quality of packaging materials acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

1. Gain knowledge about the characteristics of dehydrated and extruded food products.
2. Understand the importance of particle size of food products.
3. Evaluate the migration characteristics of packaging materials.
4. Develop suitable packaging methods for food products.

EXPERIMENTS

1. Identification and Characterization of different food packaging materials
2. Determination of Grammage/GSM of the food packaging material
3. Testing of paper, plastic and other packaging materials: Thickness, Puncture resistance, Bursting strength, Folding endurance
4. Determination of Tensile and Tearing Strength of paper, plastic and other packaging material
5. Measure the Stiffness of food Packaging material
6. Measure the quality of Oxygen, Carbon dioxide, Nitrogen (Balance gas) in the head space of packaged product
7. Determination of Grease Resistance in packaging materials used for fat rich foods
8. Carton packing, 1-7 ply, corrugated box, laminated, aluminum pack
9. Determination of water penetration of packaging material using COBB tester
10. Experiment on WVTR
11. Experiment on Swollen and Solubility test
12. Determination of Biodegradability test (Soil Burial Test) for biodegradable packaging materials
13. Evaluation of Glass bottles: Visual defects, Inspection of colour, Dimensional measurements, Pressure Test, Thermal Shock Test, Overall height, Annealing and Impact Test
14. Measure the Tin coating by tin coating weight measurement (Clark's test)
15. Measure the continuity of Tin coating for tin based material
16. Measure the ethylene gas produced by fruits and vegetables
17. Visit to Food Packaging Industry
18. Visit to Testing laboratory of food packaging

TEXT BOOK REFERENCES

1. Griffin C. R. and Sacharow, S. Principles of Package Development. The AVI Publishing Company Inc.
2. Paine, F.A. and Paine, H.Y. A Hand Book of Food Packaging. Blackie Academic & Professional.
3. Robertson GL. Food Packaging Principles and Practice. Marcel Dekker INC. New York

WEB REFERENCES

1. https://www.scribd.com/document/511126755/Food-Packaging-lab-manual
2. https://ebooks.inflibnet.ac.in/ftp08/chapter/quality-evaluation-of-packaging-materials/
3. https://www.slideshare.net/slideshow/testing-of-packaging-materialpdf/255536981
4. https://www.egyankosh.ac.in/bitstream/123456789/9639/1/Unit-13.pdf

QUALITY EVALUATION OF BAKERY AND CONFECTIONERY PRODUCTS - PRACTICAL

Code: 24FTVC2405 Credits: T0+P5 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Impart basic and applied technology of baking and confectionary and acquaint with the manufacturing technology of bakery and confectionary products.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Highlight the processing methods used in baking and confectionery industries.
- Know about the various types of food products made using baking technology.
- Able to start a small scale bakery and confectionery unit

UNIT: I

Bakery products: Types, specifications, compositions, ingredients Cereals and millets, formulations, processing, equipment.

- Introduction to Bakery and Confectionery Equipments
- Quality evaluation of raw ingredients: Flour, egg, milk, yeast, fat, sugar and other ingredients

UNIT: II

Bread making: Methods, Different types of breads and preparation of bread using different methods, quality evaluation of bread, staling of bread,

- Determination of Gluten content in the flour and its suitability for bakery products
- Bread , Pizza base and Buns - Preparation and its quality examination
- Assessment of quality of the prepared bakery products: Physical, nutritional, functional and microbial

UNIT: III

Different types of biscuits and preparation of biscuits using different methods, quality evaluation of biscuits, Preparation of other bakery products: bun, rusks, crackers, muffins and pizza quality evaluation.

- Butter cake and Sponge cake, Cookies and biscuits - Preparation and its quality examination
- Assessment of quality of the prepared bakery products: Physical, nutritional, functional and microbial

UNIT: IV

Confectionery and chocolate products: Types, specifications, compositions, ingredients, formulations, processing, equipment, packaging, storage and quality testing.

- Chocolates- Hard and soft Fudge, toffee
- Assessment of quality of the prepared confectionery products: Physical, nutritional, functional and microbial

UNIT: V

- Visit to bakery unit
- Visit to confectionery unit
- Visit to sugar manufacturing unit

REFERENCES

1. Lab manual for Beverages. Sugar and Confectionery, FSSAI 2023.
2. Dubey, S.C. (2007). Basic Baking 5th Ed. ChanakyaMudrakPvt. Ltd.
3. Raina et.al. (2003). Basic Food Preparation-A complete Manual. 3rd Ed. Orient Longman Pvt. Ltd.
4. Manay, S. &Shadaksharaswami, M. (2004). Foods: Facts and Principles, New Age Publishers. 4. Barndt R. L.
5. Fat & Calorie – Modified Bakery Products, Springer US. 5. Samuel A. Matz, Bakery Technology and Engineering, PAN-TECH International Incorporated.
6. Faridi Faubion. Dough Rheology and Baked Product Texture, CBS Publications.
7. Samuel A. Matz. Cookies & Cracker Technology, Van Nostrand Reinhold

WEBOGRAPHY

1. https://onlinelibrary.wiley.com/doi/full/10.1111/j.1745-4557.2011.00417.x
2. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0101-20612015000200215
3. https://www.slideshare.net/mobile/vlaparna/bakery-and-confectionery-final
4. https://www.slideshare.net/mobile/divyapanneer7/bakery-ppt
5. https://www.slideshare.net/mobile/AnuragMundaje/bakery-products
6. https://www.slideshare.net/mobile/cris-marz/baking-tools-and-equipments-65274399
7. https://slideplayer-com.cdn.ampproject.org/v/s/slideplayer.com/amp/14118468/?amp_js_v=a6&amp_gsa=1&usqp=mq331AQHKAFQArABIA%3D%3D#aoh=16176350926198&referrer=https%3A%2F%2Fwww.google.com&amp_tf=From%20%251%24s&ampshare=https%3A%2F%2Fslideplayer.com%2Fslide%2F14118468%2F
8. https://www.slideshare.net/mobile/mrs0ft059/yahayay
9. https://www.slideshare.net/mobile/pratikguptateddy/chocolate-27455478
10. https://www.slideshare.net/faizanmehtab90/fudge-41120031
11. https://www.slideshare.net/faizanmehtab90/toffees
12. https://bakerpedia.com/processes/bread-evaluation/

TRAINING COURSE IN FOOD SAFETY SYSTEM

Code: 24FTVC2406 Credits: T0+P3 Contact Hours/week: 3 Marks: 50

Training in food safety is a large scale training program to demonstrate their ability to control food safety hazards and contribute to ensure that food is safe at the time of human consumption are expected to meet specific requirements. Training Courses like Fostac training, FSMS training course, Food Safety, HACCP, FSMS course.

From, this students from B.Voc. Food Testing and Quality, they have to undergo anyone of the training course and submit a report based on the course they learned.

INTERNSHIP - IV

Code: 24FTVC2407 Credits: T0+P2 Contact Hours/week: 2 Marks: 50

Students have to undergo internship after completing their fourth semester at an established food analysis laboratory based on their **NSQF level 5 "Technical Lead – Food Analysis".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

FIFTH SEMESTER

ENTREPRENEURSHIP DEVELOPMENT

Code: 24FTVC3501 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- To understand the role and importance of entrepreneurs in nation building
- To imbibe the qualities of entrepreneur
- To know about the agencies supporting for entrepreneurship development programmes

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Describe the features of government programmes for entrepreneurship development
- Know the characteristics/traits of an entrepreneur
- Inculcate entrepreneurial skills to become entrepreneur

UNIT I

Concepts of entrepreneur: Entrepreneur- Definitions – Characteristics of a successful entrepreneur - General functions of an entrepreneur - Type of entrepreneurs - Role of entrepreneur in economic development - Distinction between an entrepreneur and a manager - Entrepreneur and Intrapreneur. Partnership firm, LLP, Company – registration. Concept of women entrepreneurship - Reasons for growth of woman entrepreneurship - Problems faced by them and remedial measures.

UNIT II

Emergence of entrepreneurship - Economic and non economic factors for stimulating entrepreneurship development - Obstacles to entrepreneurship development in India - Growth of entrepreneurship in India. Concept and meaning of entrepreneurship development - Need for entrepreneurship development programmes (EDPs) - Objectives of EDPs - Organizations for EDPs in India;, SISI their roles and activities

UNIT III

Factors affecting entrepreneurship development: Psychological factors, Social factors, Economic factors, Political factors and Environmental factors. Positive and negative impact of the above factor among the start-ups and venture capital industries.

UNIT IV

Setting up of micro, small and medium enterprises- Setting up of micro, small and medium enterprises, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Sickness, Causes-Remedies.

UNIT V

Role of institutions/schemes in entrepreneurial development- MOFPI, NABARD, SIDCO, SIDBI, NIESBUD, EDII, SISI, NREG , KVIC, KVIB, Scheme- SWARNA JAYANTHI, MSME, Rozgar Yojana Schemes, etc.

Related Experience

- Case study of successive entrepreneurs
- Visit to SIDCO
- Visit to DIC
- Visit to MSME centers

TEXTBOOKS

1. Michael H Morris, Corporate Entrepreneurship and Innovation in Corporations, 7th Edition, CENGAGE Learning, Delhi, 2010
2. Jerry Katz, Entrepreneurship Small Business, 5th edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.

REFERENCES

1. Khanka S.S., Entrepreneurial Development, 1st edition, S.Chand and Company Limited, New Delhi, 2013.
2. Prasama Chandra, Projects: Planning, Analysis, Selection, Implementation and Reviews, 2nd edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1996.
3. Robert D. Hisrich, Entrepreneurship, 10th edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2017.

ONLINE SWAYAM COURSE

Code: 24FTVC3502 Credits: T0+P3 Contact Hours/week: 3 Marks:

Swayam is a platform initiated by Government of India and designed to achieve the three cardinal principles of Education policy like access, equity and quality. Once, they have completed the course with certification, they can add the credits to their academic record.

Students from B.Voc. Food Testing and Quality Evaluation, they have to do any one of the course via swayam portal relevant to their subject and also submit their passing certificate.

FOOD QUALITY ASSURANCE

Code: 24FTVC3503 Credits: T5+P0 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Acquaint with food quality parameters and control systems, food standards, regulations, specifications.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Understand the principles and framework of food safety.
- Apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- Identify the wide variety of parameters affecting food quality.

UNIT- I

Definition and concepts of quality – Factors affecting food quality; Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Sensory *vis-àvis* instrumental methods for testing quality.

UNIT- II

Quality management: Objectives, importance and functions of quality control, Quality management systems in India, Indian & International organizations dealing with inspection, traceability and authentication, certification and quality assurance – PFA, FPO, MMPO, MPO, AGMARK, BIS, ISO, Food Codex and GFSI; Export import policy, export documentation.

UNIT- III

Food Safety and Standards Act, 2006 – Structure, Role/Functions and Important initiatives by FSSAI

HACCP system: Hazard analysis Critical Control Point: Definition, principles, Guidelines for the application of HACCP system

Quality Improvement Techniques**:** Quality Improvement Plans (QIP); Quality Control Circles (QCC) and Total quality management (TQM)

UNIT- IV

Food Quality Regulations: Quality assurance, GMP, GHP, GLP, GAP, Quality manuals, documentation and audits; Sampling procedures and plans, Laboratory quality procedures and assessment of laboratory performance, Applications in different food industries, Food adulteration and food safety.

UNIT- V

Total quality management (TQM) - The seven traditional tools of quality, New management tools, 5S, Kizen, Six sigma: Concepts, Lean Principles, Methodology, applications to manufacturing and service sector, Bench marking – Reason to bench mark, Bench marking process, Control Charts and Process Capability, Quality Function Development (QFD), Total productive maintenance (TPM)

TEXT BOOKS

1. Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi. .
2. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. .
3. Philip,A.C. Reconceptualizing quality (2001). New Age International Publishers, Bangalore.

REFERENCE BOOKS

1. Yong-Jin Cho, Sukwon Kang.(2011), "Emerging Technologies for Food Quality and Food Safety Evaluation" ,CRC Press.
2. AlliInteaz, (2003), "Food Quality Assurance: Principles and Practices", CRC Press.
3. Vasconcellos J. Andres, (2003), "Quality Assurance for the Food Industry: A Practical
4. Approach",CRC Press.

