Revised B.Sc Part II Food Processing and Packaging (CBCS) Syllabus w. e. f. June 2019

1. Structure of Course: B.Sc II Semester III

YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE ,SATARA									
COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)									
B. Sc. FOOD PROCESSNG AND PACKAGING (ENTIRE)									
B. Sc. II SEMESTER – III (Duration – 6 Months)									
Paper No.	Course Code	Name of the Course	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Course Code	No. of lectures	Hours	Credits
1	BFPT - 301	Processing of fruits and vegetables	3	2.4	2	Lab IX BFPP -307 Processing of Fruits, Vegetables , Cereals and Pulses	8	6.4	4
2	BFPT - 302	Processing of Cereals and pulses	3	2.4	2				
3	BFPT - 303	Processing of Milk and milk products	3	2.4	2	Lab X BFPP -308 Processing of Milk and Milk products and Processing of Meat and Poultry	8	6.4	4
4	BFPT - 304	Processing of Meat and poultry	3	2.4	2				
5	BFPT - 305	Processing of Sea foods	3	2.4	2	Lab XI BFPP - 309 Processing of Sea Food Products and Packaging-I	8	6.4	4
6	BFPT - 306	Food packaging-I	3	2.4	2				
7	AECC-3	Environmental science	3	2.4	2		---	--	
	Total of SEM III		**21**	**16.8**	**14**		**24**	**19.2**	**12**

B.Sc.-II (SEMESTER – IV)

YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE,SATARA									
COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)									
B. Sc. FOOD PROCESSNG AND PACKAGING (ENTIRE)									
B. Sc. II SEMESTER – IV (Duration – 6 Months)									
Paper No	**Course Code**	**Name of the Course**	**TEACHING SCHEME**						
			Theory			**Practical**			
			No. of lectures	**Hours**	**Credits**	**Course Code**	**No. of lectures**	**Hours**	**Credits**
1	BFPT - 401	Processing of Bakery products	3	2.4	2	Lab XII BFPP - 407 Processing of Bakery and Confectionary products	8	6.4	4
2	BFPT - 402	Processing of Confectionary products	3	2.4	2				
3	BFPT - 403	Processing of oil seeds and fats	3	2.4	2	Lab XIII BFPP -408 Processing of oil seed, fats and Plantation crops, spices	8	6.4	4
4	BFPT - 404	Processing of Plantation crops and spices	3	2.4	2				
5	BFPT - 405	Food biochemistry	3	2.4	2	Lab XIV BFPP -409 Biochemistry and Food packaging II	8	6.4	4
6	BFPT - 406	Food packaging II	3	2.4	2				
7	AECC-4	Environmental science	3	2.4	2		---	--	
	Total of SEM IV		**21**	**16.8**	**14**		**24**	**19.2**	**12**
	Total of The Year		42	33.6	28		**48**	**28.4**	**24**

Titles of Papers

Sr No	Semester - II	Semester – IV
1	BFPT - 301 Processing of fruits and vegetables	BFPT - 401 Processing of Bakery products
2	BFPT - 302 Processing of Cereals and pulses	BFPT - 402 Processing of Confectionary products
3	BFPT - 303 Processing of Milk and milk products	BFPT - 403 Processing of oil seeds and fats
4	BFPT - 304 Processing of Meat and poultry	BFPT - 404 Processing of Plantation crops and spices
5	BFPT - 305 Processing of Sea foods	BFPT - 405 Food biochemistry
6	BFPT - 306 Food packaging I	BFPT – 406 Food packaging II
7	BFPT – AECC 3 Environmental science	BFPT – AECC 4 Environmental science
8	BFPP - 308 Processing of Fruits, Vegetables, Cereals and Pulses	BFPP - -408 Processing of Bakery and Confectionary products
9	BFPP -309 Processing of Milk and Milk products and Processing of Meat and Poultry	BFPP - -409Processing of oil seed, fats and Plantation crops, spices
10	BFPP -310 Processing of Sea Food Products and Packaging-I	BFPP - -410Biochemistryand Food packaging II

Evaluation Scheme

Semester III

Course Code	ESE	Internal Exam		Course Code	Practical		Internal Evaluation	
		ISE-I	ISE-II		Exam	Journal	Survey / Educational Tour/Seminar	Day to day Performance
BFPT -301	30	5	5	BFPP -308	50	10	05	05
BFPT -302	30	5	5					
BFPT - 303	30	5	5	BFPP -309	50	10	05	05
BFPT -304	30	5	5					
BFPT - 305	30	5	5	BFPP -310	50	10	05	05
BFPT - 306	30	5	5					
BFPT - AECC -307								
Total of SEM II	180	30	30		150	30	15	15
	450							

Semester IV

Course Code	ESE	Internal Exam		Course Code	Practical		Internal Evaluation	
		ISE-I	ISE-II		Exam	Journal	Survey / Educational Tour/Seminar	Day to day Performance
BFPT -401 T	30	5	5	BFPP -407	50	10	05	05
BFPT - 402	30	5	5					
BFPT - 403	30	5	5	BFPP -408	50	10	05	05
BFPT - 404	30	5	5					
BFPT - 405	30	5	5	BFPP -409	50	10	05	05
BFPT –406	30	5	5					
AECC -4								
Total of SEM II	180	30	30		150	30	15	15
Total of year	**TOTAL OF MARKS FOR SEMESTER III+ IV: 900 Without AECC-3 & 4**							

B.Sc.-II (SEMESTER – III)
BFPT 301: PROCESSING OF FRUITS AND VEGETABLES
Theory: 45 Credits: 2

Course Objective: Students should:

1. Know classification and composition of fruits and vegetables.
2. Understand the process and defects of jam, jelly, and marmalade
3. Understand the process and preservation of different types of fruits and vegetables juices.
4. Understand the process tomato products.

Unit I: Introduction of Fruits and Vegetables (11 Lectures)

Classification and composition of fruits and vegetables, Climacteric and no-climacteric fruits; Post harvest handling, precooking, methods, post harvest treatments. Storage of fresh Fruits and Vegetables–Ambient, Refrigerated, Modified atmosphere, evaporative cool storage

Unit II: Jams, Jellies and Marmalades (11 Lectures)

Introduction**,** Jam: Constituents, selection of fruits, processing and technology**,** Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing and technology, defects in jelly, Marmalade: Types, processing and technology, defects.

Unit III: Fruits Beverage: (12 Lecture)

Introduction, Processing of fruit juices, Preservation of fruit juices: pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation, processing of RTS, processing of squashes, cordials, nectars, concentrates and powder.

Unit IV: Tomato Products and Potato Products (11 Lecture)

Introduction, Preparation of tomato juice, Soup, Preparation of tomato puree, Ketchup .Important consideration in potato processing, Potato chips, French fries.

