

MRSPTU B.Sc. (FOOD SCIENCE & TECHNOLOGY)/B.F.S.T(Hons.)
SYLLABUS 2019 BATCH ONWARDS

SEMESTER V

TotalCredits=22

SEMESTER V		CONTACT HOURS			MARKS			CREDITS
SUBJECT CODE	SUBJECT NAME	L	T	P	Int.	Ext.	TOTAL	
BFOTS1-501	Unit Operations in Food Engineering	3	1	-	40	60	100	4
BFOTS1-502	Food Packaging	3	1	-	40	60	100	4
BFOTS1-503	Sugar & Confectionary Technology	4	-	-	40	60	100	4
BFOTS1-504	Food Packaging Lab XII	-	-	4	60	40	100	2
BFOTS1-505	Sugar & Confectionary Technology Lab XIII	-	-	4	60	40	100	2
	DEPARTMENTAL ELECTIVE							
BFOTD1-511	Spices and Flavour Technology	4	-	-	40	60	100	4
BFOTD1-512	Spices and Flavour Technology Lab XIV	-	-	4	60	40	100	2
OR								
BFOTD1-513	Technology of Oils and Fats	4	-	-	40	60	100	4
BFOTD1-514	Technology of Oils and Fats Lab XV	-	-	4	60	40	100	2
	TOTAL	-	-	-	340	360	700	22

Note: In Semester Vth, students have to choose either between BFOTD1-511, BFOTD1-512 or BFOTD1-513, BFOTD1-514

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SEMESTER VI

Total credits=20

SEMESTER VI		CONTACT HOURS			MARKS			CREDITS
SUBJECT CODE	SUBJECT NAME	L	T	P	Int.	Ext.	TOTAL	
BFOTS1-601	Food Engineering	3	1	-	40	60	100	4
BFOTS1-602	Food and Nutrition	3	1	-	40	60	100	4
	DEPARTMENTAL ELECTIVE							
BFOTD1-611	Sensory Evaluation of food	4	-	-	40	60	100	4
BFOTD1-612	Sensory Evaluation of food Lab XVI	-	-	4	60	40	100	2
OR								
BFOTD1-613	Food Plant Layout	4	-	-	40	60	100	4
BFOTD1-614	Food Plant Layout Lab XVII	-	-	4	60	40	100	2
	DEPARTMENTAL ELECTIVE							
BFOTD1-621	Food Safety	4	-	-	40	60	100	4
BFOTD1-622	Food Safety Lab XVIII	-	-	4	60	40	100	2
OR								
BFOTD1-623	Food Quality Management	4	-	-	40	60	100	4
BFOTD1-624	Food Quality Management Lab XIX	-	-	4	60	40	100	2
	TOTAL	-	-	-	280	320	600	20

Note: In Semester VIth, students have to choose either between

BFOTD1-611, BFOTD1-612 or BFOTD1-613, BFOTD1-614

BFOTD1-621, BFOTD1-622 or BFOTD1-623, BFOTD1-624

Overall

Semester	Marks	Credits
V th	700	22
VI th	600	20
Total	1300	42

SEMESTER FIFTH

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SYLLABUS 2019 BATCH ONWARDS

UNIT OPERATIONS IN FOOD ENGINEERING

Subject Code: BFOTS1-501

L T P C
3 1 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the basics of unit operations.
2. To impart knowledge regarding methods of cleaning, sorting, grading, and size reduction.
3. To familiarize students with low-temperature, and high-temperature unit operations and their applications in food industry.
4. To formulate and analyze the problems related to unit operations used in food engineering.
5. To create awareness regarding selection and application of appropriate tools and techniques used in food industry.

Course Outcomes:

1. Understanding the basics of unit operations.
2. Imparting knowledge regarding methods of cleaning, sorting, grading, and size reduction.
3. Familiarizing students with low-temperature, and high-temperature unit operations and their applications in food industry.
4. Formulating and analyzing the problems related to unit operations used in food engineering.
5. Creating awareness regarding selection and application of appropriate tools and techniques used in food industry.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2					3							
CO3						3						
CO4				3								
CO5										3		

UNIT I (12 Hrs.)

Introduction: Concept of unit operations

Preliminary Unit Operations: Material handling; Conveyors and elevators, types of conveyors and elevators.

UNIT II (17 Hrs.)

Cleaning: Dry-cleaning; screening, aspiration and magnetic cleaning, wet cleaning; soaking, spray washing, ultrasonic washing, sorting and grading: methods, advantages of sorting and grading

Size reduction: Benefits, criteria for size reduction, size reduction of solid, fibrous and liquid foods.

UNIT III (16 Hrs.)

Refrigeration and Freezing: Refrigeration, components of refrigeration system, compressors, condensers and expansion valve, selection of refrigerant, cooling load, coefficient of performance, refrigerant flow rate.

Direct contact and indirect freezing systems.

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UNIT IV (15 Hrs.)

High temperature operations: Pasteurization, pasteurizer and its functioning.

Evaporation: Single effect evaporators and multiple effect evaporators, natural and forced circulations, falling and rising film evaporators.

Recommended Readings

1. Rao D. G., 'Fundamentals of Food Engineering', PHI learning private ltd.,2010.
2. Singh R. P. and Heldman D. R., 'Introduction to Food Engineering', Academic press 2nd, 3rd and 4th Edition, 1993, 2003,2009.
3. Rao C.G., 'Essentials of Food Process Engineering', B.S. publications,2006.
4. Fellow P., Food Processing Technology,1988.