WEBOGRAPHY

1. https://en.wikipedia.org/wiki/Quality_assurancehttps://www.omicsonline.org/scholarly/food-quality-assurance-journals-articles-ppts-list.phphttp://www.fao.org/3/v5380e/V5380E05.htm
2. https://www.aaps.ca/principles-of-qaqc-in-the-food-industry.php
3. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=1019
4. http://egyankosh.ac.in/bitstream/123456789/11486/5/Unit-1.pdf
5. https://www.researchgate.net/publication/304351925_Relationship_between_sensory_and_instrumental_measurement_of_texture
6. https://www.dlg.org/fileadmin/downloads/lebensmittel/themen/publikationen/expertenwissen/lebensmittelsensorik/e_2015_2_Expertenwissen_Electronic_Noses.pdf
7. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/food_technology/food_analysis_and_quality_control/08.sensory_analysis_of_foods/et/2613_et_m8.pdf
8. https://www.yourarticlelibrary.com/production-management/quality-control-meaning-importance-definition-and-objectives/26174
9. http://www.fao.org/3/i1379e/i1379e05.pdf
10. https://www.indiacode.nic.in/bitstream/123456789/7800/1/200634_food_safety_and_standards_act%2C_2006.pdf
11. https://ourworldisnotforsale.net/2017/Domestic_Regulation.pdf
12. https://www.grains.k-state.edu/spirel/docs/conferences/mb-alternatives/presentation/m%20olewnik.pdf
13. https://en.wikipedia.org/wiki/Global_Food_Safety_Initiative
14. https://www.fda.gov/food/hazard-analysis-critical-control-point-haccp/haccp-principles-application-guidelines
15. http://elearning.nokomis.in/uploaddocuments/Quality%20Management%20in%20Healthcare/chp%204%20Quality%20Control%20Circle%20(QCC)/Summary/Chapter%204.pdf

QUALITY ANALYSIS OF FRUITS AND VEGETABLES

Code: 24FTVC3504 Credits: T5+P0 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Proper post-harvest handling
- Technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Know about the status of fruit and vegetable production in India with importance to losses.
- Study the processing of fruits and vegetables.
- Impart knowledge about the various products and study the various methods of processing fruits and vegetables

UNIT- I

Introduction: Composition and nutritive value of fruits and vegetable; Post harvest handling management of fruits and vegetables – maturity indices, Factors affecting composition and quality of fruits and vegetables; Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching

UNIT- II

Spoilage of fruits and vegetables: Different types of spoilage in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention; General methods of preservation of whole fruits/vegetables and processed fruits and vegetables; Spoilage of pickles; Methods of preparation, curing techniques, defects, and remedies. Types of preservatives commonly used in Fruits and vegetables processing industry, permissible limits of usage of preservatives.

UNIT- III

Processing of fruits and vegetables: Pre-cooling, ripening, waxing. Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; applications to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables; Fruit powders using spray drying; Technology of extraction of juices from different types of fruits.

UNIT- IV

Canning – Can manufacture – canning process, types of canning, common causes of spoilage in canned foods, shelf life extension of fruits and vegetables – MAP, CAP, Intelligent packaging, temperature control, storage temperature for different fruits and vegetables, humidity control, gas control.

UNIT- V

Manufacture of Fruit products: Manufacturing process of juice, soup, puree, and paste. Jams, Jellies, and marmalades: selection, preparation, production; Difference between jam and jelly; Theory of gel formation, failure, and remedies in jam and jelly making. General principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits.
Manufacture of vegetable products: Manufacturing process of sauce, ketchup, vegetable juices, and concentrated products.

TEXT BOOKS

1. Manay, N.S, Shandaksharaswamy, M., (2004), "Foods- Facts and Principles", New Age International Publishers, New Delhi, 2. Potter, N.N, Hotchkiss, J.H.(2000), "Food Science". CBS Publishers, New Delhi.
3. Srilakshmi, B. Food Science (5rd Edition) (2015), New Age International (p) Limited Publishers, New Delhi,

REFERENCE BOOKS

1. NirmalSinha, Y. H. Hui, et al; (2010), "Handbook of Vegetables and Vegetable Processing", John Wiley & Sons.
2. Olga Martin-Belloso, Robert SolivaFortuny, (2010), "Advances in Fresh-Cut Fruits and Vegetables Processing". CRC Press.
3. Jongen (2002), "Fruit and Vegetable Processing: Improving Quality", Elsevier Publications.

WEBOGRAPHY

1. http://www.fruitandvegetable.ucdavis.edu/files/217117.pdfhttp://www.actahort.org/books/379/379_70.htmhttps://pubag.nal.usda.gov/download/26087/PDF

REGULATIONS WITH FOOD ADDITIVES AND SAFETY

Code: 24FTVC3505 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Understand the Chemistry of the additives added to food
- Know the limits of addition as prescribed by FAO/WHO and PFA
- Develop newer additives with improved safety standards

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Distinguish the characteristics of additives and their specific use in foods
- Evaluate the dietary intake of individuals consuming foods with food additives
- Development of various instant premixes by addition of preservatives within the permissible limits

UNIT I

Food additives – definition, functions and classification - INS and E-numbers, considerations in use of food additives, food safety levels as per the Specifications, Safety Evaluation of Additives – Legal aspects - NOAEL, ADI, GMP, LD 50 value, FSSAI regulations, GRAS status & Regulations.

UNIT II

Acidulants, Preservatives, Stabilizers, Emulsifiers, Thickeners and Antioxidants - Types, chemical properties, permissible level of additions in individual products, toxicity data of Acidulants – Preservatives – Emulsifiers and gums - Antioxidants – Limits of addition to food products.

UNIT III

Colorants, Flavourants - Types, chemical properties, levels of additions in individual products, toxicity data of Colourants – Natural and artificial, Flavourants, Flavour enhancers.

Fat replacers / substitutes and Sweeteners - Fat substitutes and replacers – Cocoa butter substitutes and equivalents - Types, chemical properties, levels of additions in individual products, toxicity data of Sweeteners – Taste modifiers.

UNIT IV

Raising agents, Glazing agents and Sequesterants, Humectants - Types, chemical properties, levels of additions in individual products, toxicity data of Dough conditioners - flour improvers – Humectants – Limits of addition to food products.

Chelating and Anti-browning agents - Natural and synthetic, Chelating agents, anti-browning agents, Nutritional additives – Permissible levels of addition to Food products.

UNIT V

Qualitative and Quantitative techniques used for the analysis of food additives.

Detection techniques of food adulteration coffee, tea leaves, edible oil, milk, cereals, spice powders. List of banned additives and their consequences towards health.

TEXT BOOK

1. Branen A.L., Davidson P.M., Salminen S. and Thorngate J.H. , "Food additives", 2nd Edition, Revised and Expanded. Marcel Dekker Inc. USA, 2002. ISBN: 0-8247-9343-9.

REFERENCE BOOKS

1. Newton, D.E. "Food Chemistry", Facts on File Inc., New York, ISBN-10: 0816052778, ISBN13: 978-08160527762007.
2. Gerorge, A.B. 2004. Fenaroli's Handbook of Flavor Ingredients. 5th Ed. CRC Press.
3. Madhavi,D.L., Deshpande,S.S & Salunkhe,D.K. Food Antioxidants: Technological, toxicological and Health Perspective. Marcel Dekker

WEBOGRAPHY

1. https://www.fssai.gov.in/upload/uploadfiles/files/FOOD_ADDITVES.pdf
2. https://www.fssai.gov.in/upload/uploadfiles/files/18_%20Chapter%203%20(Substances%20added%20to%20food)_compressed.pdf

ELECTIVE

Code: 24FTVC35E1/E2/E3 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

(The Elective course should be opted by the students offered by the department)

FIELD STUDY/STUDY TOUR

Code: 24FTVC3506 Credits: T0+P2 Contact Hours/week: 2 Marks: 50

Field study/study tour is an educational procedure by which each student gain or learns information by observing the objects, places, natural events and other real life information. Students have to undergo at an established food testing or food research sector organized visit by teachers. They should submit report on the activities carried out with details of date and timing.

INTERNSHIP - V

Code: 24FTVC3507 Credits: T0+P3 Contact Hours/week: 3 Marks: 50

Students have to undergo internship after completing their fifth semester at an established food research institution or the R&D sector of food industry and based on their **NSQF level 6 "Quality Assurance Manager".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

SIXTH SEMESTER

DESIGN AND DEVELOPMENT OF FOOD TESTING LAB

Code: 24FTVC3601 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

- To design and develop labs for food testing operations

Specific Learning Objectives

- Use details of space, equipments and cost to design a lab that meets quality standards
- Design labs with all facilities to enable for accreditation from national bodies.

UNIT I

Types of Laboratory - Main Laboratory, Multi- location laboratory- Multi-location, Satellite laboratory, Field laboratory, Mobile laboratory, Food Laboratory – Functions of Food Laboratory, Setting up a Regulatory Food Analysis Laboratory – Organization chart of the basic Food Analysis and Testing Laboratory

UNIT II

Infrastructure of food testing lab - Space, materials, cupboard, shelves, waterlines, lighting, ventilation adopted in different units of food testing lab. Overall Space Utilization. Guidelines, Security Laboratory Signage's, Corridors and aisles, Exits/Doors and Windows, Flooring, Walls and ceiling, Sinks Storage, Chemical Storage in the Laboratory/Bulk storage, Gas Cylinder Storage and Gas Lines.

UNIT III

Layout and requirements of food testing lab, Management and responsibilities of food testing lab – Guidelines and regulations in designing of food testing lab by FSSAI. Sampling – Test methods, testing of samples, test report, sample retention, record retention, annual report, software for lab analysis.

UNIT IV

Laboratory and Personnel Safety, Safety Equipment, Safety design in labs, Electrical Services and Safety, Fire Safety, Lab Furniture, Work Tables, Waste Disposal: Chemical Waste, Biological Waste. Location of storage equipment and spacing, Planning storage spaces, Safety and security of stores. Work simplification, working heights in relation to equipment

UNIT V

Method Validation and Verification guidelines of food testing laboratories – Validation parameters, method validation protocol – approach to validation and verification for food testing laboratories

TEXT BOOKS

1. Peters Max. S., Timmerhaus Klaus D and Ronald E West., Plant Design and Economics for Chemical Engineers, V Edition McGraw Hill.2003
2. Coulson, J. M. and Richardson J. F., Chemical Engineering, Pargamon Press, vol. 61989.

REFERENCES

1. Evans, F. L., "Equipment Design Handbook", Gulf Publishing Company, 2nd Edition.
2. Perry, R.H and Chitton, Perry's Chemical Engineers Handbook, McGraw Hill, NewYork, 7thEdition.

WEBOGRAPHY

1. https://old.fssai.gov.in/Portals/0/Pdf/GFLP_Document_06_09_2016.pdfhttps://www.fddiindia.com/Services-new/food-testing-noida.phphttps://www.manufacturing.net/article/2015/05/importance-laboratory-testing-food-production

FSSAI REGULATIONS OF FOOD TESTING

Code: 24FTVC3602 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Know the latest regulations laid by FSSAI
- Apply the practical experience to check the quality of the products as per the regulations laid by FSSAI

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- To identify foods of good quality.
- To explore the lab standards and apply the same in interpretation of result

UNIT I

Role of FSSAI in standardising the proper quality standards – food regulations – standards – quality standards – improving quality- structure of food lab ecosystem by FSSAI- new regulations of FSSAI 2020- HACCP.

UNIT II

Regulations laid for drinking water: Microbiological requirement, organoleptic and physical properties, general parameters concerning substances undesirable in excessive amount, parameters concerning toxic substances, parameters concerning radio- active residues, pesticide residues.

UNIT III

Regulations laid for dairy products and perishable food items: Specifications for milk, derivatives of milk, condensed milk, infant milk products, milk derivatives processed butter and cheese., online FSSAI license for milk products. Quality standards for meat and meat products, fish, poultry.

UNIT IV

Regulations laid for cereals and bakery products: standards laid down for cereal and cereal products, refined wheat flour, rice, durum wheat flour (refined), starches, dried fruits, infant foods, ,instant noodles, fortified atta, Establishment of a bakery, location and surroundings, design and facilities, control of operation, Regulations laid for vegetables and fruits: Food safety- pesticide residue levels, artificial ripening, quality standards for exports, Harvesting techniques.

UNIT V

Procedure for getting FSSAI certification- registration, licensing- state and central, purpose and scope of the FSSAI, Benefits of obtaining FSSAI food license, authority and stakeholders involved in the enforcement of the FSSAI. FSSAI regulation, standards, analysis methods. Guidelines for importing and exporting food. Penalties and offences for violating the act and the remedies available for consumers. Impact of the FSSAI act. Food traceability, quality control, Product information labelling, consumer awareness.