Recommended Books:

1. **Preservation of fruits and vegetables: principles and practices** Dr.Shrivastav and Dr. Sa**njeev** kumar, Hardback Published, 2002.
2. **Preservation of Fruits and Vegetables** Girdhari Lal, Siddhapa and Tondon,New Delhi : Publications and Information Division, Indian Council of Agricultural Research, 2011.
3. **Fruit and Vegetable Processing**, Sri S. Chenna Kesava Reddy, Acharya NG Ranga Agricultural University.
4. **Fruit and Vegetables Harvesting, Handling and Storage**, A. K. Thompson, Blackwell Publishing Ltd,2003.
5. **Handbook of Fruits and Fruit Processing**, Editor Y. H. Hui Associate Editors J´ozsef Barta, M. Pilar Cano, Todd W. Gusek, Wiley-Blackwell publisher, 2006.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Explain the classification and composition of fruits and vegetables.
2. Understand the postharvest treatment, methods and storage of fruits and vegetables

Unit II: After completion of the unit, Students are able to:

1. Understand the processing of jam, jellies and marmalades.
2. Understand the various defects in process and technology.

Unit III: After completion of the unit, Students are able to:

1. Understand the types, process and preservation of fruit juices.
2. Understand the processing of RTS, squashes, cordials, nectars, concentrates and powder.

Unit IV: After completion of the unit, Students are able to:

1. Understand the processing of tomato products.
2. Understand the important consideration in potato processing.

BFPT 302: PROCESSING OF CEREALS AND PULSES
Theory: 45 Credits: 2

Course Objective: Students should:

1. Know structure and composition of cereals and pulses.
2. Understand the different types of milling processes and different by products.
3. Know the barley malting process and study of different types of malts.
4. Understand the different types of improved milling methods of pulses.

Unit I: Wheat Processing (11 Lectures)

Structure and chemical composition of wheat grain, Criteria of wheat quality – physical and chemical factors. Wheat milling – general principles and operations, cleaning, conditioning and roller mill system. Flour extraction rates and various flour grades and types, Criteria of flour quality, dough rheology and its measurement

Unit II: Rice Processing (11 Lectures)

Structure and chemical composition of rice grain, Milling of rice– types of rice mill; huller millR1, Sheller-cum-cone polisher mill; Modern rice milling unit operation dehusking, paddy separation, polishing and grading; Factors affecting rice yield during milling; rice bran as rice milling byproducts , Rice parboiling technology.

Unit III: Corn Processing (12 Lectures)

Structure and composition of corn grain, different types of corn. Wet and dry milling of corn, and their products, Corn sweeteners (high fructose corn syrups) and their uses. Barley malting process: steeping, germination and drying; significance of malting; Different types of malts and their food applications.

Unit IV: Pulses Processing (11 Lectures)

Structure, and composition of pulses, Toxic constituents in pulses, Processing of pulses, soaking , germination, decortications, cooking and fermentation, Milling of pulses- Dry milling, Wet milling, Improved milling methods.

RECOMMENDED BOOKS:

1. **Post Harvest Technology of Cereals, Pulses and Oilseeds,** A.Chakraverty, Oxford and IBH Publishing Company, 2014.
2. **Cereal Processing Technology,** Gavin Owens, WoodHead Publishing Ltd, 2000.
3. **Food Science,** B. Srilakshmi, New Age International Pvt Ltd Publisher 7th Edition, 2018.
4. **Modern rice milling**, http://milltecmachinery.com/wp-content/uploads/2018/07/rice-milling.pdf

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the structure and composition of cereals and pulses.
2. Understand the criteria for flour quality, milling methods of wheat.

Unit II: After completion of the unit, Students are able to:

1. Understand the structure and chemical composition, types and milling of rice.
2. Understand the parboiling technology of rice.

Unit III: After completion of the unit, Students are able to:

1. Understand the structure and chemical composition wet and dry milling methods of corn.
2. Understand the barley malting process and study of different types of malts.

Unit IV: After completion of the unit, Students are able to:

1. Understand the structure and chemical composition, toxic constituents of pulses.
2. Understand the different types of improved milling methods of pulses.

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BFPT 303: PROCESSING OF MILK AND MILK PRODUCTS
Theory: 45 Credits: 2

Course Objective: Students should:

1. Know the present status and scope of dairy industry in india and its layout.
2. Understand the composition, food value and processing of milk.
3. Understand the processing of different milk products such as cream, butter ,cheese.
4. Know the byproducts of milk and its utilization.

Unit I: Introduction of Dairy Industry (11 Lectures)

Development of milk processing industry in India- present status and scope, Dairy layout for small scale industry, sanitation layout, dairy equipments and sanitation.

Unit II: Introduction of Milk and Primary Processes (11 Lectures)

Food value and Composition of milk. Factors affecting Composition of milk, Buying, receiving, collection, Transportation of milk, storage and distribution of milk, processing of milk, filtration, clarification, cream separation and heat, Treatment of milk.

Unit III: Different Milk Products (12 Lectures)

Milk product Processing – Cream, Butter , Khoa, Paneer, Ice-cream Condensed milk and evaporated milk, Judging and grading of milk and its products, Manufacturing of Cheddar cheese – Introduction, Manufacturing process, packaging, storage, defects and their prevention, Dried milk products – Buttermilk powder, Whey Powder, Ice Cream mix Powder , Infant milk food, WMP and SMP.

Unit IV: Byproducts Utilization (11 Lectures)

Introduction, Classification and Composition of byproducts. Principles and methods of Utilization Whey utilization and whey based beverages like lassi and buttermilk.

Recommended Books

1. **Outlines of Dairy Technology**, Sukumar De, Oxford University Press, 1st edition, 2001.
2. **Dairy Engineering Advanced Technologies and Their Applications**, Rupesh S Chavan, Netra R Goyal, Murlidhar Meghwal, Taylor and Fancis, 1st edition, 2017.
3. **Dairy Technology**, Shivashraya Singh, illustrated, New India Publishing Agency-Nipa, 2013.
4. **Structure of Dairy Products**, A.Y. Tamime, Wiley-Blackwell, 1st edition, 2007.
5. **Indian Dairy Products**, Rangappa K.S., Asia Pub. House, 2nd edition, 1975.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the present status and scope of dairy industry in india and its layout.
2. Understand the various dairy equipments and sanitation.

Unit II: After completion of the unit, Students are able to:

1. Explain the food value, composition of milk and processing of milk.
2. Understand the buying, receiving, collection, transportation, storage and distribution of milk.

Unit III: After completion of the unit, Students are able to:

1. Understand the processing of different milk products- cream, butter, khoa, paneer, ice-cream ,condensed milk.
2. Understand the processing of evaporated milk, cheddar cheese, dried milk products.

Unit IV: After completion of the unit, Students are able to:

1. Explain the classification and composition of byproduct
2. Explain the utilization of by products

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BFPT 304: PROCESSING OF MEAT AND POULTRY
Theory:45 Credits: 2

Course Objective: Students should:

1. Know importance of meat production, chemical composition in india
2. Understand the slaughtering methods and meat and poultry products
3. Understand the structure, composition and nutritive value, quality evaluation of eggs
4. Understand the chemical and nutritive value of poultry meat.