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SYLLABUS 2019 BATCH ONWARDS

FOOD PACKAGING

SubjectCode:BFOTS1-502

L T P C
3 1 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the basics of food packaging.
2. To impart knowledge regarding different types of packaging materials and their suitability for packaging of different food products.
3. To familiarize students with various types of packaging machinery and systems.
4. To develop eco-friendly packaging and addressing environmental concerns.
5. To create awareness regarding novel methods of food packaging and communicating its benefits to consumers.

Course Outcomes:

1. Understanding the basics of food packaging.
2. Imparting knowledge regarding different types of packaging materials and their suitability for packaging of different food products.
3. Familiarizing students with various types of packaging machinery and systems.
4. Development of eco-friendly packaging and addressing environmental concerns.
5. Creating awareness regarding novel methods of food packaging and communicating its benefits to consumers.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2							3					
CO3					3					2		
CO4			3									
CO5											2	

UNIT I (15 Hrs.)

Introduction to Food Packaging

Packaging Functions and Requirements, Printing of packages, Barcodes & other marking, Labelling Laws

UNIT II (16 Hrs.)

Food Packaging Materials: Paper and paper-based materials, corrugated fiber board (CFB). Plastics, formation- Injection molding, Blow molding, Types of plastics, Lamination, Biodegradable plastics, Edible packaging and Bio-composites. Environmental Concerns recycling and disposal of plastic waste.

UNIT III (14 Hrs.)

Metal packaging- Metals: Tinplate, tinning process, components of tinplate, tin free can (TFC) types of can, metallic films, lacquers

Glass: Composition, Properties, Methods of bottle making, Types of closures.

UNIT IV (15 Hrs.)

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Packaging Machinery and Systems: Bottling machines, Cartoning systems, Seal and Shrink packaging machine; Form, Fill and Sealing machine(FFS).
Vacuum, Controlled and Modified atmosphere packaging systems; Aseptic packaging systems; Retort packaging, Active and Intelligent packaging systems

Recommended Readings:

1. Robertson G. L., 'Food Packaging – Principles and Practice', CRC Press Taylor and Francis Group, 2012.
2. Paine F.A. and Paine H.Y., 'A Handbook of Food Packaging', Blackie Academic and Professional, 1992.
3. Coles R., McDowell D. and Kirwan M. J., 'Food Packaging Technology', Blackwell, 2003.

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SYLLABUS 2019 BATCH ONWARDS

SUGAR AND CONFECTIONARY TECHNOLOGY

Subject Code: BFOTS1-503

L T P C
4 0 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the manufacturing process and deterioration of sugar.
2. To impart knowledge regarding different types of icings and toppings.
3. To familiarize students with different types of confectionary products. .
4. To develop various value added products from cocoa and understand associated defects.
5. To create awareness regarding by-products of sugar industry and their utilization in an eco-friendly manner and for societal benefits.

Course Outcomes:

1. Understanding the manufacturing process and deterioration of sugar.
2. Imparting knowledge regarding different types of icings and toppings.
3. Familiarizing students with different types of confectionary products. .
4. Development of various value added products from cocoa and understand associated defects.
5. Creating awareness regarding by-products of sugar industry and their utilization in an eco-friendly manner and for societal benefits.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			3									
CO2	3											
CO3						3						
CO4		2					2					
CO5						3				2		

UNIT-I (15 Hrs.)

Composition and characteristics of cane juice, Cane juice extraction. Manufacturing of sugar. Deterioration of sugars during storage & transportation and its prevention, By-products of sugar industry and their utilization.

UNIT-II (15 Hrs.)

Icings and Toppings: Fondant, American frosting, Butter cream icing, royal icing, gum paste, glaze icing, marshmallow, almond paste and fudge.

UNIT III (15 Hrs.)

Chocolates: Cocoa processing, Cocoa liquor, Cocoa butter. Cocoa powder and chocolate manufacturing

Chocolate tempering and lipid crystallization, Chocolate enrobing and chocolate defects.

UNIT-IV (15Hrs.)

Classification of confectionary: Hard and soft boiled sugar confectionary; fondant, fudge, caramel, toffee butterscotch, Sugar panning, hard boiled candy.

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Recommended Books:

1. Minife B.W, 'Chocolate, Cocoa and Confectionary: Science & Technology', AVI Publishing Co., New York, 1997.
2. Mathur R.B.L., 'Handbook of Cane Sugar Technology', Oxford & IBH Publishing Co., New Delhi, 1986.
3. Faridi H., 'The Science of Cookie & Cracker Production', Chapman & Hall, UK, 1994.

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SYLLABUS 2019 BATCH ONWARDS

FOOD PACKAGING LAB XII

Subject Code: BFOTS1-504

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objectives:

1. To impart knowledge regarding testing of physico-mechanical parameters of packaging materials.
2. To familiarize students regarding different types of packaging machinery.
3. To analyze various quality parameters of different packaging materials and packaged food products.
4. To develop edible packaging for food products.
5. To create awareness regarding effect of packaging on shelf life of food products.

Course Outcomes:

1. Imparting knowledge regarding testing of physico-mechanical parameters of packaging materials.
2. Familiarizing students regarding different types of packaging machinery.
3. Analysis of various quality parameters of different packaging materials and packaged food products.
4. Development of edible packaging for food products.
5. Creating awareness regarding effect of packaging on shelf life of food products.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2					3							
CO3		2										
CO4							3				1	
CO5						2				2		

PRACTICAL

1. Testing of physical/mechanical properties of food packaging materials.
2. Testing of thermal shock resistance of glass.
3. Gas/Vacuum packaging of foods
4. To Study the effect of packaging on shelf life of food products.
5. Determination of Water Vapor Transmission Rate of Packaging Material.
6. Edible packaging of Food Samples.
7. Study of Sorption Isotherm for Food Package Design.
8. Packaged food cut-out analysis.
9. To study the operation of FFS machine.