WEBOGRAPHY

1. https://old.fssai.gov.in/Portals/0/pdf/FSSAI_SoPs_for_Imports.pdf
2. www.fssai.org
3. Lab Manuals of FSSAI -2018-2023
4. https://foodsafetyhelpline.com/fssai-drafts-standards-for-fruits-and-vegetables-including-additional-new-products/#:~:text=Extra%20light%20sweetened%3A%20(name(,more%20than%2021.9%C2%B0%20Brix
5. https://foodsafetyhelpline.com/fssai-guidance-note-on-artificial-ripening-of-fruits/
6. https://foodsafetyhelpline.com/fssai-notifies-final-vertical-standards-fish-fisheries-products/
7. https://foodsafetyhelpline.com/fssai-notifies-revised-general-standards-milk-milk-products/
8. https://www.element.com/more-sectors/environmental-testing/water-testing/physical-chemical-properties-of-water
9. https://foodsafetyhelpline.com/fssai-makes-amendments-standards-related-packaged-drinking-water

SAFETY IN FOODS OF ANIMAL ORIGIN

Code: 24FTVC3603 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Provide an extensive description of meat, fish and poultry processing
- Introduce the latest technologies , manufacturing processes and tools for effective control of safety and quality during processing

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Understand the processing techniques involved in fish, meat and poulty products.
- Develop safe and quality fleshy food products

UNIT I

Sources and characteristics of meat-Microorganisms associated with meat - spoilage of animal food - control of microbial food borne pathogens in meat chain - meat safety at pre-harvest, harvest and postharvest level - nutritive value of meat-Structure of muscle, methods of slaughtering, Ante mortem and post mortem inspection of meat, Sensory characteristics and evaluation of meat Biochemical changes in meat-Rigor mortis-Aging of meat, meat cut and grade, MPL of contaminants, residues and additives for Meat and Meat products.

UNIT II

Poultry industry in India, measuring the yields and quality characteristics of poultry products, microbiology of poultry meat, spoilage factors; Plant sanitation; Poultry meat processing operations in detail along with equipment used- Unloading, Stunning, Bleeding, Scalding, De-feathering, Electrical Stimulation, Evisceration etc. Chilling, Weighing and Grading. Packaging of poultry products, refrigerated storage of poultry meat. Hazard analysis and inspection of poultry processing.

UNIT III

Structure, composition and nutritive value of egg, egg proteins and functional properties of egg white and yolk. Factor affecting egg quality and their measurements. Industrial uses of eggs. Collection, grading, cleaning, washing, packaging and transportation of eggs, preparation of egg products. Microbial spoilage of egg and egg products, by products of eggs - egg products, Whole egg powder, Egg yolk products, their manufacture, packaging and storage.

UNIT IV

Commercially important marine products from India, spoilage factors of fish, fish handling, cleaning and sanitization, field refrigeration and icing practice, merits and demerits, Use of dry ice and liquid nitrogen as preservation elements, use of Refrigerated Sea Water (RSW) for preservation, Changes during storage in RSW and CSW; Freeze preservation; freezing of prawn and shrimp, weighing, filling and glazing, Individual quick freezing - relative merits and demerits, Canning operations, Salting and drying of fish, pickling and preparation of fish protein concentrate

and fish oil. Packaging of fish and fishery products, Seafood quality assessment- Physical, chemical, sensory.

UNIT V

Status of fish, Meat and poultry industry in India. Meat plant sanitation and safety; By-products of meat, poultry and eggs and their utilization; Safety standards in meat industry: HACCP/ISO/MFPO/FSSAI/Kosher/Halal.

TEXT BOOKS

1. Vikas Nanda. 2014. Meat, Egg and Poultry Science & Technology. I.K. International Publishing House Pvt. Ltd., New Delhi.
2. B.D. Sharma and Kinshuki Sharma. 2011. Outlines of Meat Science and Technology. Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.
3. B.D. Sharma. 2003. Modern Abattoir Practices and Animal Byproducts Technology. Jaypee Brothers Medical Publishers Pvt. Ltd., New Delhi.

REFERENCE BOOKS

1. B.D. Sharma. Meat and Meat Products Technology Including Poultry Products Technology. Jaypee Brothers Medical Publishers Pvt. Ltd, New Delhi.
2. Alan H. Varnam and Jane P. Sutherland. Meat and Meat Products: Technology, Chemistry and Microbiology. Chapman & Hall, London.
3. William J. Stadelman and Owen J. Cotterill. Egg Science and Technology, 4th Ed. Food Products Press, NY, USA.
4. R.A. Lawrie. Meat Science, 4th Ed. Pergamon Press, Oxford, UK.

WEBOGRAPHY

1. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/food_technology/technology_of_meat,_poultry,_fish_and_sea_foods/21.methods_of_preservation_of_poultry_meat/lm/269_lm_21_lm.pdf
2. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147721
3. http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000015FT/P000076/M000257/ET/1500357969M-09.pdf
4. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147719
5. http://iifpt.edu.in/olapp/pmfme/upload/mt_handbook_meat.pdf

QUALITY ANALYSIS OF BEVERAGES AND SPICES - PRACTICAL

Code: 24FTVC3604 Credit: T0+P5 Contact Hours/ week: 5 Marks: 100

OBJECTIVES

To enable students to

- Identify the key physical, chemical, and sensory quality parameters used to evaluate beverages and spices.
- Familiarize with industry standards and benchmarks for quality assessment.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

1. Demonstrate technical skills in operating analytical instruments and conducting laboratory procedures relevant to the quality analysis of beverages and spices

EXPERIMENTS:

1. Preparation of sample for analysis
2. Preparation of extracts using different solvents to study its secondary metabolites
3. Determination of Moisture for soluble (instant) coffee powder - Vacuum Drying Oven method
4. Determination of Total ash for Roasted and Ground Coffee
5. Determination of Total ash in Instant Tea In Solid Form
6. Determination of Caffeine Content (Bailey Andrew Method, Chromatographic – Spectrophotometric Method
7. Determination of Total Catechins in Tea: HPLC Method
8. Determination of colour, soluble and insoluble ash, alkalinity in coffee tea and coco powder
9. Test for solubility in hot water-instant coffee
10. Microscopic Examination of Spices
11. Determination of Extraneous Matter and other Refractions in Whole spices
12. Determination of Moisture (Dean and Stark Toluene Distillation Method), (Karl Fischer Method)
13. Determination of phytochemicals in spice extracts-curcumin, Piperine
14. Detection of mineral oil in pepper, Argemone seeds in Mustard
15. Detection of adulterants present in spices and condiments
16. Test for colouring substance and microscopic examination
17. Visit to Beverage manufacturing industry
18. Visit to Spice processing industry

REFERENCE

1. FSSAI Manual of Methods of Analysis of Foods- Beverages: Tea, Coffee and Chicory, 2023
2. FSSAI Manual of Methods of Analysis of Spices and Condiments, 2016

WEBOGRAPHY:

1. https://www.fssai.gov.in/home/food-testing/food-testing-manual.html

ADVANCES IN FOOD GRADING SYSTEM - PRACTICAL

Code: 24FTVC3605 Credits: T0+P5 Contact Hours/week: 5 Marks: 100

OBJECTIVES

To enable students to

- Explore historical and current methods of food grading
- Understand how data analytics and machine learning can be applied to food grading

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Design and implement advanced food grading systems in a practical setting
- Use data analysis and machine learning to make informed decisions about food quality

UNIT I

Definition and objectives of food grading - Historical development and importance in the food industry - Regulatory frameworks and standards (USDA, Codex Alimentarius)

Grading - Sorting – criteria for sorting materials - Grade Factors – Physical, Chemical and Biological characteristics, Sorting, Sizing – mechanism/types of sizing, Grading – systems of grading (static and dynamic). Classification of food by means of grading

UNIT II

Methods of Separation - Size Based Separators, Specific Gravity Separators, Colour Separators, Weight Based Separators, Magnetic Separators, Surface Texture/Roughness Separator. Screens – Grizzly, Revolving Screen/Cylinder Sorter, Shaking Screen, Rotary Screen, Vibratory Screen, Horizontal Screen, Other Screens - Particle Motions in Separation Equipment, Perforated Metal Screens, Wiremesh Screens

UNIT III

Grading of grains – seed grader, groundnut grader, indented cylinder separator, spiral separator, spiral seed separator, winnower, specific gravity separation, density and stone separator, pneumatic, magnetic seed separator, cyclonic separation

Grading machines for fruits and vegetables – screens, roller grader, dividing/diverging belt grader, weight grader, expanding pitch rubber spool potato, root crop combines.

UNIT IV

Egg grading – grades based on air cells and size, Candling of Egg, Haugh unit, Quality Factors in Grading of Egg – Indian standards for egg, U.S. Standards for Quality of Individual Shell Eggs

Milk grades based on DMC, MBRT, SPC and Resazurin test

Grading of poultry carcasses and Meat - Importance of Grading - USDA System of Carcass/Meat Grading - Meat / Carcass Evaluation - Indian Meat Grading System

UNIT V

New Innovation in grading systems - Computerized weight grader (Apples, citrus), Video image capture & analysis - size, colour & external defect grading-coffee bean, apple, NIR

Spectrometers - assess the TSS non – destructively in apple and stone fruits, X-ray imaging and Computer aided tomography, MRI - Magnetic Resonances Imaging, Spectroscopy, Acoustic methods, Volatile emission analysis

EXPERIMENTS:

1. Classify food according to grading system
2. Examine the criteria for sorting food
3. Illustrate the working principle of different separators
4. Designing of graders used for grain analysis
5. Exercise on fruit grading machines and their functionality
6. Examine the candling process of egg
7. Determination of the Haugh unit of egg
8. Perform test for the classification of egg according to Indian standards and US standards
9. Determination of Milk grades by DMC, MBRT, SPC and Resazurin test
10. Exercise on the quality/palatability grade
11. Demonstrate the meat/carcass evaluation
12. Determine the Indian meat grading system
13. Visit to grain processing unit
14. Visit to fruit grading sectors
15. Visit to meat processing unit

TEXT BOOKS:

1. Food Grading: A Study of Quality and Standards by Kathy King
2. Food Processing Technology: Principles and Practice by P.J. Fellows

REFERENCES:

1. H. Gao, S. Prasher, J. Landry, and R. Bonnell, "Automatic Fruit Weighing System Using Computer Vision," Transactions of the ASABE, vol. 43, no. 3, pp. 675-680, 2000.
2. Du, C.J., & Sun, D.W. (2004). "Comparison of three methods for classification of pizza topping using different color space transformations." Journal of Food Engineering, 68(3), 277-287.
3. Kondo, N. (2010). "Fruit grading robot," Journal of Robotics and Mechatronics, 12(2), 143-148.
4. Nicolaï, B.M., Beullens, K., Bobelyn, E., Peirs, A., Saeys, W., Theron, K.I., & Lammertyn, J. (2007). "Nondestructive measurement of fruit and vegetable quality by means of NIR spectroscopy: A review," Postharvest Biology and Technology, 46(2), 99-118.
5. Mendoza, F., Lu, R., & Abbott, J.A. (2010). "Application of X-ray computed tomography imaging for internal quality evaluation of apple fruit," Journal of Food Engineering, 101(3), 364-372.
6. Goodner, K.L., & Braddock, R.J. "Magnetic Resonance Imaging for Nondestructive Quality Evaluation of Orange Juice," Journal of Food Science, 59(1), 77-79.

7. Cozzolino, D., & Roberts, J.P. "Applications and developments in the use of near-infrared spectroscopy for quality control in the food industry," Food Bioprocess Technology, 5(4), 1183-1191.
8. Chen, H., & De Baerdemaeker, J. "Acoustic impulse response for measuring apple firmness," Transactions of the ASAE, 36(4), 1073-1077.
9. Lasekan, O., & See, N.S. (2015). "Key volatile aroma compounds of three black velvet tamarind (Dialium guineense) fruit species," Food Chemistry, 167, 82-87.

WEBOGRAPHY:

1. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=16410
2. https://egyankosh.ac.in/bitstream/123456789/10626/1/Unit-6.pdf
3. https://egyankosh.ac.in/handle/123456789/11345
4. https://egyankosh.ac.in/bitstream/123456789/10740/1/Unit-3.pdf
5. https://egyankosh.ac.in/bitstream/123456789/12073/1/Unit-3.pdf
6. https://egyankosh.ac.in/bitstream/123456789/11914/1/Unit-6.pdf
7. https://www.slideshare.net/slideshow/cleaning-grading-amp-conveying/240732243
8. https://www.slideshare.net/slideshow/cleaning-grading-equipments-for-fruit-and-vegetable/231568077#6
9. https://www.slideshare.net/slideshow/grading-and-quality-parameters-of-eggs/83741804
10. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=63725

MINI PROJECT

(Students those who are exit on sixth semester)

Code: 24FTVC3606 Credit: T0+P5 Contact Hours/ week: 5 Marks: 100

The Objective of this mini project is to let the students apply their knowledge and having great exposure in research field. Students are formed in group under guidance and finally they need to submit the report along with presentation.