Unit I: Introduction of Meat Products. (11 Lectures)

Introduction and Importance of meat products in India, Chemical Composition and microscopic structure of meat, Transportation, feeding of animal before slaughtering

Unit II: Meat (12 Lectures)

Ante-mortem examination of meat animals, Pre –slaughtering operation, scientific techniques of slaughtering, Post- mortem inspection, Storage, Preservation

Unit III: Egg and Egg Products. (11 Lectures)

Egg: Structure, composition and nutritive value, Storage and shelf life problems, Quality evaluation of eggs, Egg products: egg powder, value added egg products, Preservation.

Unit IV: Poultry Processing (11 Lectures)

Poultry products: types, chemical and nutritive value of poultry meat, slaughtering and evaluation of poultry carcasses, poultry cut-up parts and meat/bone ratio, Preservation of poultry meat.

RECOMMENDED BOOKS:

1. **Meat, Poultry & Fish Products Technology,** Syed Imran Hashmi, VNMAU Parbhani
2. **Principles of Meat Science** Aberle E.D. Kendall Hunt Publication, Fifth edition, 2012
3. **Handbook of Heat and Meat Processing** Hue Y.H. CRC Press, New York, 2012
4. **Meat Processing Improving Quality**, Joseph Kerry.
5. **Processed Meats**, A. M. Pearson, Second Edition 2011
6. **Meat Science**, Lawrie R A, Lawrie's,Woodhead Publisher England, 5th Ed, ,2017.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the meat production and chemical composition in india
2. Explain the microscopic structure of meat, transportation and feeding of animals.

Unit II: After completion of the unit, Students are able to:

1. Understand the slaughtering methods and meat and poultry products.
2. Understand the pre and post inspection, storage and preservation of meat and poultry products.

Unit III: After completion of the unit, Students are able to:

1. Explain the structure, composition and nutritive value of egg.
2. Understand the storage, shelf life, quality evaluation and preservation egg and egg products.

Unit IV: After completion of the unit, Students are able to:

1. Understand the poultry products: Types, chemicaland nutritive value of poultry meat.
2. Understand the preservation of poultry meat.

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BFPT-305: PROCESSING OF SEA FOODS
Theory: 45 Credits: 2

Course Objective: Students should:

1. Know fish processes and factors affecting quality of fresh fish.
2. Understand the byproduct utilization of fish industry
3. Understand the fish preservation by smoking.
4. Understand the principle of fish canning.

Unit I: Introduction of Sea Foods. (11 Lectures)

Introduction, fisheries resources of the world, Types of fish, Water activity and shelf-life, Factors affecting quality of fresh fish. Fish processing: manufacturing of fish paste and sauces, fish oil, fish protein concentrate and fish meal. By-products of fish industry and their utilization.

Unit II: Chilling and Freezing of Fish (11 Lectures)

Relationship between chilling and storage life, MAP, general aspects of freezing Freezing systems (air blast freezing, plate or contact freezing, spray or immersion freezing) Changes in quality in chilled and frozen storage, thawing.

Unit III: Fish Curing and Smoking (12 Lectures)

Drying and salting of fish, salting process. Salting methods (brining, pickling, kench curing, Gaspe curing), Dried and salted fish products- pindang , fishwood, dried shrimp. Preservation by smoking, smoke production, smoke components, quality, safety and nutritive value of smoked fish, processing and equipment, pre-smoking processes, smoking process control .Traditional chimney kiln, modern mechanical fish smoking kiln, Examples of smoked and dried products.

Unit IV: Canning of Fish (11 Lectures)

Principles of canning, classification based on pH groupings Effect of heat processing on fish, Pre- process operations and post process operations Storage of- Canned fish Cannery operations for specific canned products-Tuna, Mackerel, Sardine.

RECOMMENDED BOOKS:

1. **Fish Processing Technology**, George M Hall published by Backie academic and professional, 2ndedition.
2. **Applications of Seafood By-products in the food industry and Human Nutrition** Janak K.Vidanarachchi, Senaka Ranadheera, Wijerathne, R.M.C,S.M.C, Himali, Udayagani and Jana Pickova published Springer New York, Editors: Se-Kwon Kim
3. **Post-harvest technology of fish and fish products,** K.K.Balachandran published DAYApublishing house, 2016.
4. **Advances in Fish Processing Technology,** D.P.Sen, published, Allied publishers, Feb 2005.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the fishery resources, types of fish, water activity and shelf-life.
2. Explain the factors affecting quality of fresh fish and processing offish.

Unit II: After completion of the unit, Students are able to:

1. Understand the general aspects of freezing.
2. Understand the chilling and freezing offish

Unit III: After completion of the unit, Students are able to:

1. Understand the processing of dried and salted fish products
2. Understand the fish curing and smoking

Unit IV: After completion of the unit, Students are able to:

1. Understand the principles of canning.
2. Understand the pre and post process operations and storage of fish.

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BFPT-306: FOOD PACKAGING I
Theory: 45 Credits: 2

Course Objective: Students should:

1. Know the importance, functions and types of food packaging.
2. Know the properties and functions of wood and paper
3. Understand the properties and functions of glass and metal packaging.
4. Know the different packaging techniques.

Unit I: Introduction to Food Packaging. (11 Lectures)

History, Importance and functions of Food packaging. Properties of packaging material in relation to these functions, package design. Tests for flexible packaging materials. Materials used in packaging- rigid, semi rigid and flexible. Types of containers-primary and secondary, flexible and rigid, hermetic and non hermetic.

Unit II: Wood and Paper Packaging. (11 Lectures)

Packaging materials: Wood- structure, types, properties and wooden containers used in packaging, types of wooden boxes. Paper and paper board- structure, making, properties, types and uses of paper and paper board, CFB boxes and their comparison with wooden containers.

Unit III: Glass and Metal Packaging (12 Lectures)

Packaging materials: Glass – composition, properties, structure, types and manufacture of glass containers, their uses, breakage in glass, closure for glass containers. Metals-properties of metals, different metals used in food packaging, steel plate and functions of various constituents of steel, formation of two piece and three piece cans, tinning process, tin free steel, aluminumcontainers, lacquering –type and applications, aluminumfoil, corrosion of metal cans.

Unit IV: Packaging Methods (11 Lectures)

Aseptic packaging of foods: sterilization of packaging material, food contact surfaces and aseptic packaging systems, active food packaging – definition, scope, physical and chemical principles involved, edible films and coatings.

RECOMMENDED BOOKS:

1. **Food Packaging: Principles and Practice**, Robertson, G.L., Taylor and Francis Group Boca raton, London New York press, published CRC, 3rd Ed, 2006.
2. **Food Packaging Technology**, Richard coles, Derek McDowell and Mork J Kirwan published Black well publishing CRC Press, August 2003
3. **Food Science,** B. Shrilakshmi published New Age International, 2003.
4. **Novel Food Packaging Techniques**-Edited by Raija Ahvenainen published Woodhead Publishing Limited, First Edition, June 2003

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the history, importance and functions of food packaging.
2. Explain the types of food packaging materials.