Recommended Readings:

1. Robertson G.L., 'Food Packaging – Principles and Practice', CRC Press Taylor and Francis Group, 2012.
2. Paine F.A. and Paine H.Y., A Handbook of Food Packaging, Blackie Academic and Professional, 1992.
3. Coles R., McDowell D. and Kirwan M. J., 'Food Packaging Technology', Blackwell, 2003.

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SUGAR AND CONFECTIONARY TECHNOLOGY LAB XIII

SubjectCode:BFOTS1-505

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objective:

1. To understand the effect of different processing conditions on sugar.
2. To impart knowledge regarding instruments used for the analysis of various quality parameters of confectionary products.
3. To familiarize students with different types of packaging used for confectionary products.
4. To develop the ability to prepare various types of sugar and confectionary products.
5. To analyze sensorial attributes of various confectionary products.

Course Outcomes:

1. Understanding the effect of different processing conditions on sugar.
2. Imparting knowledge regarding instruments used for the analysis of various quality parameters of confectionary products.
3. Familiarizing students with different types of packaging used for confectionary products.
4. Developing ability to prepare various types of sugar and confectionary products.
5. Analysis of sensorial attributes of various confectionary products.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2					3							
CO3							2					
CO4			3									
CO5		3										

PRACTICAL

1. Determine the effect of heat on sugar solution and perform the thread and cold water test.
2. To study the process of inversion, melting and caramelization in sucrose.
3. Preparation of fondant, fudge and brittles.
4. Preparation of *Shakarpara* and *Chhanamurki*.
5. Preparation of candy and toffee and to perform quality assessment tests.
6. Preparation of cake decorations.
7. Collection of various types of confectionary packages.
8. Determination of sugar in confectionary product by saccharometer.
9. Determination of refractive index of sugar – solutions of different consistencies.
10. Organoleptic testing of different confectionary products.
11. Visit to sugar and confectionary industry.

Recommended Readings:

1. Raina et.al., 'Basic Food Preparation-A complete Manual', 3rd Edition, Orient Longman Pvt. Ltd., 2003.
2. Manay, S. and Shadaksharaswami, M., 'Foods: Facts and Principles', New Age Publishers, 2004.

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- 3.Beckette S.T., 'Industrial Chocolate Manufacture', Blackwell Publishing Ltd., 2009.
- 4.Minifie B.W. , 'Chocolate, Cocoa and Confectionary', Aspen Publications,1999.
5. Mohini S. and Eram R., 'Food science- Experiments and applications', 2nd Edition., CBS publishers & Distributors Pvt. Ltd.2011.

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SPICES AND FLAVOUR TECHNOLOGY

Subject Code: BFOTD1-511

L T P C
4 0 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand types, chemical composition, processing, and applications of different spices.
2. To impart knowledge regarding processing of spices.
3. To familiarize students with packaging of spices and spice products.
4. To summarize about different flavoring compounds and their stability during processing.
5. To create awareness regarding microbial contamination and insect infestation in spices and its control.

Course Outcomes:

1. Understanding types, chemical composition, processing, and applications of different spices.
2. Imparting knowledge regarding processing of spices.
3. Familiarizing students with packaging of spices and spice products.
4. Summarizing about different flavoring compounds and their stability during processing.
5. Creating awareness regarding microbial contamination and insect infestation in spices and its control.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2	3											
CO3							2					
CO4			2									
CO5		2								2		

UNIT I (15 Hrs.)

Classification & use of spices, Chemical constituents of spices, Processing of white pepper. Dehydration products of onion, garlic.

UNIT-II (15 Hrs.)

Cryomilling of spices. Spice oleoresins and spice emulsion. Packaging of spices and spice products.

Microbial contamination and insect infestation in spices and its control.

UNIT-III (16 Hrs.)

Classification of flavouring compounds. Stability of flavourings. Flavor encapsulation Processing of Cocoa and Coffee.

UNIT IV (14 Hrs.)

Processing of white pepper, cardamom, cinnamon, cloves, turmeric, ginger, fenugreek and fennel.

Recommended Books:

1. Peter K.V., 'Handbook of Spices', Woodhead Publishers, UK, 2001.
2. Pruthi, J. S., 'Spices and Condiments', NBT India, 1976.
3. Spice Statistics by Spices Board, GOI, Cochin, 2007.

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SYLLABUS 2019 BATCH ONWARDS

SPICES AND FLAVOUR TECHNOLOGY LAB XIV

SubjectCode:BFOTD1-512

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objective:

1. To impart knowledge regarding proximate composition of spices.
2. To familiarize students regarding organoleptic evaluation of flavoring compounds and their role in different food products.
3. To understand the methods used to assess quality of spices.
4. To analyze microbiological quality of spices in order to ensure their safety for human consumption.
5. To create awareness regarding adulteration of spices and their detection methods.

Course Outcomes:

1. Imparting knowledge regarding proximate composition of spices.
2. Familiarizing students regarding organoleptic evaluation of flavoring compounds and their role in different food products.
3. Understanding the methods used to assess quality of spices.
4. Analysis of microbiological quality of spices in order to ensure their safety for human consumption.
5. Creating awareness regarding adulteration of spices and their detection methods.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2			2									
CO3		2			1							
CO4							3					
CO5				3		2						

PRACTICAL

1. Determination of moisture in ground spices.
2. Determination of total ash in spices.
3. Determination of extraneous matter in spices.
4. Determination of pungency rating (Scoville method) in Red Pepper.
5. Adulteration tests for different spices.
6. Organoleptic evaluation of flavours.
7. Identification of Saffron by sulphuric – diphenylamine test.
8. To evaluate microbiological quality of spices.