FOOD TESTING UNIT – CASE STUDY

Code: 24FTVC3606 Credit: T0+P5 Contact Hours/ week: 5 Marks: 100

The objective of this case study is to understand the ways and means of establishment of food processing unit and food testing lab. Students will get clear idea on how processing plant works. The Students shall be placed in food processing and food testing unit. Each student is expected to do an individual case study. The students have to submit the case study along with presentation.

INTERNSHIP – VI / EXPERIENTIAL LEARNING

Code: 24FTVC3607 Credit: T0+P3 Contact Hours/ week: 3 Marks: 50

Experiential learning helps the student to develop competence, capability, capacity building, acquiring skills, expertise and confidence to start their own enterprise and turn job creators instead of ob seekers. This is a step forward for "Earn While Learn" concept. Experiential learning is an important module for high quality professional competence and practical work experience in real life situation to Graduates.

The main objectives of EL are:

1. To promote professional skills and knowledge through meaningful hands on experience
2. To build confidence and to work in project mode
3. To acquire enterprise management capabilities

SEVENTH SEMESTER

RESEARCH METHODOLOGY

Code: 24FTVC4701 Credit: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Make the students understand about Research Processing.
- Gain knowledge on to conduct research , article writing , presentation and concluding of research

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Research Process, Conducting Literature Review, Information's Sources, Data collection, Sampling, Citation and listing system of documents

UNIT – I

Meaning of Research: Objectives of research, Types of Research, Research Process, Problem Statement, Research Design

UNIT – II

Problem Formulations: Conducting Literature Review, Information's Sources (Books, monographs, reviews, blogs, etc) Information Retrieval, Role of libraries in Information Retrieval, Research Gap,

UNIT - III

Research Design: Experimental/Theoretical/Empirical Research, Cause effect Relationship, Field Experiment, Data/variable types and classifications, Data collection- Methods and Tools

UNIT – IV

Data Analysis and Interpretations: Sampling, Sampling Error, Statistical Methods/Tools – Measures of Central Tendency, Test of Hypothesis - Correlations and regression analysis, Co-efficient of variation.

UNIT – V

Writing Research Articles and Thesis: Guidelines for writing the abstracts, introductions, methodology, results and discussion, Conclusion, section of manuscript, Plagiarism and Ethical Considerations in Research.

TEXT BOOKS

1. Research and Methodology by C.R Kothari, Gaurav Garg.
2. Research and Methodology by Ranjitkumar
3. Research Design by R. Pannerselvam

REFERENCES

1. Case Study Research Design and Methods by Robert K. Yin
2. The Action Research Dissertation(A Guide FOR Students and Faculty) by Kthryn Herr, Gary L.Anderson
3. Research Design by Jhon W.Creswell

FOOD MARKETING

Code: 24FTVC4702 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Introduce students to the fundamental concepts and principles of marketing within the context of the food industry.
- Equip with the skills needed to conduct market research and analyze market data specific to the food industry.

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Gain a solid foundation in marketing theories, terminology, and frameworks, enabling them to apply these principles to real-world food marketing scenarios
- Able to design and implement market research projects, interpret data, and use insights to make informed marketing decisions and identify market opportunities

UNIT I

Marketing- definition- marketing management, Marketing concepts and function- marketing mix. Food Marketing: Definition, meaning, characteristics of rural and urban marketing. Opportunities and challenges marketing food products by small scale entrepreneurs. Marketing environment: Internal and External - Marketing interface with other functional areas –Production, Finance, Human Relations Management, Information System.

UNIT II

Market Segmentation - Rural marketing segmentation, rural consumer behavior, changing trends in rural consumer selection and decision, marketing process and influential factors, marketing needs for export products. Urban marketing segmentation, urban consumer behavior, changing trends in urban consumer selection and decision, marketing process and influential factors. Marketing channel – stockiest, dealer, distributor, retailer, B-to-B, B-to-C.

UNIT III

Marketing Products - Product development- Product mix- PLC- Branding- brand equity- Brand loyalty-Trade mark, QR code, Bar code, GST, HSN code. Product design, innovative presentation, services, prices, method of pricing, network for sourcing raw materials and distribution of products in both rural and urban area. Food packaging, labelling for consumer acceptability.

UNIT IV

Supply Chain Management – Logistics - Forward and backward linkages in supply chain management, its elements, channel of distribution, types- factors affecting choice of a channel of distribution, channel conflicts, its resolution

Marketing Communication - Designing advertisement, campaign, sales promotion, choice of media, techniques, personal selling and publicity

UNIT V

Modern marketing- Direct marketing- E Marketing- Tele marketing-Viral marketing - Relationship marketing-Social marketing- Demarketing - Remarketing- Synchro marketing- Service marketing. Marketing Information System – Research Process – Concepts and applications: Product Advertising – Promotion – Consumer Behaviour – Retail research – Customer driven organizations - Cause related marketing - Ethics in marketing –online marketing trends.

TEXT BOOKS:

1. Philip Kortler and Kevin Lane, Marketing Management, PHI 13th Edition, 2008
2. Paul Baisen et al, Marketing, oxford University Press, 13th edition, 2008.

REFERENCE BOOKS:

1. Micheal R. Czinkota & Masaaki Kotabe, Marketing Management, Vikas Thomson Learning,2nd edition, 2001.
2. Duglas, J. Darymple, Marketing Management, John Wiley & Sons, 7th edition, 2008.
3. NAG, Marketing successfully- A Professional Perspective, Macmillan 2008.
4. Boyd Walker, Marketing Management, McGraw Hill, 5th edition, 2006.
5. Dalvymple, Marketing Management, Wiley India Pvt Ltd, 2008.
6. Keith Flether, Marketing Management and Information Technology, Prentice Hall, 1998.

SPECIALIZATION – I

FOOD TRACEABILITY

Code: 24FTVC4703 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Understanding of the principles and importance of food traceability in the food supply chain
- Study various technologies used in food traceability, including barcoding, RFID, block chain, and database management systems

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Capable of designing, developing, and implementing effective traceability systems in real-world scenarios, utilizing industry-standard software tools
- Critically assess the performance of traceability systems, identify areas for improvement, and apply best practices to overcome challenges

UNIT I

Food Traceability – Introduction, food supply chain - typical roles in the produce supply chain. Design of food traceability system – the coding and numbering system, defining batches, traceability information, record keeping. Principles of traceability, Importance and characteristics of traceability system. Types of traceability. Contract and farmers producer, company for effective traceability from farm to fork, organic certification.

UNIT II

Basic components of Traceability System – Downstream, Upstream, Supplier or Backward Traceability, Process Traceability or Internal Traceability, Customer or Forward Traceability. Food standards code – traceability requirements, Technology supporting/Common traceability systems used in India - Document based traceability, Bar code, RFID (Radio Frequency Identification), ICT (Information and Communication Technology), WSN (Wireless Sensor Network), Block chain Technology,

UNIT III

Effectiveness of traceability system, - Information requirement – food receipt, food recall, Implementation of Traceability System, Establishing the components of a traceability system-methodology for implementation, developing traceability procedure, Process flow diagram, Lot IDs, Product labeling, record keeping. Conceptual framework of food traceability system. Challenges with food traceability system – types of food fraud, opportunities with using food traceability system, researching.

UNIT IV

Role of food traceability in the Agro industry. Regulatory and Food safety standard's perspective across globe: European Union, China Food Safety Law, Australia and New Zealand, Canada, US Food and Drug Administration Regulation**,** Food safety Regulation in India.

UNIT V

Certifications enhancing traceability, Identifiers, hardware and software - Problems of Traceability, Legislation, Impending Legislation and Voluntary Schemes, Future of Food Traceability – Critical Tracking Events

REFERENCES

1. McEntire, J., Kennedy, A., Donnelly, C. J., & Detwiler, D. (Eds.). *Food Traceability*. Springer.
2. Hoorfar, J. (Ed.). (2011). *Food Chain Integrity: A Holistic Approach to Food Traceability, Safety, Quality and Authenticity*. Woodhead Publishing.

WEBORAPHY

1. https://www.importpromotiondesk.com/fileadmin/Exporter_Guides/Export_Know_how_strategy/IPD_guide_to_export_success_Traceability.pdf
2. https://www.deskera.com/blog/food-traceability/#us-food-and-drug-administration-regulation
3. https://www.linkedin.com/pulse/food-traceability-system-requirements-methods-indian-jalgaonkar
4. https://www.linkedin.com/pulse/food-traceability-meilani-may-santos-fsco
5. https://agriculture.ny.gov/system/files/documents/2022/04/guidanceforproducetraceability-blueribbon.pdf
6. https://openknowledge.fao.org/server/api/core/bitstreams/73065421-9aae-440a-8362-5ea847deb2eb/content
7. https://www.fssai.gov.in/upload/uploadfiles/files/Report_Intern_Shelina_04_10_2019.pdf
8. https://documents1.worldbank.org/curated/en/166321564122767490/pdf/The-Basics-of-Food-Traceability.pdf
9. https://www.slideshare.net/slideshow/food-traceability-87996816/87996816
10. https://intracen.org/file/eqm-bulletin-91-2015traceabilityfinal-14oct15webpdf

COMPUTATIONAL APPROACHES IN FOOD TESTING LABORATORY - PRACTICAL

Code: 24FTVC4704 Credit: T0+P6 Contact Hours/ week: 6 Marks: 100

OBJECTIVES

- To impart knowledge related to the applications of computation in food industries
- To expose the students with fundamental knowledge on the computer software

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Gain knowledge regarding the computer applications and how to use the applications in food industry.

UNIT I-Introduction to Computer and software used in food Industry

- Importance of computerization in food testing laboratory
- Introduction to computer related hardware used in FSTS (Bar code, GSI system, RFID, Chromatography – CHAS, Spectroscopy)
- Introduction to various software for their application in food industry (like Matlab, CAD for designing equipment, SAP, FASTLANE for organizing data) with relevant case studies.
- Software for food testing lab – sample receiving to analysis, report sending

UNIT II- MS Office Package Tools

- MS Office word
- MS Excel
- MS Powerpoint
- MS Access
- MS Visual Basic

UNIT III - Automation

- Automation – Need, uniqueness and types
- Tools of automation – Computer integrated system, Online sensors, Robot technology, computer vision system

UNIT IV – Softwares used in Food Industry

- Basic Introduction to application of computers in instrumentation and process control of food industry (PLC, SCADA, etc.,)
- Inventory control and management in food industry using Computers
- Sensory analysis using softwares like Compusense, SIIMs

UNIT V - Laboratory Information Management System (LIMS)

- LIMS – Introduction, benefits and features
- LIMS Integration

REFERENCE

1. Chary SN (2004), Production and Operations Management, Tata Mc Graw Hill III Edition.
2. Anil Kumar, S and Suresh, N (2009), Operations Management, New Age International (P) Ltd., Publishers, New Delhi
3. Slack, N, Chambers, S and Jhonston, R (2007) Operations Management, Pearson Education Ltd., Essex, UK
4. Joseph G. Monks, Operations Management Theory and Problems, Mc. Graw Hill III Edition

WEBOGRAPHY

1. https://www.slideshare.net/slideshow/automation-use-of-computer-in-food-analysis/124678418
2. https://www.labware.com/blog/lims-integrations-food-testing-lab
3. https://labsols.com/food_beverage.html

FOOD TRACEABILITY - PRACTICAL

Code: 24FTVC4705 Credit: T0+P6 Contact Hours/week: 6 Marks: 100

OBJECTIVES

To enable students to

- To impart knowledge related to purpose and implementation of food recall
- To gain knowledge in guidelines and withdrawal procedure of food recall

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Gain knowledge regarding the food recall, FSSAI Regulation, state and local government responsibilities.
- Familiar in checklist of food recall given by government.

EXPERIMENTS

1. Exercise on Purpose of Industry food recall.
2. Classification of industry recall and implementation
3. Recall program framework – role of industry and government.
4. Exercise on checklist recording government effectiveness of food recall
5. Recall management team their roles and responsibilities
6. Traceability & handling of emergencies & incidents
7. Food recall procedure based on FSSRegulation, 2017.
8. Distributor & retailer responsibilities related to food recall.
9. State and Local government responsibilities related to food recall.
10. International recall Co-ordinator responsibilities of food recall
11. Determine the recall or withdrawal decision matrix.
12. Guidelines for food recall advertisements.
13. Case Studies and discuss about the importance of food traceability & recall.