Unit II: After completion of the unit, Students are able to:

1. Understand the wood and paper as packaging materials.
2. Understand the types and uses of paper, CFB boxes and their comparison with wooden containers.

Unit III: After completion of the unit, Students are able to:

1. Understand the glass and metals- their types, making properties.
2. Explain the type and applications of packaging materials

Unit IV: After completion of the unit, Students are able to:

1. Understand the aseptic packaging of foods
2. Understand the active food packaging

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LAB IX BFPP 307 -PROCESSING OF FRUITS, VEGETABLES, CEREALS AND PULSES

Course Objectives: Students should:

1. To know the principle and working of tray dryer, brixometer.
2. To understand the process of different fruit and vegetable product.
3. To know the physico-chemical properties of food grains and pulses.
4. To know the cooking quality of rice

Practicals-

PART – I PROCESSING OF FRUITS AND VEGETABLES

1. Judging the maturity indices of important fruits
2. Judging the maturity indices of important vegetables
3. Identification of equipment required for fruit and vegetable processing
4. Preparation of instant fruit juice, soup mix, vegetable juice
5. Preparation of squash, RTS ,Juice Nectar
6. Preparation of Cordial, Crush ,Syrup
7. Preparation of Jam, Marmalade
8. Preparation of Jellies
9. Preparation of Tomato Ketchup
10. Preparation of Preserve and Candied Fruit
11. Preparation of Potato chips
12. Preparation of Pickle
13. Preparation of food product by drying: Onion flakes, Raw mango powder / Leafy vegetable

PART - II PROCESSING OF CEREALS AND PULSES

1. Determination of gluten content in wheat flour.
2. Preparation of malt.
3. To study the cooking quality of rice using water up takes method.
4. To study physico-chemical properties of food grains.
5. Determination of physical properties pulses.
6. Determination of Hundred grain weight of grains.
7. Determination of bulk density, true density, porosity of grains.

8. Parboiling ofpaddy.
9. Fermenting power of yeast
10. Preparation of instant dhokla mix.

RECOMMENDED BOOKS:

1. **Manual of Methods of Analysis of Foods Fruit and Vegetable Products**, Food Safety And Standards Authority Of India Ministry Of Health And Family Welfare.
2. **Handbook of Analysis and Quality Control for Fruit and Vegetable Products,** S.Ranganna, 2nd Ed. Tata-McGraw-Hill.2001.
3. **Post Harvest And Management And Value Addition Of Fruit And Vegetables,** Dr.VishnuK. Garande, College Of Agricultural, Mahatma Phule KrishiVidyapeeth, Rahuri
4. http://www.egyankosh.ac.in/bitstream/123456789/45805/1/Practical%20Manual.pdf.
5. **Bakery Products Science and Technology** Y.H.Hui.
6. http://www.dakotayeast.com/yeast_testing.html.pdf
7. https://www.fortunefoods.com/sites/default/files/Khaman%20Dhokla%20Recipe.pdf

Course outcomes:

After completion of the Lab course, Students are able to:

1. Operate tray dryer, refractometer.
2. Prepare different types of fruit and vegetable products.
3. Learn physico -chemical properties of cereal and pulses.
4. Understand cooking quality of rice.
5. Prepare different types of malts.

LAB X BFPP -308-PROCESSING OF MILK, MEAT AND POULTRY PRODUCT

Course Objectives: Students should:

1. Know the principle and working of hydrometer.
2. Understand the processing of milk products.
3. Know the method of slaughtering and dressing of meat animals.
4. Understand the quality analysis of meat, egg etc.

Practicals-

PART – I PROCESSING OF MILK AND MILK PRODUCT

1. Platform tests in milk.(Organoleptic test, Acidity, COB, specific gravity, SNF)
2. Estimation of milk fat.
3. Adulteration tests for different foods: Milk and milk products.
4. MBRT and phosphatase test of milk.
5. Preparation of Flavoured milk.
6. Preparation of Curd
7. Preparation of Shrikhand.
8. Preparation of Khoa
9. Preparation of Paneer
10. Preparation of Condensed milk.
11. Preparation of whey based beverage.
12. Preparation of Ice-cream and Kulfi mix.

PART - II PROCESSING OF MEAT AND POULTRY

1. Slaughtering and dressing of meat animals.
2. Study of post-mortem changes in meat
3. Preservation of meat by different methods
4. Estimation of moisture content of meat
5. Analysis of frozen meat/meat emulsion products (Chemical and Microbial)
6. To study shelf-life of eggs by different methods of preservation
7. Evaluation of eggs for quality parameters market eggs,
8. Evaluation of eggs for quality parameters of eggs.
9. To perform freezing of yolk/albumen
10. Meat/Egg product formulation

RECOMMEND BOOKS

1. **Outlines of Dairy Technology,** Sukumar De, Oxford University Press, 1st edition, 2001.
2. **Dairy Engineering Advanced Technologies and Their Applications**, Rupesh S Chavan, Netra R Goyal, Murlidhar Meghwal, Taylor and Fancis, 1st edition, 2017.
3. **Dairy Technology**, Shivashraya Singh, illustrated, New India Publishing Agency-Nipa, 2013.

4. **Structure of Dairy Products**, A.Y. Tamime, Wiley-Blackwell, 1st edition, 2007.
5. **Indian Dairy Products**, Rangappa K.S., Asia Pub. House, 2nd edition, 1975.
6. **FSSAI manuals of analysis of foods, Milk and milk products,** Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi, 2016.
7. **Meat, Poultry and Fish Products Technology**, Syed Imran Hashmi, DAYA publishing house, 2nd Edition, 2015.
8. **Manual Of Methods Of Analysis Of Foods Meat And Meat Products Food Safety And Standards,** Authority Of India Ministry Of Health And Family Welfare Government Of India New Delhi,2016

Course outcomes:

After completion of the Lab course, students are able to:

1. Perform platform test of milk.
2. Prepare different types of dairy products like ice-cream paneer, khoa and condensed milk etc.
3. Study shelf-life of eggs.
4. Analyze the frozen meat/meat emulsion products.
5. Formulation meat/egg product.

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Lab XI BFPP 309- PROCESSING OF SEA FOOD PRODUCTS and PACKAGING-I

Course Objectives : Students should:

1. Evaluate quality of fish/prawn
2. Understand cut out examination of canned fish
3. Know the principle and working of vernier calliper to measure thickness of paper and paper board.
4. Understand the measurement of cobb's value and gsm value of paper and paperboard

Practicals-

PART – I PROCESSING OF SEA FOOD PRODUCTS

1. Quality evaluation of fish/prawn.(Physical Parameters)
2. Formulation of fish products.
3. Study of the anatomy of fish.
4. Precanning operation of fish (selection, sorting, descaling, washing, nobbing, brining)
5. Cut out examination of canned fish.
6. Determination of acidity of brine from canned fish sample.
7. Determination of moisture content from the different fish samples.
8. Determination of histamine from different fish samples by using TLC.
9. Quantitative determination of starch in the packing medium.
10. To determine Ascorbic acid from different Sea food product.