Recommended Books:

1. Peter K.V., 'Handbook of Spices', Woodhead Publishers, UK,2001.
2. Pruthi, J. S., 'Spices and Condiments', NBT India,1976.
3. Spice Statistics by Spices Board, GOI, Cochin,2007.

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TECHNOLOGY OF OILS AND FATS

Subject Code: BFOTD1-513

L T P C
4 0 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the basics of fats and oils.
2. To impart knowledge regarding processing of fats and oils.
3. To familiarize students with deteriorative changes in fats and oils.
4. To analyze physico-chemical properties of fats and oils.
5. To create awareness about nutritional importance of oils and fats.

Course Outcomes:

1. Understanding the basics of fats and oils.
2. Imparting knowledge regarding processing of fats and oils.
3. Familiarizing students with deteriorative changes in fats and oils.
4. Analyzing physico-chemical properties of fats and oils.
5. Creating awareness about nutritional importance of oils and fats.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2			2								1	
CO3		2										1
CO4						3						
CO5							2			2		

UNIT-I (14 Hrs.)

Introduction to oils and fats, Physical and chemical properties of fats and oils, Nutritional importance of oils and fats.

UNIT-II (16 Hrs.)

Source and physico-chemical properties of following oils:

- a) Animal – Butter oil, lard and tallow.
- b) Plant – Groundnut, Sunflower, Soybean and Coconut oil.

Extraction of oils/fats.

Problems during storage – rancidity, reversion.

UNIT-III (15 Hrs.)

Refining: degumming, choice of alkali, batch and continuous refining.

Bleaching: choice of adsorbent, batch and continuous bleaching.

Deodorization: process parameters: batch and continuous processing

UNIT-IV (15 Hrs.)

Hydrogenation of oils: mechanism, process parameters and batch processing. Fractionation and winterization of oils.

Alternative processing methods: PCT (physical cleaning techniques)

Recommended Books:

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1. Meyer L.H., 'Food Chemistry', CBS Publisher, New Delhi, 2006.
Potter N. N. 'Food Science', 5th Edition, CBS Publisher, New Delhi, 2006
2. Lawson H., 'Food Oils & Fats: Technology, Utilization and Nutrition', CBS Publisher, New Delhi, 1995.

TECHNOLOGY OF OILS AND FATS XV

Subject Code: BFOTD1-514

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objectives:

1. To familiarize students with physico-chemical properties of fats and oils.
2. To impart knowledge regarding various quality indices of fats and oils.
3. To understand organoleptic properties of fats and oils for their appropriate use in food products.
4. To analyze extent of rancidity in fats and oils using appropriate tests.
5. To create awareness regarding adulteration of fats and oils and detection techniques.

Course Outcomes:

1. Familiarizing students with physico-chemical properties of fats and oils.
2. Imparting knowledge regarding various quality indices of fats and oils.
3. Understanding organoleptic properties of fats and oils for their appropriate use in food products.
4. Analyzing the extent of rancidity in fats and oils using appropriate tests.
5. Creating awareness regarding adulteration of fats and oils and detection techniques.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3					2						
CO3			2				1					
CO4		3			2							
CO5							2			2		

PRACTICAL

1. To determine moisture content of oilseed.
2. To determine FFA of oil.
3. Determination of Iodine Value, R.M. Value and Polenske Value.
4. To determine Saponification value, anisidine value and peroxide value of oil.
5. Determination of melting point of fats.
6. Detection of sesame oil in vanaspati by furfural test.
7. Detection of adulteration with mineral oil, Cotton seed oil or Groundnut oil.
8. Organoleptic evaluation of fats and oils.
9. To carry out refining and bleaching of oil in lab.
10. To estimate colour of oil.
11. Visit to vegetable oils industry.

SEMESTER SIXTH

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SYLLABUS 2019 BATCH ONWARDS

FOOD ENGINEERING

SubjectCode:BFOTS1-601

L T P C
3 1 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To familiarize the students with fundamental concepts and terminology of food engineering.
2. To understand the basic principles, processes and components of material and energy balances.
3. To impart knowledge regarding principles of fluid flow, types of fluids, and equations involved.
4. To develop an ability for an appropriate selection of pump for different types of fluids.
5. To interpret data using psychrometry and utilize this information for developing appropriate storage and processing conditions for different products.

Course Outcomes:

1. Familiarizing the students with fundamental concepts and terminology of food engineering.
2. Understanding the basic principles, processes and components of material and energy balances.
3. Imparting knowledge regarding principles of fluid flow, types of fluids, and equations involved.
4. Developing an ability for an appropriate selection of pump for different types of fluids.
5. Interpretation of data using psychrometry and utilizing this information for developing appropriate storage and processing conditions for different products.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2						2						
CO3	2				1							
CO4												2
CO5			2		2							

UNIT I (15 Hrs.)

Fundamental Concepts and Definitions: Dimensions and units, thermodynamic systems (closed, open and isolated), intensive and extensive properties, equilibrium state, density, specific volume, specific weight, specific heat, enthalpy, entropy, pressure, temperature scales.

UNIT II (15 Hrs.)

Material Balances: Basic principles, process flow diagrams, total mass balance, component mass balance.

Energy Balances: Basic principles, energy terms, specific heat of solids and liquids, properties of saturated and superheated steam, heatbalances.