REFERENCE:

1. GOI (Government of India) FSSAI published the Food Safety and Standards (Food Recall Procedure) Regulations, 2017.

WEBOGRAPHY:

1. http://www.slideshare.net/slideshow/guidelines -on-food-recall/10468658
2. http://www.slideshare.net/conducting a food recall_ppt
3. http://www.fssai.gov.in

SPECIALIZATION – II

FOOD LABELLING AND REGULATION

Code: 24FTVC4706 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Gain comprehensive knowledge of the various food labelling requirements and regulations at national and international levels
- Understand the importance of accurate and informative labelling in ensuring consumer safety and compliance with legal standards

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Demonstrate an understanding of national and international food labelling regulations and standards, including the roles of various regulatory bodies
- Understand the importance of food labelling in protecting consumer rights and preventing misleading claims, contributing to public health and safety

UNIT I – Components of Food Label

Food label- introduction, meaning, objectives. Functions of labelling, labelling requirements- name of the food, list of ingredients, nutritional information, declaration of Veg-Non Veg, regarding of food additives, complete address of manufacturing, expiry/best before use date. FSSAI Logo/license number- lot/code/batch identification, net quantity, consumer details, date marking, and food allergen.

UNIT II

Harmonization of Food Labels- Codex Alimentarius Commission, Regional and International agreements, WTO agreements**.** Misbranding and Misleading of labelling - Preventing, Promoting consumer understanding and use of labels, Format language and legibility. Formulation food labelling policy-cost and benefits of food labelling. Food labelling standards – FSSAI, AGMARK, ISI, FPO, ECOMARK etc.,

UNIT III

Mandatory labels, Voluntary labelling, Support for the implementation and effectiveness of food labelling, Compliance and Enforcement Mechanisms. Specific requirements/ restrictions on manner of labelling-labelling of edible oils and fats- coffee chicory mixture- milk and milk products- prohibitions for drinking water (both packaged and mineral)- gluten free products.

UNIT IV

Introduction- the evolution of food labelling, standards and legal issue, labelling to protect and promote health, labelling to protect the environment and promote sustainable food production, labelling promote social well-being and protect culture, labelling in relation to new technologies. Food packaging and labelling symbols and their intended use.

UNIT-V

New technologies and food labelling: the controversy over labelling of foods derived from genetically modified crops- agricultural biotechnology and consumers, vegan foods, policy options, commercial experiences with labelling.

Key issues in food labelling – Perspective of labelling w.r.t consumer, manufacturers' and Legislators'

BOOK REFERENCES

1. J. Ralph Blanchfield, "Food Labelling", Woodhead Publishing Limited and CRC Press LLC; CRC Press ISBN 0 8493 0852 6, 2000.

REFERENCES

1. Janice Albert, Food and Agriculture Organization of the United
2. Nations (FAO), Italy
3. https://fssai.gov.in/upload/uploadfiles/files/Comp_Labelling.pdf
4. https://www.fssai.gov.in/upload/notifications/2020/12/5fd87c6a0f6adGazette_Notification_Labelling_Display_14_12_2020.pdf

NON-DESTRUCTIVE EVALUATION OF FOOD QUALITY - PRACTICAL

Code: 24FTVC4707 Credits: T0+P6 Course Hours/week: 6 Marks: 100

OBJECTIVES

To enable students to

- Understand the principles and techniques of non-destructive evaluation (NDE) methods for food quality assessment
- Learn the application of NDE techniques in food processing and quality control

Specific Learning Outcome
On Successful Completion of this course, the students will be able to

- Identify and select appropriate NDE techniques for specific food quality attributes (e.g. moisture content, texture, contamination)
- Operate and calibrate NDE instruments (e.g. spectrometers, ultrasound devices)
- Analyze and interpret NDE data for food quality assessment

EXPERIMENTS:

1. Modeling of Quality Attributes for food – maturity index and quality index
2. **Colour measurement and modeling techniques:**
   - Sample preparation and presentation
   - Application of colour measurement and modeling techniques for fruits and vegetables
3. **Computer Vision Systems:**
   - Application - Image acquisition, image processing, colour image processing, non-visible computer imaging
4. **Electronic Nose and Electronic Tongue:**
   - E-nose instrumentation, principle and sensors
   - Application of E-nose – food process monitoring, shelf life investigation and freshness evaluation
5. **Near Infrared Spectroscopy:**
   - Sample preparation and presentation
   - Application of NIRS and sample classification
6. Principles and demonstration of mineral analysis in AAS/ICP
7. Application of CT and MRI for quality detection of agricultural produce
8. Application of Ultrasonic to Food Quality Measurement
9. Visit to advanced instrumentation laboratory
10. Visit to food or agro-based research institute

TEXT BOOK REFERENCES:

1. Nondestructive Evaluation of Food Quality: Theory and Practice" by Shyam N. Jha
2. "Advanced Nondestructive Detection Technologies in Food" by Quansheng Chen, Hao Lin and Jiewen Zhao
3. "Handbook of Advanced Nondestructive Evaluation" by Nathan Ida and Norbert Meyendorf

REFERENCES:

1. Jha, Shyam N., editor. Nondestructive Evaluation of Food Quality: Theory and Practice. Foreword by M.M. Pandey, Springer-Verlag Berlin Heidelberg, 2010.

WEBOGRAPHY:

1. https://www.ndt.net/article/IranNDT2016/papers/A13105.pdf
2. https://www.researchgate.net/publication/331743075_Non_destructive_quality_evaluation_of_food
3. https://download.e-bookshelf.de/download/0000/0150/38/L-G-0000015038-0002347755.pdf
4. https://link.springer.com/book/10.1007/978-3-642-15796-7
5. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiftpj3sYWHAxWKUGwGHf6wCOMQFnoECB0QAQ&url=http%3A%2F%2Fndl.ethernet.edu.et%2Fbitstream%2F123456789%2F27149%2F1%2FNondestructive%2520Evaluation%2520of%2520Food%2520Quality.pdf&usg=AOvVaw0f1NODyVH6TxUHUPIzJXCB&opi=89978449

FOOD ANALYTIC AND EQUIPMENT HANDLING - PRACTICAL

Code: 24FTVC4708 Credits: T0+P6 Contact Hours/week: 6 Marks: 100

OBJECTIVES

To enable students to

- Gain knowledge about the different types of equipment used in food analysis
- Learn the proper handling, calibration, and maintenance of analytical equipment

Specific Learning Outcome
On Successful Completion of this course, the students will be able to

- Operate analytical equipment correctly and safely
- Perform routine calibration and maintenance of equipment to ensure accurate results

EXPERIMENTS:

1. Identify the equipment used for food product quality analysis
2. Collect operational manual and procedure of all equipment
3. Calibrate equipment like weighing scale, pH meter, brix meter etc on daily basis
4. Identify the standard operating procedures (SOP) for calibration of each Equipment such as hot air Oven, Muffle Furnace, pH Meter, Infrared Moisture, Meter, Sieve Shaker, Autoclave, Weighing Balance, Magnetic Stirrer, Thermometer, Centrifuge, Hot Water Bath, Burette, Vacuum Drier, Colony Counter (Electronic Digital), B.O.D Incubator, Microscope, Soxhlet Extraction Unit, Round Heating Plate, Heating Mantles, Kjeldhal Digestion and Distillation Unit, Laminar Air Flow, Hand Refractometer, Hygrometer
5. Check the working condition and performance of all equipments on regular basis
6. Maintain annual maintenance contract of all equipment
7. Demonstrate the maintenance of equipment used for analysis, as per company standards
8. Follow SOP for preparing each chemical reagent
9. Prepare chemicals and solvents for preparation of standard
10. Illustrate working principle and performance of all equipment such as hot air Oven, Muffle Furnace, pH Meter, Infrared Moisture Meter, Sieve Shaker, Autoclave, Weighing Balance, Magnetic Stirrer, Thermometer, Centrifuge, Hot Water Bath, Burette, Vaccum Drier, Colony Counter (Electronic Digital), B.O.D Incubator, Microscope, Soxhlet Extraction Unit, Round Heating Plate, Heating Mantles, Kjeldhal Digestion Unit, Laminar Air Flow, Hand Refrectrometer.
11. Prepare standards solutions for calibration of equipment.
12. Demonstrate the use of safety equipment.
13. Demonstrate hygienic production of food by inspecting raw material, ingredients and finished product
14. Apply industry standards such as GMP, GHP and HACCP

REFERENCES

1. AOAC International: Official Methods of Analysis of AOAC International.
2. FSSAI: Manual of Methods of Analysis of Foods.
3. ISO Standards: Various ISO standards for laboratory equipment and calibration.
4. USP (United States Pharmacopeia): General Chapters on laboratory equipment and procedures.
5. Manufacturer Manuals: Operational and maintenance manuals from equipment manufacturers.

INTERNSHIP - VII

Code: 24FTVC4709 Credits: T0+P6 Contact Hours/week: 6 Marks: 100

Students have to undergo internship after completing their seventh semester at an established food sector based on their **NSQF level 7 "Food Regulatory Affairs Manager".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated.

EIGHTH SEMESTER

ADVANCED FOOD TECHNOLOGY

Code: 24FTVC4801 Credits: T6+P0 Contact Hours/week: 6 Marks: 100

OBJECTIVES

To enable students to

- Gain an in-depth understanding of the principles and concepts of food science
- Understand the principles, applications, and benefits of food processing technologies

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Demonstrate an advanced understanding of food science principles
- Utilize advanced food processing techniques to enhance food quality and safety

UNIT I

Fundamentals of food structure: Polymer solutions of food, phase transitions of importance in foods, Food colloids, mechanical and rheological properties of foods. Examination of food microstructure: Light microscopy, transmission electron microscopy, scanning electron microscopy, spectroscopy and other techniques; Image analysis: Image acquisition, processing and analysis.

UNIT II

Microstructural components and functional properties of food carbohydrates, proteins and lipids: their analysis and application in various food systems. Food structuring: structuring and texture improvement; freezing, crystallization, milling, crushing, baking and other operations. Microstructural approach to heat and mass transfer operations during processing of foods. Food quality and microstructure: measurement of texture and structural aspects of food texture.

UNIT III

Distillation: Vapour liquid equlibria, flash vaporization, differential distillation, steam distillation, azeotropic distillation and extractive distillation for binary system. Mechanical and Membrane separation processes: Centrifugal separation, filtration, reverse osmosis, nano-filtration, ultra-filtration, micro-filtration, molecular weight cut-off in each case. Membranes and their characteristics.

UNIT IV

Drying and dehydration: Technological aspects and applications of drying and dehydration of foods, osmotic and freeze drying of foods. Solid-liquid and liquid –liquid extraction processes: Principles, choice of solvents, extraction equipments. Leaching. Super critical fluid extraction: Super critical fluid state, properties of supercritical fluids. Supercritical phase equilibria, SCFE systems and equipment, applications in food.

UNIT V

Extrusion: Theory, extrusion cooking, single and twin screw extruders, forming and snack food extruders. Microwave and Infrared Heating: Theory, Equipment and applications in food industry.

Preservation by Irradiation: Principles and applications.

Emerging food processing techniques: Theory and application of Pulsed Electric Field in food processing, Dielectric and Ohmic heating, High Pressure processing and other new technologies

TEXT BOOK REFERENCES:

1. José Miguel Aguilera and David W. Stanley, Microstructural Principles of Food Processing and Engineering, Springer.
2. D.J.McClements and E. Dickinson. Advances in Food Colloids, 1st ed. Springer.
3. E.Dickinson and E. Martin. Food Colloids. Springer, 2007.
4. J.Andrew. Food Texture: Measurement and Perception. Springer.
5. Z.E.Sikorski, Chemical and Functional Properties of Food Components, 3rd ed. CRC Press. 2006.
6. Christie J. Geankoplis, Transport Processes and Separation Process Principles, 4th ed., Prentice Hall of India, 2006
7. Da-Wen Sun, Emerging technologies for Food Processing, Elsevier, 1st ed., 2005
8. Warren L. McCabe, Julian C. smith and Peter Harriot, Unit Operations of Chemical Engineering, 5th ed., McGraw Hill.