PART – II FOOD PACKAGING-I

1. To determine GSM (gram per square meter) of paper and paperboard.
2. To determine thickness of paper and paperboard.
3. To determine Cobb's value of a paperboard.
4. To determine the thermal shock resistance of a glass container.
5. To find out the porosity of tinplate.
6. To find out the tin coating weight.
7. To identify the different types of packaging materials.
8. To evaluate shelf life of packaged products.
9. To study the different parts of glass container.
10. To study the defects in glass containers.

RECOMMENDED BOOKS-

1. **Handbook of Analysis and Quality control for fruits and vegetable products** S.Ranganna published by McGraw Hill Education(India) PVT.LTD, Chennai, 2nd edition
2. **Food Packaging Technology** Richard coles, Derek McDowell and Mork JKirwan. Published Blackwell publishing CRC Press.
3. **Novel Food Packaging Techniques**, Raija Ahvenainen, WOODHEAD PUBLISHING LIMITED
4. **Determination of water absorptive of corrugated fiberboard** (Cobb test)-FEFCOTESTING METHOD-April 1986 amended in 1985, 1994, March1997 TAPPI Standards: Regulations and Guidelines. Revision ofT410om-08.
5. **TAPPI Standards: Regulations and Guidelines**. Revision of T4 l11om-97.
6. **FSSAI manual of methods of analysis of foods** (meat and meat products and fish and fish Products) FSSAI Ministry of Health and Family welfare, Govt .of India, New Delhi-16.
7. **Freshness evaluation of fish by quality index method** (QIM) and instrumental method at veraval fish landing centre by Jitesh Solanki.
8. **Processing and fish preservation**-nptel (https://.ac.in>module5>lecture9).
9. **Cut out analysis for canned fishery** products(ecourseonline.iasri.in>mod>view)

Course outcomes:

After completion of the Lab course, Students are able to:

1. Evaluate quality of fish/prawn, formulation of fish products, determine histamine
2. Determine moisture content from the different fish samples.
3. Calculate gsm of paper and paper board, measure thickness of paper, measure the porosity of tin plate.
4. Identify the different types of packaging materials, evaluate shelf life of packaged foods.

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B.Sc.-II (SEMESTER – IV)

YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE,SATARA									
COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)									
B. Sc. FOOD PROCESSNG AND PACKAGING (ENTIRE)									
B. Sc. II SEMESTER – IV (Duration – 6 Months)									
Paper No	Course Code	Name of the Course	**TEACHING SCHEME**						
			Theory			**Practical**			
			No. of lectures	**Hours**	**Credits**	Course Code	**No. of lectures**	**Hours**	**Credits**
1	BFPT - 401	Processing of Bakery products	3	2.4	2	Lab XII BFPP -407 Processing of Bakery and Confectionary products	8	6.4	4
2	BFPT - 402	Processing of Confectionary products	3	2.4	2				
3	BFPT - 403	Processing of oil seeds and fats	3	2.4	2	Lab XIII BFPP -408 Processing of oil seed, fats and Plantation crops, spices	8	6.4	4
4	BFPT - 404	Processing of Plantation crops and spices	3	2.4	2				
5	BFPT - 405	Food biochemistry	3	2.4	2	Lab XIV BFPP -409 Biochemistry and Food packaging II	8	6.4	4
6	BFPT - 406	Food packaging II	3	2.4	2				
7	AECC-4	Environmental science	3	2.4	2		---	--	
	Total of SEM I V		**21**	**16.8**	**14**		**24**	**19.2**	**12**
	Total Of The Year		42	33.6	28		**48**	**28.4**	**24**

B.Sc.-II (SEMESTER – IV)
BFPT-401: PROCESSING OF BAKERY PRODUCTS
Theory: 45 Credits: 2

Course Objectives: Students should:

1. Know principle and importance of bakery.
2. Understand the different types of ingredients used in bakery products and their function.
3. Understand the types of baking procedures for different bakery products like bread, cake.
4. Study the preservation of bakery products and quality aspect.

Unit I: Introduction of Bakery Products (11 Lectures)

Introduction and Importance of bakery, Principle involved in bakery products, working, principles, application of Dough mixer, moulding machine, Oven Machines and equipment for batch and continuous processing of bakery products.

Unit II: Raw Material of Bakery Products (11 Lectures)

Ingredients used in Bakery products and their functions, Types and quality of flour, various doughs and their use, Process parameter. Heat transfer in baking, time temperature relationship in baking,

Unit III: Processing of Bakery Products (12 Lectures)

Fermentation and proofing, Procedures of Different types of bakery products - bread, cookies, crackers, cake and biscuits, Cooling and packaging of baked products. Defects of baked products and preventive measures, specialized baked products -diabetic baked products, pizza, Passover products.

Unit IV: Preservation of Bakery Products (11 Lectures)

Preservation of baked product, Freezing and frozen storage of baked product, equipment for frozen storage, Canned bakery product. Quality aspect of preserved baked products, M aintenance, safety and hygiene of bakery plants.

Recommended Books:

1. **Bakery Products Science and Technology,** Y.H.Hui, Wiley Blackwell Publishing, 2014.
2. **Bakery and Confectionary products**, Acharya N.G.Ranga Agricultural University
3. **Cereal Processing Technology,** Gavin Owens, WoodHead Publishing Ltd, 2000
4. **Handbook of Baking and Bakery products,** Rashmi. S. Sharma.
5. **Textbook of Bakery and Confectionery**, Yogambal Ashokkumar, Prentice Hall India Learning Private Limited, 2012.
6. **FSSAI manuals of analysis of foods, Bakery,** Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi, 2016.
7. **Professional Baking**, Wayne Gisslen, Sixth Edition.
8. **Preservation ofbaked product** https://sensoryeffects.com/sites/default/files/bake.pdf

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the importance, principle of bakery, working, and application of bakery Equipment.
2. Understand the batch and continuous processing of bakery products

Unit II: After completion of the unit, Students are able to:

1. Understand the ingredients and their function, types and quality of flour.
2. Understand the various dough and their use, process parameters.

Unit III: After completion of the unit, Students are able to:

1. Understand the fermentation and proofing.
2. Understand the procedures of different types of bakery products.

Unit IV: After completion of the unit, Students are able to:

1. Understand the preservation, and canned bakery product.
2. Understand the quality and maintenance of bakery products.

BFPT-402: PROCESSING OF CONFECTIONARY PRODUCTS
Theory: 45 Credits: 2

Course Objectives: Students should:

1. Know the importance of confectionary
2. Understand the processing of different confectionary products
3. Understand the processing of sugar confectionary products.
4. Understand the processing of boiled sweets

Unit I: Introduction of Confectionary Products. (11 Lectures)

Importance of confectionery in food industry, Principle involved in confectionery products**,** Classification of confectionary, Types of confectionary products, ingredients in confectionary.