UNIT III (15 Hrs.)

Fluid Flow Principles: Fluid statics and dynamics, mass balance and energy balance, Bernoulli's equation, concept of viscosity, Newtonian and non-Newtonian fluids, streamline and turbulent flow, Reynold's number, Selection of pumps

UNIT IV (15 Hrs.)

Psychrometrics: Properties of dry air: composition of air, specific heat of dry air, enthalpy of

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dry air, dry bulb temperature, Wet bulb temperature, Relative humidity, Dew point temperature.

Recommended Readings:

1. Rao C.G., 'Essentials of Food Process Engineering'. B S publications, 2006
2. Rao D.G., 'Fundamentals of Food Engineering', PHI learning private Ltd., 2010.
3. Singh R.P. and Heldman D.R., Introduction to Food Engineering, 2nd, 3rd and 4th Edition, Academic press, 1993, 2003, 2009.
4. Fellow P., Food Processing Technology, 1988.

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FOOD AND NUTRITION

Subject Code: BFOTS1-602

L T P C
3 1 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the concept, terminology, and importance of food and nutrition.
2. To familiarize students with different methods of cooking, their effects on properties of foods, merits and demerits.
3. To impart knowledge regarding global trends, nutritional labeling, codex-, and FSSAI guidelines.
4. To develop an ability to plan meals addressing specific needs of society.
5. To create awareness regarding micro-, and macro nutrients present in food in terms of their sources, role, RDA and deficiency.

Course Outcomes:

1. Understanding the concept, terminology, and importance of food and nutrition.
2. Familiarizing the students with different methods of cooking, their effects on properties of foods, merits and demerits.
3. Imparting knowledge regarding global trends, nutritional labeling, codex-, and FSSAI guidelines.
4. Developing an ability to plan meals addressing specific needs of society.
5. Creating awareness regarding micro-, and macro nutrients present in food in terms of their sources, role, RDA and deficiency.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2			3									1
CO3							1			2		
CO4						3						
CO5	1					2						

UNIT I (15 Hrs.)

Introduction to food and nutrition: Basic terms used in study of food and nutrition, BMI and nutritional status, understanding relationship between food, nutrition and health. Balanced diet Functions of food-physiological, psychological and social, concept of balanced diet, Food Groups, Food Pyramid.

UNIT II (16 Hrs.)

Nutrients: Classification, digestion, functions, dietary sources, RDA, clinical manifestations of deficiency and excess and factors affecting absorption of the following in brief: Energy, Carbohydrates, lipids and proteins, Fat soluble vitamins-A, D, E and K, Water soluble vitamins – thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C
Minerals – calcium, iron, iodine, fluorine, copper and zinc

UNIT III (14Hrs.)

Concepts of Meal planning: Factors affecting meal planning, understanding specific considerations for planning meal for different groups of people (Infants, Toddler, Adolescents, Adults, Old age and pregnant women)

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UNIT IV (15 Hrs.)

Methods of cooking: Dry, moist, frying and microwave cooking, Advantages, disadvantages and the effect of various methods of cooking on foods. Nutritional labeling.

Importance, global trends, codex guidelines, nutritional labelling in India, FSSAI guidelines.

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SYLLABUS 2019 BATCH ONWARDS

Recommended Readings

1. Bamji M.S., Krishnaswamy K. and Brahman G.N.V., 'Textbook of Human Nutrition', 3rd Edition, Oxford and IBH Publishing Co. Pvt. Ltd.,2009.
2. Srilakshmi 'Food Science', 4th Edition, New Age International Ltd.,2007.
3. Srilakshmi, 'Dietetics', Revised 5th Edition. New Age International Ltd.,2005.
4. Wardlaw M.G. and Paul M Insel Mosby, 'Perspectives in Nutrition', 3rd Edition,1996.
5. Codex Guidelines on Nutrition Labelling (CAC/GL 2_1985) (Rev.1_1993). Rome, Food and Agriculture Organisation of the United Nations / World Health Organisation,1993.
6. Food Safety and Standards Authority of India portal, Government of India
7. Gopalan C., 'Nutritive Value of Indian Foods', NIN, ICMR,1990.
8. Seth V. and Singh K., 'Diet planning through the Life Cycle: Part 1. Normal Nutrition.A
9. Practical Manual., 4th Edition, Elite Publishing House Pvt. Ltd.,2005.

SENSORY EVALUATION OF FOOD

Subject Code: BFOTD1-611

L T P C
4 0 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the structure and physiology of taste organs, and mechanism of taste perception.
2. To impart knowledge regarding sensory evaluation of different quality attributes of foods and their significance.
3. To familiarize students with taste-, olfactory-, and color abnormalities.
4. To analyze taste, odor, color, and texture of food products using different techniques.
5. To summarize different types of equipments involved in evaluation of sensory attributes of food products.

Course Outcomes:

1. Understanding the structure and physiology of taste organs, and mechanism of taste perception.
2. Imparting knowledge regarding sensory evaluation of different quality attributes of foods and their significance.
3. Familiarizing students with taste-, olfactory-, and color abnormalities.
4. Analyzing taste, odor, color, and texture of food products using different techniques.
5. Summarizing different types of equipments involved in evaluation of sensory attributes of food products.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2							2			1		
CO3				3								
CO4					3							
CO5					3							

UNIT I (16 Hrs.)

Taste: Introduction and importance of taste, Structure and physiology of taste organs- tongue, papillae, taste buds, salivary glands, Mechanism of taste perception

Chemical dimensions of basic tastes: sweet, salt, sour, bitter and umami

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SYLLABUS 2019 BATCH ONWARDS

Factors affecting taste quality, reaction time, taste modification, absolute and recognition of threshold taste abnormalities.