REFERENCES:

1. M.Bourne. Food Texture and Viscosity: Concept and Measurement, 2nd ed. Academic Press. 2002.
2. Z.E.Sikorski. Chemical and Functional Properties of Food Proteins. CRC Press. 2001.
3. B.Dimitrios and A.Kolakowska. Chemical and Functional Properties of Food Lipids. CRC Press. 2002.
4. P.Tomasik. Chemical and Functional Properties of Food Saccharides. CRC Press, 2003.
5. P. Fellows, Food Processing Technologies: Principles and Practice, 2nd ed., CRC Press, 2003
6. R.P.Singh and D.R.Heldman, Introduction to Food Engineering, 3rd ed., Academic Press, 2001
7. Gustavo V. Barbosa Canovas, Novel Food Processing Technologies, 1st ed., CRC Press, 2005
8. J. E. Lozano, Trends in Food Engineering, 1st ed., Technomic,

ACCREDITATION PROCEDURE OF NABL SETUP

Code: 24FTVC4802 Credits: T6+P0 Contact Hours/week: 6 Marks: 100

OBJECTIVES

To enable students to

- Comprehend the principles, requirements, and significance of National Accreditation Board for Testing and Calibration Laboratories (NABL) accreditation
- Familiarize with the ISO/IEC 17025 standards that underpin NABL accreditation
- Understand the procedural steps for applying for NABL accreditation

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Design and implement an effective Quality Management System (QMS) that aligns with ISO/IEC 17025 standards, ensuring consistent and reliable laboratory operations
- Equipped to prepare and submit an application for NABL accreditation, handle the assessment process, and address any findings or non-conformities identified during assessments.

UNIT I

Accreditation – Definition and terminologies used in accreditation, accreditation body logo, accreditation symbol, Importance, benefits and objectives of NABL – ISO/ICE 17025: 2017 accreditation, principle for accreditation, NABL - organisation structure, services, international recognition, impartiality policy, scope of NABL accreditation.

UNIT II

Accreditation process – application, document review, assessment – assessment standard, pre-assessment, initial assessment, Surveillance assessment, On-site surveillance, desktop surveillance, reassessment, unannounced assessment, Application form submitted with quality manual. Scope of accreditation of range of testing/limits of detection, uncertainty of measurement, calibration of equipments, CRM chemicals, SOP with FSSAI/AOAC testing methods, organization chart, PT/ILC participation report. Change in test / calibration method or equipment in respect of accredited scope, Change (addition/deletion) in CAB's key personnel

UNIT III

Accreditation decision-making, issue of accreditation certificate, maintaining accreditation, rights and obligations of NABL, rights and obligations of CAB, integrated assessment for accreditation of laboratories, NABL recognition programs, benefits of laboratory accreditation, benefits of accreditation for Proficiency Testing Provider (PTP), benefits of accreditation for Reference Material Producers (RMP)

UNIT IV

Procedure for Integrated Assessment of Testing Laboratories to obtain Recognition/Approval from Regulatory Body(ies) – FSSAI, BIS, EIC, APEDA, IOPEPC, Spices board, SHEFEXIL and other commodity boards

UNIT V

Duties and Responsibilities of NABL Staff - CEO, Technical Officers, Directors, Joint Directors, Quality Manager, Deputy/ Assistant Directors, Accreditation Officer / Executive Officer, Administration and Supporting Staff, Jt. Director, Deputy Director, Deputy/ Assistant Director, Senior Executive Assistant & other Supporting Staff, Senior Accountant

Internal Audit – Objectives, organisation, planning of audit and implementation of internal audit - follow up of corrective actions, records and reports of internal audit, formats for internal audit: Management Review – objectives, organisation, planning and implementation, records of management reviews

REFERNCES

1. NABL 100: General Information Brochure by National Accreditation Board for Testing and Calibration Laboratories
2. ISO/IEC 17025:2017 - General Requirements for the Competence of Testing and Calibration Laboratories by International Organization for Standardization
3. Laboratory Quality Assurance Manual by AIHA Laboratory Accreditation Programs
4. ISO 15189: Medical laboratories – Requirements for quality and competence by International Organization for Standardization

WEBOGRAPHY

1. https://www.4cpl.com/blog/nabl-iso-17025-accreditation-requirements-implementation-and-benefits-for-your-laboratory/
2. https://jiwaji.edu/pdf/ecourse/pharmaceutical/NABL%20accreditation%20principle%20&%20%20procedure%20(1).pdf
3. https://nabl-india.org/nabl/index.php?c=publicaccredationdoc&m=index&docType=both
4. https://nabl-india.org/wp-content/uploads/2023/11/202211231128-NABL-100A-doc.pdf
5. https://nabl-india.org/nabl/file_download1.php?filename=202402220503-NABL-100B-doc.pdf
6. https://nabl-india.org/nabl/file_download1.php?filename=202401230945-NABL-127-doc.pdf
7. https://nabl-india.org/nabl/file_download1.php?filename=202103150455-NABL-015-doc.pdf
8. https://nabl-india.org/nabl/file_download1.php?filename=202402221116-NABL-161-doc.pdf

MAIN PROJECT

Code: 24FTVC4803 Credits: T0+P12 Contact Hours/week: 12 Marks: 200

In Eighth semester, the students have to do the main project under specialization which is taken from seventh semester. The student projects are performed under their respective guides. Improved quality of learning in research field increased collaborative among student and faculty. They need to submit the final report along with presentation.

I	**The Cover Page – It should have** • Title of the Project • Name and address of student • Name and address of Project Guide
II	**Abstract- 500 words**
III	**Contents**
IV	**Introduction – Description on background of the study**
V	**Objectives**
VI	**Review of literature**
VII	**Methodology**
VIII	**Result and Discussion**
IX	**Summary and Conclusion**
X	**Bibliography**
XI	**Appendix**

INTERNSHIP - VIII

Code: 24FTVC4804 Credits: T0+P6 Contact Hours/week: 6 Marks: 100

Students have to undergo internship after completing their eighth semester at an established food sector based on their **NSQF level 7 "Food Regulatory Affairs Manager".** Students who underwent training should submit a report on their daily routine activities. After the successful completion of internship, a viva voce will be conducted with their presentation and evaluated

ELECTIVES

ELECTIVE – 1

PRODUCT DEVELOPMENT, TESTING AND MARKETING

Code: 24FTVC35E1 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Understand various aspects of development of a food product
- Acquire knowledge on the importance of Consumer Research, Finance and Communication

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Appraise the main features and trends of a specific food product product within an appropriate market setting
- Understand the development cycle of the food product.
- Develop and justify technical specifications for the new product

UNIT I

New Food Products development: Definition, classification, characterization, factors influencing new product development – social concerns, health concerns, impact of technology. Marketing – Concepts, strategies, pricing strategies, concept of testing, product life cycle.

UNIT II

Generation of New Product Ideas: Internal sources of idea, External sources of ideas and market place analysis, understanding consumer needs, Screening of the ideas: Team approach and involvement of various departments, objectives of screening, criteria for screening ideas.

Branding management – concept of brand equity, brand positioning, creating brands in competitive market, brand positioning and repositioning.

UNIT III

Phases in Food Product Development-prototype, standardization, Sensory Evaluation: Descriptive, Labelling threshold and acceptance test. Shelf life testing- types of shelf life testing mode of food deterioration. Technical development – recipe development and scale up.

UNIT IV

Newer food stabilizing systems : Thermal processing, ohmic heating, stabilizing with high pressure, other non-thermal stabilizing systems, controlled / modified atmosphere packaging, irradiation, hurdle technology, low temperature stabilization -Use of various new ingredients to suit product functions.

Packaging- types, new trends in packaging materials and methods suitable for various products. Graphic designing and nutritional labeling.

UNIT V

Test Marketing: Objectives, procedure, evaluating results and analyzing of consumer and business goods market testing. Costing of the products, methods of pricing, product specification, pilot plant and consumer testing, product portfolio management.

REFERENCES

1. Fuller G W, New Food Product Development : From Concept to Market place CRC Press, New York
2. Man C M D and Jomes A A, Shelf life Evaluation of Foods. Blackie Academic and Professional, London
3. Olickle, J K, New Product Development and value added. Food Development Division, Agriculture, Canada
4. Graf E and Saguy I S, Food Product Development : From concept to the Market Place, Van Nostrand Reinhold New York

WEBOGRAPHY

1. https://www.destechpub.com/wp-content/uploads/2015/01/Methods-for-Developing-New-Food-Products-preview.pdf
2. https://nzifst.org.nz/resources/foodproductdevelopment/Chapter-3-1-2.htm
3. https://discoverfoodtech.com/food-product-development-process/
4. https://krishi.icar.gov.in/jspui/bitstream/123456789/20380/1/An%20overview%20of%20non%20thermal%20preservation.pdf
5. https://www.basu.org.in/wp-content/uploads/2020/04/10th-PPT-of-Foods-and-Industrial-MicrobiologyCourse-No.-DTM-321.pdf

ELECTIVE – 2

BY-PRODUCTS AND WASTE UTILIZATION

Code: 24FTVC35E2 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Origin and type of waste and by products, waste identification, classification and composition.
- Understand the need for treatment and utilization.
- Know the impact of waste disposal on environment

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- Utilize waste from food industries and develop novel products
- Align with the Legal and statutory requirements for food waste handling, treatment and disposal

UNIT I

Introduction, status in India, definition, origin and type of waste and by products, their identification, classification, composition and characterization, need for treatment and utilization, impact on environment, food waste as source of biogenic raw material and energetic utilization Types and formation of by-products and waste; Magnitude of waste generation in different food processing industries.

UNIT II

Concept, scope and maintenance of waste management and effluent treatment, Temperature, pH, Oxygen demands (BOD, COD), fat, oil and grease content, metal content, forms of phosphorous and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides residues.

UNIT III

Waste utilization in various industries, furnaces and boilers run on agricultural wastes and byproducts, briquetting of biomass as fuel, production of charcoal briquette, generation of electricity using surplus biomass, producer gas generation and utilization; Waste utilization from fish Processing Industry – Bio fuel, dietic products, Pigments, Packaging application, Cosmetics, Therapeutic products etc.

UNIT IV

Utilization of waste: grains and milling industry - oil extraction from waste - waste management in sugar mills

By-Products Utilization of Wheat and Pulse Mill: By products of wheat milling- germs and bran - by products of pulses milling - husk, germs and broken. Coconut processing – by-product utilization - fuel briquette.

UNIT V

Processes for waste utilization from fruit and vegetable industries - Distillation for production of alcohol fermentation (alcohol and beer) - citric acid production from fruit waste, extraction of active ingredients from fruit waste

Fish, Meat and Poultry Waste Utilization: Fish Industry by products and Waste utilization- livestock and poultry, fish, meat waste recycling.

TEXT BOOKS

1. Shewfelt, R.L. and Prussi, S.E, Post-Harvest Handling – A Systems approach, Academic Press Inc.
2. USDA, Agricultural Waste Management Field Hand book. USDA, Washington DC..
3. V.K. Joshi & S.K. Sharma. Food Processing Waste Management: Treatment & Utilization. New India Publishing Agency
4. Robert R. Zall (2004), Managing Food Industry Waste: Common sense methods for Fod Processors, Blackwell Publishing.

REFERENCE BOOKS

1. Markel, I.A. Managing Livestock Waste, AVI Publishing Co.
2. Pantastico, ECB. 1975. Post Harvest Physiology, Handling and utilization of Tropical and Subtropical fruits and vegetables, AVI Pub. Co..
3. VassoOreopoulou and Winfried Russ (Edited). 2007. Utilization of By-products and
4. Treatment of waste in the Food Industry. Springer Science & Business media, LLC 233 New York.
5. Weichmann J. Post Harvest Physiology of vegetables, Marcel and Dekker Verlag
6. Food and Agricultural Wastewater Utilization and Treatment, Sean X. Liu, First edition 2007 Blackwell Publishing, Iowa 50014, USA.
7. Managing Food Industry Waste, ROBERT R. ZALL, First edition, 2004, Blackwell Publishing Professional, Iowa, USA.
8. Food Processing Waste Management by Green J.H. AVI Publication

WEBOGRAPHY

1. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=126248
2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3614052/
3. https://www.eai.in/ref/ae/wte/typ/clas/india_industrial_wastes.html
4. https://p2infohouse.org/ref/31/30495.pdf

ELECTIVE – 3

PROCESSING OF FATS AND OIL

Code: 24FTVC35E3 Credits: T4+P0 Contact Hours/week: 4 Marks: 100

OBJECTIVES

To enable students to

- Comprehend the fundamental principles and methods used in the processing of oilseeds and fats.
- Familiarize students with the types and characteristics of oilseeds and fats used in food processing
- Understand the factors influencing oil yield and quality

Specific Learning Outcome
On Successful Completion of this course, the students will be able to

- Develop skills in the analysis and quality control of oils and fats, including the assessment of physical, chemical, and sensory properties.
- Know the standards and regulations governing oilseed and fat products

UNIT I

Raw material and Properties - Overview of fats and oil, sources of fats and oils-vegetables, animal fat; properties of fats and oils nomenclature and structure; chemical properties and reactions – hydrolysis and free fatty acids, esterification, inter-esterification, saponification and iodine value, oxidative stability, peroxide value, conjugated dienes, anisidine value; physical properties – colour, crystal structure of fat, thermal properties, density, optical and spectroscopical properties.