Unit II: Chocolate Processing (11 Lectures)

Chocolate Processing - Ingredients used in chocolate, Cocoa butter substitutes, Processing of cocoa beans, chocolate refining, conching and molding, enrobing, panning.

Unit III: Sugar Confectionary (12 Lectures)

Sugar confectionary: Types of sugar- production, storage, alternative bulk sweeteners, corn syrup and glucose syrup, sorbitol, xylitol, maltitol, isomalt, lactitol, mannitol, polydextrose**,** Chewing gum and Bubble gum- Ingredients, functions, manufacture.

Unit IV: Boiled and Gelatin Sweets. (11 Lectures)

Boiled Sweets - Hard and soft boiled sugar confectionary: fondant, fudge, caramel, toffee, nut Brittles, Gelatin Sweets - Fruit chews, jellies, gums, Defects in confectionary: sugar bloom, Fat bloom

RECOMMENDED BOOKS

1. **Textbook of Bakery and Confectionery,** Yogambal Ashokkumar, Prentice Hall India Learning Private Limited, 2012.
2. **The Science of Sugar confectionery**, William P Edwards, Royal Society of Chemistry, 2nd edition, 2018.
3. **Chocolate and Confections; Formula, Theory and Technique for the Artisan Confectioner**, Peter P. Greweling, Wiley, 2nd edition, 2012.
4. **Confectionery and Chocolate Engineering: Principles and Applications**, Ferenc A. Mohos, Wiley-Blackwell, 2010.
5. **Bakery and Confectionery**, Acharya NG Ranga Agricultural University.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the importance of confectionery in food industry.
2. Understand the principle, classification, types and characteristics of confectionary products.

Unit II: After completion of the unit, Students are able to:

1. Understand the chocolate processing
2. Understand the cocoa butter substitutes

Unit III: After completion of the unit, Students are able to:

1. Explain the types of sugar- production, storage, alternative sweeteners.
2. Understand the sugar confectionary

Unit IV: After completion of the unit, Students are able to:

1. Understand the processing of boiled sweets
2. Understand the processing of gelatin sweet.

BFPT 403 PROCESSING OF OIL SEEDS AND FATS
Theory: 45 Credits: 2

Course Objectives: Students should:

1. Know physical and chemical characteristics of dietary oil seeds and fats.
2. Understand the extraction processes of oil seeds and fats.
3. Understand the refining process and its methods.
4. Understand the processing of butter and other products.

Unit I: Introduction Processing of Oil Seeds and Fats (11 Lectures)

Sources; chemical composition; physical and chemical characteristics; Functional and nutritional importance of dietary oil seeds and fats. Post-harvest handling storage Processing of oilseeds for directs use and consumption.

Unit II: Extraction (12 Lectures)

Extraction of oil by mechanical expelling and solvent extraction and obtaining deoiled cakes suitable for edible purposes. Processing of other plant sources of edible oils and fats like coconut, cottonseed, rice bran, maze germ, etc.

Unit III: Refining (11 Lectures)

Refining: Clarification, degumming, neutralization (alkali refining), bleaching, deodorization techniques / processes. Blending of oils. Processing of refined oils: Hydrogenation, fractionation, winterization, inter-esterification etc. for obtaining tailor-made fats and oils.

Unit IV: Processing of Butter (11 Lectures)

Production of butter oil, lard, tallow, Margarine, Cocoa butter equivalents, shortenings, low fat spreads, peanut butter etc. Specialty fats and designer lipids for nutrition and dietetics, especially bybiotechnology.

RECOMMENDED BOOKS

1. **Physical and chemical characteristics of oils, fats and waxes**, David Firestone, Amer oil chemists society, 3rd Edition, 2006
2. **Vegetables and oils in food technology** Frank D.Gunstone.2002
3. **Olive oil chemistry**, Dimitrios Boskou, 2nd edition.1996
4. **Bailey's Industrial Oil and Fat Products**, John Wiley and Sons, 4th edition, 2004

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand physical and chemical characteristics of dietary oil seeds and fats.
2. Understand post-harvest storage processing of oilseeds for consumption.

Unit II: After completion of the unit, Students are able to:

1. Understand extraction methods for oil seeds and fats as mechanical and solvent extraction methods.
2. Understand processing of other plant sources of edible oils and fats

Unit III: After completion of the unit, Students are able to:

1. Understand different refining processes of fats and oils.
2. Understand blending of oils

Unit IV: After completion of the unit, Students are able to:

1. Understand processing of butter.
2. Understand specialty fats and designer lipids.

BFPT-404: PROCESSING OF PLANTATION CROPS AND SPICES
Theory: 45 Credits: 2

Course Objectives: Students should:

1. Know importance and processing of plantation crops
2. Understand the definition, classification and adulteration of spices
3. Know the production and processing of major spices
4. Know the production and processing of minor spices

Unit I: Plantation Crops (11 Lectures)

Importance of plantation crops, chemical composition, Processing of Tea leaves: Black tea, Green tea and Oolong tea, Instant tea, Processing of coffee : coffee beans, grinding, storage, Soluble /Instant coffee, Use of chicory in coffee, decaffeinated coffee**.** Processing of coconut and cashew nut

Unit II: Spices (11 Lectures)

Definition, Classification, Properties, Spice oil and Oleoresins - Definition, Technology of Manufacturing, Use of Spices, Production of spices in India, Adulteration of spices

Unit III: Major Spices (12 Lectures)

Production and processing of Major Spices -Pepper, Cardamom, Ginger, Chilies, Turmeric, onion.

Unit IV: Minor Spices (11 Lecture)

Production and processing of Minor spices – ajwain, coriander, cumin, cinnamon, fenugreek, garlic, mustard, saffron, tamarind, cloves, mint, vanilla, asafoetida and spice production.

RECOMMENDED BOOKS

1. **Production technology of spices, Aromatic, Medicinal, and Plantation crops** - Acharya N.G. Ranga.
2. **Production technology of spices, Aromatic, Medicinal, and Plantation crops,** N.kumar, Oxford and IBH publish ungco.pvt.ltd.2018.
3. **Plantation Crops**, P.K. Abdul Khader, University of Calicut, 2005.
4. **Spices and plantation crops**, Jitendra Singh, National Book Trus, 1996.
5. **Black pepper**, Food and Agriculture Organization of the United Nations http://www.fao.org/3/a-au145e.pdf.
6. **Ginger**, Food and Agriculture Organization of the United Nations http://www.fao.org/fileadmin/user_upload/inpho/docs/Post_Harvest_Compendium_-_Ginger.pdf.
7. **Turmeric,** Food and Agriculture Organization of the United Nations http://www.fao.org/fileadmin/user_upload/inpho/docs/Post_Harvest_Compendium_-_Turmeric.pdf.
8. **Handbook of herbs and spices**, K. V. Peter. Woodhead Publishing, 2012
9. **Spices and Plantation Crops** K.G. Shanmugavelu Agrotech Publication, Delhi

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the chemical composition of plantation crops.
2. Understand the processing of tea, coffee, coconut, cash nut.