Taste measurement

UNIT II (15 Hrs.)

Odour: Introduction, definition and importance of odour and flavor, Anatomy of nose, physiology of odour perception, Mechanism of odour perception

Odour classification, chemical specificity of odour.

Odour measurement using different techniques – primitive to recent techniques. Merits and demerits of each method. Olfactory abnormalities.

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SYLLABUS 2019 BATCH ONWARDS

UNIT III (16 Hrs.)

Colour: Introduction and importance of colour.

Dimensions of colour and attributes of colour, appearance factors, gloss etc.

Perception of colour, Colour abnormalities

Measurement of colour; Munsell colour system, CIE colour system, Hunter colour system, spectrophotometry and colorimetry etc.

UNIT IV (13 Hrs.)

Texture: Introduction, definition and importance of texture

Phases of oral processing

Texture perception, receptors involved in texture perception

Texture classification

Texture measurement – basic rheological models, forces involved in texture measurement.

Recommended Readings

1. Rao E. S., 'Food Quality Evaluation', Variety Books, 2013.
2. Amerine P. and Roessler, 'Principles of Sensory Evaluation of Food', Academic Press, London, 1965.
3. Meilgard D., 'Sensory Evaluation Techniques', 3rd Edition. CRC Press LLC, 1999.
4. Man J., 'Principles of Food Chemistry', 3rd Edition., Springer, 2007.
5. Brannen and et al., 'Food Additives', Marcel Dekker, New York, 1990.

SENSORY EVALUATION OF FOOD LAB XVI

Subject Code: BFOTD1-612

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objectives:

1. To impart knowledge regarding training of sensory panel.
2. To perform different analytical tests for sensory evaluation of food.
3. To measure quality attributes of various food products.
4. To create awareness regarding sensory attributes of food products and their importance.
5. To evaluate different quality parameters of food products using instruments.

Course Outcomes:

1. Imparting knowledge regarding training of sensory panel.
2. Performing different analytical tests for sensory evaluation of food.
3. Measuring quality attributes of various food products.
4. Creating awareness regarding sensory attributes of food products and their importance.
5. Evaluation of different quality parameters of food products using instruments.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2				2								
CO3					2							
CO4							2			1		
CO5					3							

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PRACTICAL

1. Training of sensory panel.
2. To perform recognition and sensitivity tests for four basic tastes.
3. To perform analytical tests of sensory evaluation.

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SYLLABUS 2019 BATCH ONWARDS

4. Recognition tests for various food flavors, flavor defects in milk.
5. Sensory evaluation of milk and milk products.
6. Texture evaluation of various food samples- crispier/ cookies/ biscuits/ snack foods
7. Measurement of colour by using Tintometer/ Hunter Color Labetc.
8. Qualitative tests for hydrogenated fats, butter, ghee
9. Platform tests for milk
10. Quality evaluation of various food stuffs- cereals, pulses, honey, jaggery, sugar, tea, coffee etc.

Recommended Readings

1. Rao E. S., 'Food Quality Evaluation', Variety Books, 2013.
2. Amerine P. and Roessler, 'Principles of Sensory Evaluation of Food', Academic Press, London, 1965.
3. Meilgard 'Sensory Evaluation Techniques', 3rd Edition. CRC Press LLC, 1999.
4. deMan J., 'Principles of Food Chemistry', 3rd Edition., Springer, 2007.
5. Brannen and et al., 'Food Additives', Marcel Dekker, New York, 1990.

FOOD PLANT LAYOUT

Subject Code: BFOTD1-613

L T P C
4 0 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the concept of layout designing and its importance.
2. To impart knowledge regarding factors to be considered for selection of site for setting up a plant.
3. To familiarize the students with considerations for selection of material, process, and machinery.
4. To summarize the importance of management in setting up a plant.
5. To create awareness regarding layout symbols.

Course Outcomes:

1. Understanding the concept of layout designing and its importance.
2. Imparting knowledge regarding factors to be considered for selection of site for setting up a plant.
3. Familiarizing the students with considerations for selection of material, process, and machinery.
4. Summarizing the importance of management in setting up a plant.
5. Creating awareness regarding layout symbols.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2		2										
CO3					2							
CO4							2			1		
CO5										2		

UNIT-I (15 Hrs.)

Plant design concepts and general design considerations

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SYLLABUS 2019 BATCH ONWARDS

Plant Layout problems, Importance and Objectives

Advantages of a good layout

UNIT-II (15 Hrs.)

Plant location: location factors and their interaction with plant location, Importance of a plant layout selection of site and layouts of different food industries.

UNIT-III (15 Hrs.)

Selection of building material, selection and planning of manufacturing process and service facilities. Process selection; process flow charts, selection of equipment and machinery; maintenance and replacement, depreciation of machinery

UNIT IV (15 Hrs.)

Management set up in a plant. Plant layout, layout symbols.

Recommended Books:

1. Marriott, 'Principle of Food Sanitation', 5th Edition, CBS Publishers, New Delhi, 2006.
2. Green J.H. and Kramer A., 'Food Processing Waste Management', AVI Publishers, USA., 1979.
3. Potter N. N., 'Food Science', 5th Edition., CBS Publishers, New Delhi, 2006.
4. Sharma S.C., 'Plant Layout and Material Handling', 3rd Edition Khanna Publishers, 2000.
5. James M. M., 'Plant layout & design', Collier Macmillan Ltd., 1962

FOOD PLANT LAYOUT LAB XVII

Subject Code: BFOTD1-614

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objectives:

1. To impart knowledge regarding preparation of process diagrams for different food products.
2. To familiarize students with calculation of cost in relation to designing, processing, and depreciation.
3. To understand the factors to be considered while designing the layout and process diagrams of different manufacturing units.
4. To develop an ability to prepare layout for manufacturing plants of different food products.
5. To create awareness regarding depreciation of machinery and processing.