UNIT II

Extraction Methods - Oil extraction methods –mechanical expression Cold Press Extraction–Advantages ghani , power ghani, rotary, hydraulic press, screw press, expellers, filter press - principle of operation and maintenance-solvent extraction process – steps involved, batch and continuous-continuous solvent extraction process for rice bran, soy bean and sunflower-oil extraction process for groundnut and cotton seed-production of special oils – palm oil, virgin coconut oil – extraction process.

UNIT III

Refining of oils – objectives – characterization - degumming – Zeneath process – deacidification process – continuous acid refining-bleaching of oil –decolourising agents-deodorization and winterization processes- Hydrogenation of Fats – Vanaspati and Margarine – Ghee and butter-Physical Refining

UNIT IV

Quality of oils - Flavour quality of fats and oils – formation of flavours and off-flavours, hydrolytic rancidity, oxidative rancidity, flavour impact of oxidation compound, factors affecting

flavour quality – intrinsic and extrinsic, methods to measure flavour quality - chemical, sensory analysis, oil quality improvement through processing

UNIT V

Packaging of Edible Oils and storage - Packaging of edible oils – requirements – types – tinplate, semi rigid, glass, Polyethylene Terephthalate, Poly Vinyl Chloride, flexible pouches – packaging for Vanaspati and ghee. Changes during storage of oil –rancidity – causes – atmospheric oxidation and enzyme action – free fatty acid – colour.

Oils and fat applications - Utilization of fats and oils: shortening technology, margarine types and preparation technology, liquid oil technology, speciality fats and oils, by product utilization.

TEXT BOOKS

1. Harry W. Lawson, "Food oils and Fats - Technology, Utilization and Nutrition", Springer; Softcover reprint of the original 1st ed., ISBN-10: 144194737X, ISBN-13: 978-1441947376, 2011.
2. Gunstone F.D., "Oils and Fats in Food Industry", Blackwell Publishing, United Kingdom, ISBN – 13: 9781405181212, 2008.

REFERENCE BOOK

1. Gunstone F.D., "Vegetable Oils in Food Technology: Composition, Properties and Uses", 2nd Edition, Wiley - Blackwell Publishing Ltd., ISBN 9781444332681, 2011.
2. Handbook of Food Science, Technology, and Engineering" edited by Y. H. Hui

WEBOGRAPHY

1. https://icar-iior.org.in
2. https://egyankosh.ac.in/bitstream/123456789/33861/1/Practical-4.pdf

MULTIDISCIPLINARY PAPERS OFFERED BY B.VOC. FOOD TESTING AND QUALITY EVALUATION

MULTIDISCIPLINARY - I

INTRODUCTION TO FOOD SCIENCE

Code: 24FTVM1101 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- Know about the commodities derived from plants and animals
- Provide knowledge on nutritive value of food commodities
- Illustrate the importance of processing the food commodities

Specific Learning Outcome

On Successful Completion of this course, the students will be able to

- After completion of this course, the students will be able to Identify the foods from plant and animal sources
- Select foods rich in nutrients for preparation of novel foods
- Categorize the foods based on its shelf life

UNIT I

Food meaning and its function, food composition, food groups, food production around the world and India, Food demand and supply, food wastage. Experiment on different methods of cooking.

UNIT II

Cereals: rice, wheat, maize, barley oats & rye nutritive value, nutritive value of major and minor millets; pulses and legumes - types and nutritive value. Experiment on cereals processing and cookery, Experiment on pulse processing and cookery.

UNIT III

Classification of vegetables - leaf, roots & tubers and others, nutritive value of vegetables, Classification of fruits-climatric& non-climatric, nutritive value of fruits. Experiment of fruits and vegetables- Effect of cooking pigments.

UNIT IV

Milk: source, type and nutritive value, Egg: source type and nutritive value, Meat and Fish: sources, types and its nutritive value. Experiment on Egg, milk and milk products.

UNIT V

Food Spices: source, type and nutritive value, Sugar: source, type and nutritive value, Fat and Oil: source, type and nutritive value. Experiment on stages of sugar cookery. Smoking temperature on fats and oils.

RELATED EXPERIENCES

- Plot a food pyramid using locally available food ingredients
- Survey the availability of cereals in the market
- Collect and display pulses and legumes
- Identify the greens cultivated in the local area
- Collect fruits available in the local market and categorize it
- Survey on type of meat and fishes available in the market
- Survey on spices and herbs cultivated in local area
- Survey on types of sugar and evaluate its quality
- Survey on vegetable oil and/fat available in the market

TEXTBOOK

1. Srilakshmi, B.(2018), "Food Science", New Age International Publishers, New Delhi
2. Potter, N.M. and Birch, G.G. Food Science, AVI, West Port, Conn.
3. Swaminathan, M. Food Science and Experimental Foods. Madras: Ganesh and Company.

REFERENCE BOOK

1. Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology. John Wiley & Sons.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
3. Gopalan, C., Rama Sastri, B.V., Balasubramanian, S.C., Narasinga Rao, B.S., Deosthale, Y.G., & Pant, K.C. 2012.
4. Nutritive value of Indian Foods, National Institute of Nutrition, ICMR, Hyderabad, India.

WEBOGRAPHY

1. https://egyankosh.ac.in/bitstream/123456789/11694/1/Unit-1.pdf
2. http://lib.rudn.ru/file/Food_Science_Nutrition_Catalogue_ebook.pdf
3. https://www.slideshare.net/RoshinaRabail/introduction-to-food-science-and-technology101
4. https://www.slideshare.net/partharoychaudhry/cereals-pulses-36867856
5. https://slideplayer.com/slide/14016092/
6. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=147675

FOOD ADULTERATION

Code: 24FTVM1102 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable the student to

- Know about common food adulterants and their detection techniques
- Impart knowledge in the legislatory aspects of adulteration
- Aware about standards and composition of foods and role of consumer.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Gain the knowledge of food adulteration and influencing activity of food adulterants
- Knowledge on regulatory laws and limitations for \ food adulteration

UNIT I

Food adulteration – introduction of food adulteration, definition; new adulterants in foods, Historical Food legislation in India; Central food laboratory, Municipal laboratories.

UNIT II

Common adulterant in cereals, pulses and milk, and its identification

UNIT III

Common adulterants in oil and sugar, spices, condiments and packed powders and its identification

UNIT IV

Common adulterants in beverages, fruit juices and food colours and its identification

UNIT V

Role of FSSAI on food adulteration, vertical standards vs horizontal standards; food safety officer- powers, procedures, role of food analyst.

TEXT BOOKS

1. Srilakshmi. B, (2018).Food Science, New Age International Pvt Limited Publishers, New Delhi.
2. ShakuntalaManay, N and Shadaksharaswamy, Food Facts and Principles. New Age International Publisher, New Delhi.

REFERENCE BOOKS

1. Titus A. M. Msagati, (2012), “The Chemistry of Food Additives and Preservatives”, John Wiley & Sons Publishers.
2. Jim Smith, Lily Hong-Shum (2011), “Food Additives Data Book”, John Wiley & Sons Publishers.
3. Deshpande, S.S. (2002). “Handbook of Food Toxicology”, Marcel Dekker Publishers.
4. A first course in Food Analysis – A.Y. Sathe, New Age International (P) Ltd., 1999.
5. Food Analysis, 4th Edition. S. Suzanne Nielsen (ed.) 2010. Springer. 3rd Edition

FOOD SAFETY

Code: 24FTVM1103 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- To understand and impart knowledge of importance of food hygiene, sanitation, and safety during food processing unit.

Specific learning outcomes:

On Successful Completion of this course, the students will be able to

- Know the principles and applications of sanitation in food industry.
- Know about the various types of Sanitation techniques applicable in the food industry
- Gain an understanding of food hygiene, sanitation and safety during food processing unit operations

UNIT I: Sanitation and Health

Definition, importance of sanitation, application of sanitation to food industry and food service establishments. Microorganisms and their characteristics, control of microbial growth in food. Food contamination and spoilage, food borne diseases.

UNIT II Hygiene and food handling

Purchasing and receiving safe food, food storage, sanitary procedures in food preparation, serving and displaying of food, special food operations.

UNIT III Environmental Sanitation

Location and layout of premises, constructional details, sanitary requirements for equipment, guidelines for cleaning equipment, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution.

UNIT IV Hygiene Practices in food industry

Introduction, necessity, personnel hygiene, sanitary practices, management and sanitation, safety at work place. Sanitation regulations and Standards. Introduction, regulatory agencies, control of food quality, local health authority. Food sanitation check list.

UNIT V Food sanitation and hygiene practical

- Extraneous matter and its detection.
- Testing kitchen ware.
- Microbial testing of water.
- Determination of BOD
- Determination of Howard mold count
- Testing hygiene of Food handler
- Microbiological report of different food products.
- Testing quality of ingredients.

REFERENCES

1. Food Hygiene and Sanitation, McGraw Hill Publishing Company Limited Marriott,
2. Norman (2013), "Principles of Food Sanitation", Springer Science & Business Media Publishing.
3. H. L. M. Lelieveld, John Holah, David Napper, (2014), "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.

WEBOGRAPHY

1. http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=187&printable=1
2. https://www.sciencedirect.com/topics/food-science/food-hygiene
3. http://www.open.edu/openlearncreate/mod/oucontent/view.php?id=193&printable=1
4. https://www.who.int/foodsafety/areas_work/food-hygiene/en/
5. https://www.fsis.usda.gov/wps/portal/fsis/topics/regulatory_compliance/compliance-

FOOD PACKAGING MATERIALS AND THEIR PROPERTIES

Code: 24FTVM1201 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- Familiarize with different methods and materials used for packaging.
- Understand the technology behind packaging.
- Understand interaction of food with packaging & to do shelf life testing.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- The concepts and functions of food packaging
- Know packaging of food products from primary to tertiary packaging materials and method.

UNIT I Introduction to packaging

Definition, Functions of packaging - Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging primary, secondary and tertiary packaging.

UNIT II Deteriorative reactions and shelf life of foods

Introduction, deteriorative Reactions in food- factors affecting deterioration of foods- physical changes, biological changes, chemical changes. Shelf life of foods - Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.

UNIT III Packaging materials and their properties

Rigid containers- Glass, Wooden boxes, metal cans- Aluminium and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene and Polypropylene. Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

UNIT IV Special packaging

Aseptic packaging, Active packaging, Intelligent packaging, Modified atmospheric packaging and controlled atmospheric packaging, Shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetra packs. Labelling and safety concerns in food pack. Printing process, inks, adhesives, labelling, coding- bar codes, Food packaging closures of glass and plastic containers, Legislative and safety aspects of food packaging,

UNIT V Quality test for food packaging materials

Package testing-Thickness - Paper density - Basis weight - Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate (WVTR).

REFERENCES

1. Gordon L. Robertson (2012), "Food Packaging: Principles and Practice", Third Edition, CRC Press.
2. Takashi Kadoya (2012), "Food Packaging", Academic press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), "Food Packaging Technology", CRC Press.

PRE-REQUISITE PROGRAMME OF FOOD SAFETY SYSTEM

Code: 24FTVM1202 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable the student to

- Provide students with a comprehensive understanding of the fundamental principles of food safety.
- Equip students with knowledge about the importance of prerequisite programs (PRPs) in ensuring food safety throughout the food supply chain.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Understand the key components of prerequisite programs and their role in ensuring food safety across the food supply chain.

UNIT-I Basics of Food Safety

Food Contaminants (Microbial, Chemical, Physical) Food Microbiology, Food Adulteration (Common adulterants, simple test for detection of adulteration), Food Additives (Classification, functional role, safety issues), Food Packaging and Labelling (Packaging types, understanding, labelling rules and Regulations, Nutritional labelling, Labelling requirements for pre-packaged food as per CODEX)

UNIT-II The Food Safety and Standards Act, 2006

Food Safety and Standards Authority of India, General Principles of Food Safety, General Provisions as to Articles of food, Special Responsibilities as to Food Safety, Analysis of Food, Offences and Penalties, Adjudication and Food Safety Appellate Tribunal ,The Food Safety and Standards Rule, 2011.