Unit II: After completion of the unit, Students are able to:

1. Understand the definition, classification and properties of spices
2. Understand the manufacturing, uses, production and adulteration of spices.

Unit III: After completion of the unit, Students are able to:

1. Understand the production of major spices on commercial scale.
2. Understand the processing of major spices.

Unit IV: After completion of the unit, Students are able to:

1. Understand the production of minor spices on commercial scale.
2. Understand the processing of minor spices.

BFPT-405: FOOD BIOCHEMISTRY
Theory: 45 Credits: 2

Course Objectives: Students should:

1. Know the utilization of carbohydrates disorders related to carbohydrate metabolism in body.
2. Know the utilization and free radical oxidation of lipids, disorders related to lipid metabolism in body.
3. Know the utilization of phenolics and its metabolism in body.
4. Know about effect of phenolics on human health.
5. Study classification, function and mechanism of enzyme and coenzymes.

Unit I: Enzyme and Coenzyme (12 Lectures)

Enzyme: Classification, nomenclature, activation energy, Michaelis-Menten equation, Lineweaver Burk Plot, factors affecting on enzymes action, mechanism of enzyme action, Coenzymes: Classifications [metabolite derived /vitamin derived] function of various types, structure of NAD+, NADP+, and FAD and FMN.

Unit II: Utilization of Carbohydrates (11 Lectures)

Glycolysis, Kreb cycle, Pentose phosphate pathway, gluconeogenesis, glycogen metabolism, glycogen synthesis, Disorders in carbohydrate metabolism, Essential Metabolic pathways.

Unit III: Influence of Phenolic Substances on Health (11 Lectures)

Free radicals in biological system, Oxidative stress and chronic diseases, antioxidant in fruits and vegetables, absorption and metabolism of polyphenolics, Efficiency of polyphenolics in Promoting human health

Unit IV: Utilization of Lipid and Lipid Oxidation (11 Lectures)

Utilization of fats, Disorders related to lipid metabolism, clinical disorders associated with fats. Lipid oxidation -active oxygen species and free radical theory. Hydroperoxide formation and decomposition photo-oxidation of unsaturated lipid.

RECOMMENDED BOOKS:

1. **Principles of Biochemistry**, Lehninger,David L. Nelson and Michael M. Cox; W. H. Freeman 7th ed. 2017.
2. **Biochemistry,** Stryer, W. H. Freeman; 6th Edition, 2006.
3. **Principles of biochemistry**, Donald J. Voet, Judith G. Voet, Charlotte W. pratt. Wiley; 4th Edition International Student Version edition 2012.
4. **Enzyme technology**, Anusha Bhaskar, V. G.Vidhya, MJP Pub.2009.
5. **Principles of enzyme technology**- M.Y. Khan, Faraha Khan, PHI Learning Pvt Ltd; 1st edition 2015.
6. **Textbook of medical biochemistry**- M.N.Chatterjea, Ranashinde, Jaypee Brothers Medical Publishers2007.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the basics of enzyme, its classification, nomenclature and mechanism of action.
2. Understand the coenzymes, its classifications, function and structure of various coenzymes.

Unit II: After completion of the unit, Students are able to:

1. Understand the utilization of carbohydrates.
2. Understand the disorders in carbohydrate metabolism

Unit III: After completion of the unit, Students are able to:

1. Understand the utilization of and its effect on human body.
2. Understand the efficiency of polyphenolics in promoting human health

Unit IV: After completion of the unit, Students are able to:

1. Understand the utilization of lipid and lipid oxidation.
2. Understand the disorders related to lipid oxidation.

BFPT-406: FOOD PACKAGING II

Theory: 45 Credits: 2

Course Objectives: Students should:

1. Know classification and uses of plastic polymers.
2. Know the techniques and methods used for packaging.
3. Know the types of oxygen absorbents and its application.
4. Understand the safety considerations in food packaging.

Unit I: Plastic Packaging (11 Lectures)

Plastic packaging materials: plastic banned in India, classification of polymers, functional and mechanical properties of thermoplastic polymers; Processing and converting of thermoplastic polymers, testing of plastic packages.

Unit II: Techniques and Methods Used for Packaging (11 Lectures)

Techniques and methods used for Packaging of cereals and cereal product, fruits and vegetables and their products, milk and milk products and meat and meat products, beverages. Shelf life evaluation of packed products.

Unit III: Oxygen Absorbents (11 Lectures)

Classification and main types of oxygen absorbents, factors influencing the choice of oxygen absorbents, Application of oxygen absorbents for shelf-life extension of food and advantages and disadvantages of oxygen absorbents.

Unit IV: Safety Considerations in Food Packaging (12 Lectures)

Labeling, Types of food safety problems associated with package, package labeling and food safety. Food packaging and environment-recycling, composting, thermal treatment and land fill.

Recommended Books:

1. **Food Packaging: Principles and Practice**, Robertson, G.L. published CRC Press, Taylor and Francis Group Boca raton, London New York press,3rd ed, 2006.
2. **Food Packaging Technology**, Richard coles, Derek McDowell and Mork J Kirwan, published by Blackwell publishing CRC Press
3. **Food Science,** B. Shrilakshmi, New Age International,2003
4. **Novel Food Packaging techniques** Raija Ahvenainen published Woodhead Publishing Limited.

Course outcomes:

Unit I: After completion of the unit, Students are able to:

1. Understand the classification of polymers, functional and mechanical properties.
2. Understand the thermoplastic polymers

Unit II: After completion of the unit, Students are able to:

1. Understand the techniques of shelf life evaluation of packed products
2. Understand the methods used for packaging

Unit III: After completion of the unit, Students are able to:

1. Explain the classification of oxygen absorbent.
2. Understand the types, advantages and disadvantages of oxygen absorbent.

Unit IV: After completion of the unit, Students are able to:

1. Understand the labeling and food safety problems associated with package.
2. Understand food packaging and environment-recycling, composting, thermal treatment and landfill.

LAB XII BFPP 407 PROCESSING OF BAKERY AND CONFECTIONARY PRODUCTS

Course Objectives: Students should:

1. Know the principle and working of microwave oven.
2. Understand the preparation of butter cake, sponge cake, instant cake
3. Understand the preparation of different types of chocolate products,
4. Understand the preparation of different types of sugar products.

Practicals-

PART – I
PROCESSING OF BAKERY PRODUCTS

1. Preparation of bread and assessment of its quality.
2. Preparation of pizza base and assessment of its quality
3. Preparation of butter cake, assessment of its quality.
4. Preparation of sponge cake, assessment of its quality..
5. Preparation of icings and introduction of decorating agents in sponge cake.
6. Preparation of instant cake mix and assessment of its quality
7. Preparation of biscuits and assessment of its quality.
8. Preparation of butter cookies and assessment of its quality.
9. Preparation of almond butter cookies and assessment of its quality.
10. Preparation of Chocolate chip cookies and assessment of its quality.
11. Preparation of Rusk and assessment of its quality.
12. Preparation of Crackers and assessment of its quality.
13. Preparation of toast and assessment of its quality.