Course Outcomes:

1. Imparting knowledge regarding preparation of process diagrams for different food products.
2. Familiarizing students with calculation of cost in relation to designing, processing, and depreciation.
3. Understanding the factors to be considered while designing the layout and process diagrams of different manufacturing units.
4. Developing an ability to prepare layout for manufacturing plants of different food products.
5. Creating awareness regarding depreciation of machinery and processing.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2											
CO2											2	
CO3	2						1					

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CO4	2			1								
CO5					2							

PRACTICAL

1. Preparation of layout and process diagram of potato crisp manufacturing plant.
2. Preparation of layout and process diagram of Jam/Marmalade manufacturing plant.
3. Preparation of layout and process diagram of Bread making plant.
4. Preparation of layout and process diagram of a dairy industry.
5. Preparation of layout and process diagram of wine making unit.
6. Preparation of layout and process diagram of a modern slaughter house.
7. Preparation of layout and process of diagram of a confectionary unit.
8. Calculation of depreciation of machinery and processing costs.

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SYLLABUS 2019 BATCH ONWARDS

FOOD SAFETY

Subject Code: BFOTD1-621

L T P C
4 0 0 4

Duration: 60(Hrs.)

Course Objectives:

1. To understand the concept of food safety, factors involved, and its importance.
2. To impart knowledge regarding importance of hygiene and sanitation in food service establishments and ways to ensure the same.
3. To familiarize students with Indian food regulatory regime and Global Scenario.
4. To develop an ability of hazard management and ensuring food safety.
5. To create awareness regarding emerging pathogens, and recent advancements in food production, processing, and safety.

Course Outcomes:

1. Understanding the concept of food safety, factors involved, and its importance.
2. Imparting knowledge regarding importance of hygiene and sanitation in food service establishments and ways to ensure the same.
3. Familiarizing students with Indian food regulatory regime and Global Scenario.
4. Developing an ability of hazard management and ensuring food safety.
5. Creating awareness regarding emerging pathogens, and recent advancements in food production, processing, and safety.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	2						1					
CO3										1		
CO4		1					2					
CO5				1		2						

UNIT I (15 Hrs.)

Introduction to Food Safety

Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods

Food Hazards of Physical and Chemical and Microbiological origin, Management of hazards, Need, Control of parameters, Temperature control and Food storage

UNIT II (14 Hrs.)

Hygiene and Sanitation in Food Service Establishments

Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control and Personnel Hygiene

UNIT III (16 Hrs.)

Food laws and Standards

Indian Food Regulatory Regime, Global Scenario and Other laws and standards related to food safety (FSSAI, AGMARK, FPO, MFPO, MPO, BIS AND ISO)

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SYLLABUS 2019 BATCH ONWARDS

UNIT IV (15 Hrs.)

Recent concerns

New and Emerging Pathogens, Genetically modified foods\Transgenics, Organic foods and newer approaches to food safety

Recommended Readings

1. Lawley R., Curtis L. and Davis J., 'The Food Safety Hazard Guidebook', RSC publishing, 2004.
2. De Vries, 'Food Safety and Toxicity', CRC, New York,1997'
3. Marriott, N. G., 'Principles of Food Sanitation', AVI, New York,1985.
4. Forsythe, S. J., 'Microbiology of Safe Food', Blackwell Science, Oxford,2000.

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SYLLABUS 2019 BATCH ONWARDS

5. Forsythe S. J., 'The Microbiology of Safe Food', 2nd Edition, Wiley- Blackwell, U.K., 2010.
6. Mortimore S. and Wallace C. 'HACCP, A practical approach', Chapman and Hill, London, 1995.
7. Clive de Blackburn and Peter McClure., Foodborne Pathogens Woodhead Publishing, 2009.

FOOD SAFETY LAB XVIII

Subject Code: BFOTD1-622

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objectives:

1. To familiarize students with different types of media preparations used in microbiology.
2. To identify type of microbes present using different microbiological techniques.
3. To impart knowledge regarding microbiological contamination of water and its analysis.
4. To develop an ability for microbiological examination of food samples and interpretation of data.
5. To create awareness regarding types of hazards, importance of hygiene and sanitation and ways for their assessment.

Course Outcomes:

1. Familiarizing students with different types of media preparations used in microbiology.
2. Identifying type of microbes present using different microbiological techniques.
3. Imparting knowledge regarding microbiological contamination of water and its analysis.
4. Developing an ability for microbiological examination of food samples and interpretation of data.
5. Creating awareness regarding types of hazards, importance of hygiene and sanitation and ways for their assessment.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2					3							
CO3		3										
CO4				2								
CO5	2						2					

PRACTICAL

1. Preparation of different types of media (complex, differential and selective)
2. Enumeration of aerial microflora using PDA
3. Identification of Molds by lactophenol bluestaining
4. Negative Staining
5. Microbiological Examination of food
6. Bacteriological Analysis of Water by MPN method
7. Assessment of surface sanitation by swab and rinse method
8. Assessment of personal hygiene
9. Detection of Physical and chemical hazards in food.
10. Determination of coliforms in water

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Recommended Readings

1. Lawley R., Curtis L. and Davis J., 'The Food Safety Hazard Guidebook', RSC publishing, 2004.
2. De Vries, 'Food Safety and Toxicity', CRC, New York, 1997.
3. Marriott, N. G., 'Principles of Food Sanitation', AVI, New York, 1985.
4. Forsythe, S. J., 'Microbiology of Safe Food', Blackwell Science, Oxford, 2000.