UNIT-III Prerequisite Programme- GMP

Good Manufacturing Practices - Personal hygiene – occupational health and safety specification, Food Plant Sanitation Management - Plant facilities construction and maintenance - exterior of the building- interior of the building- equipments. Storage, transportation, traceability, recalling procedures, training

UNIT-IV Prerequisite Programme- GHP/GLP

Good Hygiene Practices (GHP) Objective, Scope & Use, Key aspect of Hygiene Control Systems etc Good Laboratory Practices- What is GLP, .principles of GLP, Application of GLP, care to taken as per the GLP in laboratory.

UNIT-V Prerequisite Programme- HACCP

Food Safety Management System-HACCP, HACCP seven principles HACCP applications.

REFERENCES

1. https://gcwgandhinagar.com/econtent/document/1589361426Unit%20V%20Food%20testing%20laboratories-
2. https://fssai.gov.in/upload/uploadfiles/files/Book_Food_Testing_22_12_2021.pdf
3. https://egyankosh.ac.in/bitstream/123456789/69066/1/Block-4.pdf
4. https://foodsafetynews.wordpress.com/wp-content/uploads/2013/01/manual-for-recognition-of-food-testing-laboratories.pdf

FOOD ALLERGEN MANAGEMENT

Code: 24FTVM1203 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- Understand the importance of allergen detection in ensuring food safety and preventing allergic reactions.
- Explore the regulatory landscape and guidelines governing allergen labeling and detection.
- Evaluate different detection methods and technologies for allergen analysis.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Learn about regulatory requirements, analytical techniques, emerging technologies, and practical applications for ensuring food safety and allergen management.

UNIT-I

Food allergen- Definition and types of food allergies. Common symptoms and health impacts. Need and understanding of food allergen, methods of food allergen techniques. Importance of allergen management. Allergen management of SOP.

UNIT-II

Common Food Allergens: Sources and examples of foods containing allergens - Allergens caused in cereals products- wheat, rye, oats, barley and spelt or their hybridized strains, allergens caused by pulses- Soya bean and their products, groundnut and their products. Allergens caused by animal foods- milk and their products, egg and their products, fish and their products. Allergens caused by oilseeds- Nuts, oils and their products. Allergens caused by fruits and vegetables, fish and shellfish and their products.

UNIT-III

Allergen and mechanism of allergic resource, chemistry of food allergens, types of allergens and the specific terms used to declare allergens by FSSAI.

UNIT-IV

Regulatory Requirements and Compliance: National Regulations: Overview of local food allergen labeling laws, Food Safety and Standards Authority of India (FSSAI) guidelines. International Standards: Codex Alimentarius, U.S. Food and Drug Administration (FDA) regulations, European Union (EU) food allergen labeling requirements.

UNIT V

Allergen Management and Control - Allergen Control Plans: Developing and implementing allergen control plans in food production, Preventing cross-contamination in manufacturing and handling, Risk Communication: Labeling and consumer information, Communicating risks to stakeholders. Case Studies: Analysis of allergen management failures and successes in the industry.

RELATED EXPERIENCE:

1. Laboratory Identification of Food Allergens:
   Hands-on practice with ELISA and PCR techniques.
   Analysis of food samples for allergen presence.
2. Labeling and Regulatory Compliance:
   Exercises on proper labeling practices.
   Case studies on regulatory compliance and enforcement.
3. Development of Allergen Control Plans:
   Creating and evaluating allergen control plans for different food production scenarios.
   Group discussions and presentations on management strategies.

BOOK REFERENCES

1. "Food Allergens: Analysis, Instrumentation, and Methods" - Leo M.L. Nollet and Fidel Toldrá.
2. "Managing Food Allergens" - Clare Mills and Katherine W. Allen.
3. "Handbook of Food Allergen Detection and Control" - Simon Flanagan.
4. "Food Allergy: Adverse Reactions to Foods and Food Additives" - Dean D. Metcalfe, Hugh A. Sampson, and Ronald A. Simon.
5. "Food Allergens: Biochemistry and Molecular Nutrition" - Kathleen G. Tallman.

WEBOGRAPHY

1. https://www.foodlabelsolutions.com/info-centre/Menu-Labelling/allergen-management-in-fssai-menu-labelling-regulations-for-restaurants/
2. FSSAI Food Safety and Standards (Labelling and Display) Regulations, 2020.
3. https://fssai.gov.in/upload/notifications/2020/12/5fd87c6a0f6adGazette_Notification_Labelling_Display_14_12_2020.pdf
4. FSSAI Guidance Note on Display of Information in Food Service Establishments (Menu Labelling), 2022.
5. https://www.fssai.gov.in/upload/uploadfiles/files/Guidance_Note_Labelling_23_02_2022_.pdf
6. The Importance of Allergen Management in Food Industry, PECB, 2014. The Importance of Allergen Management in Food Industry | PECB
7. Guidance Document: Food Safety Management Systems- Food Industry Guide To Implement GMP/GHP Requirements and Risk Assessment, Health Supplements and Nutraceuticals. 2018.
8. Food Safety Management Systems Guidance Document for Food Supplements (fssai.gov.in).

FOOD LABELLING AND SAFETY CONCERN

Code: 24FTVM2301 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- To achieve several critical goals to protect consumers and ensure transparency in the food supply chain.
- Empower consumers with the information needed to make safe, healthy, and informed decisions about the food they purchase and consume.

Learning Outcomes

On Successful Completion of this course, the students will be able to

- Relate food labeling and safety concerns, the focus is on achieving tangible benefits and improvements in various areas.
- Underscore the importance of robust food labeling and safety practices in safeguarding public health, supporting consumer choice, and promoting a fair and transparent food marketplace

UNIT I

Food labelling definition- importance, functions, components of food labelling

UNIT II

Food packaging and labelling symbols –their intended use.

Unit-III

Certification and marks for food products – FSSAI, ISI, AGMARK, FPO, ECO Mark etc.

UNIT-IV

Misbranding food- false or misleading label, sales under another name, imitation of another food, misleading containers, label for package form, statement on label placed conspicuously, conformity with prescribed definition and standards, quality below standard name of the food and ingredients etc.

UNIT-V

Safety concern with food labelling- the power of packaging- A visual symphony that sells Balancing beauty and substance-Regulatory guideline for food labelling, navigating the landscape-striking the perfect chord. Empowering choices- The future of food product labelling.

REFERENCE

1. FDA Food Labeling Guide.
2. Codex Alimentarius - Food Labeling.
3. Consumer Reports Food Safety
4. https://arborealstevia.com/blog/guiding-consumers-safely-fda-and-fssai-regulations-for-food-product-labeling/

APPLICATION OF SENSORY ANALYSIS IN FOOD

Code: 24FTVM2302 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- Understand different aspects of sensory science and its application.
- Use sensory evaluation as an analytical tool.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Understand importance of sensory perception to food quality
- Know the scientific method used to evoke, measure, analyze and interpret those responses to products.

UNIT I Sensory Perceptions

Definition and importance of sensory evaluation. The perceptions of taste, smell, visual and oral texture of foods. Rheology, classification of textural properties and texture perception. Interactions between colour, flavour and texture, Classification of food flavours, Non-volatile and volatile flavour composition of foods.

UNIT II Sensory Analysis of Foods

Basic requisites for conducting sensory analysis – objectives, types of panels, recruitment and training of panel, testing environment, testing time and laboratory features. Sensory threshold value: detection, difference, recognition and terminal thresholds. Relation between instrumental methods and sensory methods

UNIT III Subjective and Objective Methods of Evaluation

Consumer surveys and tests; acceptance and preference tests, hedonic scales, ranking and rating tests, Instrumental methods of measuring sensory characteristics of food – colour, flavor and texture, Measurement of off flavours and tastes; Sensory assessment of food quality, Taste sensation on the tongue, recognition test for the four basic tastes, Taste modifiers, Odour and smell, smelling techniques, Texture definition of texture, Classification of textural characteristics, glossary of textural terms. Texture measurement - Colour vision and appearance measurement, Visual perception and colour of foods. Flavour and aroma, definition of flavour, Flavour profile methods, flavour compounds

UNIT IV Sensitivity threshold testing of foods

Sensitivity – Threshold tests, Difference tests – Paired comparison, Duo-trio test, Triangle test, Ranking tests – Two sample difference test, Multiple sample difference test, Hedonic tests – Numerical and composite scoring 4.5 Acceptance and preference, Descriptive Tests – Flavour profile, Banana profile, Sauce profile

UNIT V Application of Sensory Evaluation

Sensory evaluation of products – baked products, dairy products, spices, fruits and vegetables, beverages. Application of sensory analysis to food industries. Data analysis –

importance of data analysis, tests of significance, null hypothesis, mean, median, variance, standard deviation, t-test, chi-square test.

REFERENCE BOOK

1. Amerine, M.A., Pangborn, R.M. and Rossles, E.B. Principles of Sensory Evaluation of Food. Academic Press, London.
2. Jellinek, G. Sensory Evaluation of Food - Theory and Practice. Ellis Horwood.
3. Lawless, H.T. and Klein, B.P. Sensory Science Theory and Applicatons in Foods. Marcel Dekker.
4. Piggot, J.R. Sensory Evaluation of Foods. Elbview Applied Science Publ.
5. Potter, N.N. and Hotchleiss, J.H. Food Science. 5th Ed. CBS Publishers, Delhi.
6. Rai, S.C. and Bhatia, V.K. Sensory Evaluation of Agricultural Products. Indian Agricultural Statistics Research Institute (ICAR), New Delhi.
7. Stone, H. and Sidel, J,L. Sensory Evaluation Practices. Academic Press.
8. Harry, T. Lawless, HildegardeHeymann. 2010. Sensory Evaluation of Food: Principles and Practices. 2nd Ed., Springer, New York or Dordrecht Heidelberg, London.

WEBOGRAPHY

1. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=6035
2. https://www.slideshare.net/mobile/mrhunterspage/sense-organs-anatomy-and-physiology
3. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=6039
4. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=6037
5. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=6047
6. https://books.google.co.in/books/about/Sensory_Evaluation_of_Food.html?id=u-XpBwAAQBAJ&printsec=frontcover&source=kp_read_button&redir_esc=y
7. https://en.m.wikipedia.org/wiki/Sensory_threshold
8. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=6057
9. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=5761
10. https://www.slideshare.net/mobile/AndrewMyrthong/descriptive-analysis-for-sensory-evaluation

FOOD PRODUCT DEVELOPMENT

Code: 24FTVM2303 Credits: T3+P0 Contact Hours/week: 3 Marks: 100

OBJECTIVES

To enable students to

- Acquire knowledge on the importance of consumer research, finance, trends and economic
- Understand various aspects of food product development.

Specific Learning Outcomes

On Successful Completion of this course, the students will be able to

- Understand and know various aspects of food product development underling food science and technology and consumer research.
- Able to appraise the features and trends of specific food product within appropriate market settings.

UNIT-I

Food needs and consumer preference –needs and types of food consumption Trends, economic, psychological, anthropological and sociological dimensions of food consumption. Trends in social changes and its role in diet pattern-consumer research and the market identifying the need for new products.

UNIT- II

Designing new products using need based perspective and application in various situations the R&D process. Developing standards products- Types of product and logistics, primary and secondary, various food ingredients used, use of additives.

UNIT-III

Standardization and large scale preparation. Chemical and physical properties of foods-shelf life studies shelf predictions.

UNIT-IV

Storage and transportation – Types and mode of transportation optimization of Transport taking into account the types of product distance storage facilities, Equipment and space.

UNIT-V

Value addition in plant foods/animal foods - Garlic, Ginger, Dragon fruit, Bitter Gourd, Lichi, Moringa, Coconut, Mushroom, Seaweed and related innovative approaches in foods. Vegan Yoghurt- Oat Milk Yoghurt, almond milk yoghurt, coconut milk yoghurt, soy based and hemp yoghurt. Kefir, Container milk, Fudge. Goat Milk, Cheese, Butter, Ice Cream, Yoghurt. Chicken nuggets, Saussages, Patties, Quail meat products, Processing and preservation techniques.

REFERENCE

1. Fuller G.W. New Food Product Development: From Concept to Market Place, New York, CRC Press.
2. Man C.M.D and James A.A. Shelf-life Evaluation of Foods. London: Blackie Academic and Professional.
3. Olickle J.K. New Product Development and Value added. Canada: Food Development Division Agriculture.
4. International Journal of Food Science and Technology.