PART - II
PROCESSING OF CONFECTIONARY PRODUCTS

1. Preparation of fondant, assessment of its quality.
2. Preparation of fudge and assessment of its quality.
3. Preparation of jujubes candy and assessment of its quality.
4. Preparation of toffee and their quality assessment tests.
5. Preparation of Chocolate their quality assessment tests.

6. To study the process of inversion, melting and caramelization in sucrose.
7. Determination of the effect of heat on sugar solution.
8. Preparation of milk based confectionery products.
9. Preparation of brittles and assessment of its quality.
10. Preparation of hardboiled candy and their quality assessment tests.

Recommended Books:

1. **Handbook of Baking and Bakery products,** Rashmi. S. Sharma.
2. **Textbook of Bakery and Confectionery**, Yogambal Ashokkumar, Prentice Hall India Learning Private Limited, 2012.
3. **FSSAI manuals of analysis of foods, Bakery,** Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi, 2016.
4. **Professional Baking** Sixth Edition by Wayne Gisslen.
5. **Bakery Products Science and Technology** Y. H.Hui, Wiley Blackwell Publishing, 2014.
6. **Bakery and Confectionary products**, Acharya N.G.Ranga Agricultural University

Course outcomes:

After completion of the Lab course, Student are able to:

1. Operate microwave oven.
2. Understand the preparation of butter cake, sponge cake, instant cake.
3. Prepare different types of chocolate food.
4. Prepare different types of sugar based product.

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LAB XIII BFPP408-PROCESSING OF OIL SEEDS, FATS AND PLANTATION CROPS, SPICES

Course Objectives: Students should:

1. Know the detection of adulteration in spices.
2. Understand the microscopic examination of spices
3. Find out adulteration in fats and oil samples.
4. To carry out qualitative estimation of different fats and oils.

Practicals-

PART -I
PROCESSING OF OIL SEEDS and FATS

1. To prepare test samples and determine moisture content of fats and oils.
2. Determination of Specific gravity and Refractive index of fats and oils.
3. Qualitative estimation of Rice bran oil and mustard oil.
4. Qualitative estimation of Seasame oil.
5. Qualitative estimation of Cotton seed oil.
6. Determination of Melting point of fats and oils.
7. Determine carotenoid content in raw Palm oil.
8. Detection of animals fat in vegetables fat.
9. Detection of presence of rancidity.
10. To determine adulteration in fats and oils.

PART -II
PROCESSING OF PLANTATION CROPS and SPICES

1. Microscopic Examination of Spices.
2. Detection of adulteration of Argemone seeds in Mustard.
3. Detection of adulteration of Mineral Oil in Black Pepper.
4. Detection of adulteration of Papaya seeds in Black Pepper.
5. Detection of adulteration in Turmeric.
6. Detection of adulteration in Chilies.
7. Detection of adulteration in Coriander.
8. Detection of adulteration in Black pepper.
9. Detection of adulteration in Saffron.
10. Detection of adulteration in Asafoetida.

RECOMMENDED BOOKS:

1. **FSSAI manuals of analysis of foods, Oils and Fats,** Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi, 2016.
2. **Standards Methods for the analysis of Oils, fats and Derivatives,** International Union of Pure and Applied Chemistry on Oils, fats and Derivatives, 7th edition.
3. **Animal and Vegetable Fats and Oils**, EAS 319, 2nd edition, 2002.
4. **FSSAI manuals of analysis of foods, Spices and Condiments,** Food Safety and Standards Authority of India, Ministry of Health and Family Welfare, Government of India, New Delhi, 2016.
5. **Manuals of Food Quality Control,8, Food analysis: quality, adulteration and tests of identity,** FAO, Food and Nutrition Paper, Swedish International Development Authority, 1986.

Course outcomes:

After completion of Lab course, Students are able to:

1. Prepare test samples and determine moisture content of fats and oils.
2. Determine specific gravity and refractive index of fats and oils
3. Determine melting point of fats and oils, carotenoid content in raw palm oil.
4. Detect adulteration of spices.

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LAB XIV BFPP 409 BIOCHEMISTRYAND FOOD PACKAGING II

Course Objectives: Students should:

1. Know the principle and working of different chromatographic techniques.
2. Understand the enzyme and its activity.
3. Estimate and analyze the vitamins, carbohydrates, lipids from food sample.
4. Know the principle and working of tearing, bursting, tensile strength tester etc.

Practicals-

PART -I BIOCHEMISTRY

1. Estimate the quantity of ascorbic acid by Titration (Volumetric) method in food sample.
2. Estimate the quantity of Vitamin A in food sample.
3. Estimate the quantity of iron in food sample.
4. Qualitative detection of antioxidants by thin layer chromatography.
5. Analysis of lipids present in food sample.
6. Determination of carbohydrates present in food sample.
7. Separation of carotenoids by thin layer chromatography,
8. Separation of amino acids by column chromatography.
9. Detection of enzymes in food sample.(urease, amylase, lipase)
10. To estimate the quantity of enzyme activity.
11. To study the effect of temperature on enzyme activity.
12. To study the effect of substrate concentration on enzyme activity.

PART -II FOOD PACKAGING II

1. To determine grease resistance of packaging materials.
2. To determine the chemical resistance of packaging material.
3. Determination of water vapor transmission rate of various packaging materials.
4. To prepare Labels for different types of food products according to package labeling laws.
5. Determination of continuity of Tin coating.
6. To carried out grading of glass bottles for alkalinity.
7. To determine Tear resistance of different packaging materials.
8. To determine Bursting strength of different packaging materials
9. To determine Tensile strength of different packaging materials.
10. To study the Finishes and Closures in Glass containers.

Recommended Books:

1. **Handbook of Analysis and Quality control for fruits and vegetable products** S. Ranganna published McGraw Hill Education (India) PVT.LTD, Chennai, 2ndedition, 2007.
2. **Food Packaging: Principles and Practice** Robertson G.L. Published, CRC Press, Taylor and Francis Group Boca raton, London New York press, 3rd ed, 2006.
3. **Food Science**, B. Shrilakshmi published New Age International,2003
4. **An introduction to practical biochemistry**, Plummer, Tata McGraw Hill Publishing Co. NewDelhi.3rd edition, 2004.
5. **Modern experimental biochemistry**, Rodney Boyer, Dorling Kindersley (India) Pvt Ltd 3rd Edition, 2000.

Course outcomes:

After completion of the Lab course, Student are able to:

1. Understand the principle and working of different chromatographic techniques, estimate vitamins (vit. C and vit. A) from food sample.
2. Estimate the quantity of carbohydrates, amino acids
3. Determine quality of packaging material.
4. Prepare labels for different types of food products.

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