MRSPTU B.Sc. (FOOD SCIENCE & TECHNOLOGY)/B.F.S.T (Hons.)

SYLLABUS 2019 BATCH ONWARDS

5. Forsythe S. J., 'The Microbiology of Safe Food', 2nd Edition, Willey- Blackwell, U.K., 2010.
6. Mortimore S. and Wallace C. 'HACCP, A practical approach', Chapman and Hill, London, 1995.
7. Clive de Blackburn and Peter McClure., Foodborne Pathogens Woodhead Publishing, 2009.

FOOD QUALITY MANAGEMENT

Subject Code: BFOTD1-623

L T P C

Duration: 60(Hrs.)

4 0 0 4

Course Objectives:

1. To understand the concept of quality and its importance in agri-food production chain.
2. To familiarize students with quality management systems in India and their role in quality control and assurance.
3. To impart knowledge regarding different types of ingredients and processing techniques involved in food production.
4. To analyze chemical, technological and toxicological aspects of different types of food additives used in food industry.
5. To create awareness regarding contamination of food, its sources and control.

Course Outcomes:

1. Understanding the concept of quality and its importance in agri-food production chain.
2. Familiarize the students with quality management systems in India and their role in quality control and assurance.
3. Imparting knowledge regarding different types of ingredients and processing techniques involved in food production.
4. Analyzing chemical, technological and toxicological aspects of different types of food additives used in food industry.
5. Creating awareness regarding contamination of food, its sources and control.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2	1					
CO2	3											
CO3	1				2							
CO4				3								
CO5		2										

UNIT I (15 Hrs.)

Introduction to food quality management – Definition of quality, quality concepts, quality perception, quality attributes.

Concepts of quality management: Objectives, importance and functions of quality control and quality assurance; Quality management systems in India

Quality in the Agri- food production chain-Techno- managerial approach, food quality relationship and food quality management functions. Dynamics on the agri- food production chain, core developments in food quality management.

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UNIT II (15 Hrs.)

Contamination in Food: Physical, chemical contaminants (heavy metals, pesticide residues, antibiotics, agrochemicals, veterinary drug residues, environmental pollutants, radionuclides, solvent residues, chemicals) and Natural toxins.

UNIT III (15 Hrs.)

Chemical, technological and toxicological aspects

Risk assessment studies: Safety and quality evaluation of additives and contaminants, Acute and chronic studies. Introduction, need of food additives in food processing and preservation, Characteristics and classification of food additives.

Antimicrobial agents. -Nitrites, sulphides, sulphur dioxide, sodium chloride, hydrogen peroxide.

UNIT IV (15 Hrs.)

High fructose corn syrup, cryogenic freezing, supercritical fluid extraction, fat mimetics, flavour encapsulation, use of nano technology in foods etc.

Recommended Readings

1. Pieterneel A, L. and Willem J. M., 'Food Quality Management Technological and Managerial principles and practices', Wageningen, 2009.
2. Brannen and et al., 'Food Additives', Marcel Dekker, New York, 1990.
3. Jones J. M., 'Food Safety', Eagan Press, 1992.
4. Shapton D.A. and Shapton N.F., 'Principles and Practices for the safe processing of Foods' CRC Press, 1998.
5. DeMan, 'Principles of Food Chemistry', 3rd edition, Springer, 2007.

FOOD QUALITY MANAGEMENT LAB XIX

Subject Code: BFOTD1-624

L T P C
0 0 4 2

Duration: 30(Hrs.)

Course Objectives:

1. To familiarize students with qualitative estimation of different food components in various food stuffs.
2. To conduct quality inspection of different food stuffs.
3. To analyze different food components quantitatively.
4. To implement GMP and HACCP in food industry.
5. To evaluate different food contaminants in food stuffs.

Course Outcomes:

1. Familiarizing students with qualitative estimation of different food components in various food stuffs.
2. Conducting quality inspection of different food stuffs.
3. Analyzing different food components quantitatively.
4. Implementing GMP and HACCP in food industry.
5. Evaluating different food contaminants in food stuffs.

MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2					1						
CO2				2								
CO3	2		1									
CO4					3							
CO5		3										

PRACTICAL

1. Qualitative tests for hydrogenated fats, butter, and ghee.
2. Quality inspection of various food stuffs- cereals, pulses, spices and condiments etc.
3. Estimation of sulphur dioxide in foods
4. Chromatographic estimation of colour.
5. Analysis of edible common salt for moisture content, MIW and total chlorides.
6. Estimation of ammonia nitrogen in water.

7. Estimation of benzoic acid/ sorbic acid in foods.
8. To implement HACCP plan in particular phases of food chain.
9. To evaluate various processes in food plant for implementation of GMP.
10. Determination of insecticides in given food samples.
11. Determination of heavy metals in food samples.

Recommended Readings

1. Pieterse A. L. and Willem J. M., 'Food Quality Management Technological and Managerial principles and practices', Wageningen, 2009.
2. Brannen and et al., 'Food Additives', Marcel Dekker, New York, 1990.
3. Jones J. M., 'Food Safety', Eagan Press, 1992.
4. Shapton D.A. and Shapton N.F., 'Principles and Practices for the safe processing of Foods' CRC Press, 1998.
5. DeMan, 'Principles of Food Chemistry', 3rd edition, Springer, 2007