



Rayat Shikshan Sanstha's
YASHAVANTRAO CHAVAN INSTITUTE OF SCIENCE, SATARA
(AUTONOMOUS)
(Lead College Karmaveer Bhaurao Patil University, Satara)

Reaccredited by NAAC with 'A+' Grade

Syllabus for

Bachelor of Science

Part - I

B.Sc. Food Processing & Packaging

Syllabus

to be implemented from June, 2023 onwards

(As Per NEP-2020 Guidelines)

Rayat Shikshan Sanstha's
Yashvantrao Chavan Institute of Science, Satara (Autonomous)
Lead college, Karmaveer Baurao Patil University, Satara

Syllabus for Bachelor of Science Part I

1. **Title:** B.Sc. Food Processing and Packaging

2. **Year of Implementation:**2023-24

3. **Preamble:**

B.Sc. Food Processing and Packaging course under autonomy has been prepared keeping in view the unique requirements of B.Sc. Food Processing and Packaging students. The emphasis of the contents is to provide students the latest information along with due weightage to the concepts of classical trends in Processing and Packaging in food so that they are able to understand the all subjects.

The course content also lists new practical exercises so the students get hands on experience of the latest techniques that are currently used in Food industries. Project curriculum spanning over the one year of the course is designed in a way to understand the basics of food processing and packaging. Along with students are also provided with an opportunity to peruse the practical knowledge about subject. The course will also inspire students to pursue higher studies and research in Food Processing and Packaging, for becoming an entrepreneur a deniable students to get employed in Food, Nutraceutical and Agriculture Industries.

4. **General Objectives:**

- Construction and designing of the courses to suite industrial needs.
- More emphasis on applied aspects of Food Processing and Packaging.
- To develop aptitude of students in the field of research.
- Enrichment of basic knowledge in areas of Food Processing and Packaging.

5. **Duration:** Three/Four Year

6. **Exam Pattern:** Semester

7. **Medium of Instruction:** English

8. Structure of B. Sc. I:

B.Sc I SEMESTER I COURSE STRUCTURE

Sr. No.	Course Category	Course Code	Name of the Course
1	Major I	BFPT 111	Principles of Food Processing-I
2	Major II	BFPT 112	Food Packaging-I
3	Lab I	BFPP 113	Based on BFPT 111 and BFPT 112
4	Minor I	BFPT 114	Food Microbiology-I
5	Minor II	BFPT 115	Food Preservation –I
6	Lab II	BFPP 116	Based on BFPT 114 and BFPT 115
7	GE/OE-I	BFPT 117	Food Service Management
8	GE/OE-II	BFPT 118	Food Production Management
9	Lab III	BFPP 119	Based on BFPT 117 and BFPT 118
10	IKS	IKS 101	Indian Traditional Foods

Note: - GE-General Elective, OE- Open Elective, IKS- Indian Knowledge System

B.Sc I SEMESTER II COURSE STRUCTURE

Sr. No.	Course Category	Course Code	Name of the Course
1	Major I	BFPT 121	Principles of Food Processing-II
2	Major II	BFPT 122	Food Packaging-II
3	Lab I	BFPP 123	Based on BFPT 121 and BFPT 122
4	Minor I	BFPT 124	Food Microbiology-II
5	Minor II	BFPT 125	Food Preservation -II
6	Lab II	BFPP 126	Based on BFPT 124 and BFPT 125
7	GE/OE-I	BFPT 127	Dairy Production and Management
8	GE/OE-II	BFPT 128	Management of Bakery and Confectionary Industries
9	Lab III	BFPP 129	Based on BFPT 127 and BFPT 128
10	SEC	SEC 103	Analytical Techniques-I
11	VEC	VEC 104	Digital Technology

Note: GE-General Elective, OE- Open Elective, SEC- Skill Enhancement Course, VEC- Value Education Course.

SEMESTER I MAJOR

SEMESTER I

COURSE BFPT 111: - PRINCIPLES OF FOOD PROCESSING-I

Course Objectives: Students should be able to...

1. understand different methods of primary processing in food industry.
2. know different methods of secondary processing in food industry.
3. illustrate various cooking methods.
4. explain objectives of food processing.

Credits (Total 02 Credits)	BFPT 111 PRINCIPLES OF FOOD PROCESSING-I	No. of hours (30 hrs)
UNIT-I	Introduction to food	7
	<ul style="list-style-type: none">• Definition of food, classification of food, constituents of food.• Food preservation, food spoilage, causes of food spoilage, food poisoning, food borne intoxication, food borne infection.	
UNIT-II	Primary processing.	8
	<ul style="list-style-type: none">• Introduction, classification and methods of cleaning. Sorting, grading, cutting, seeding, chilling and freezing.	
UNIT-III	Secondary processing.	7
	<ul style="list-style-type: none">• Introduction, classification and methods of Slicing• Pulping, paste, frying, chilling and freezing, milling	
UNIT-IV	Common food processing	8
	<ul style="list-style-type: none">• Introduction, Classification and Method of Cooking.• Baking, frying, roasting, toasting, grilling, blanching, extrusion.	

Course Outcomes: Student will be able to...

1. analyze different methods of primary processing in food industry.
2. apply methods of secondary processing in food industry.
3. identify food spoilage.
4. implement preservation and processing methods in food.

REFERENCE BOOKS:

1. Mishra. J. P., Mohapatra. S., Rastogi. M, Verma. S. and Singh. V. 2023. Textbook of Integrated Farming Systems for Sustainable Agriculture. B. P. International, Kolkata.
2. Mercer, Donald G. 2023. Bridging the gap in the communication of food science knowledge and technology. Science Direct.
3. Porter, M. E. 2023. Mrs. Porter's New Southern Cookery Book. Andrews McMeel Publishing LLC. Sydney, London.
4. Greer, Sandra C., 2023. Chemistry for Cooks: An Introduction to the Science of Cooking. MIT Press, Cambridge.
5. Jafari. S. M., Hedayati, Sara, Vahid B., 2023, Cooking equipment for the food industry. In High-Temperature Processing of Food Products, Woodhead Publishing, New Delhi.
6. Girdharilal, Siddapa. G. S., Tandon. G. L., 2022. Preservation of fruits and vegetables. 3rd ed. Indian Council of Agricultural research, New Delhi.
7. Fellows, Peter John., 2021. Food processing technology: principles and practice. Woodhead publishing,
8. Jafari, Seid. M., 2021. Engineering Principles of Unit Operations in Food Processing: Unit Operations and Processing Equipment in the Food Industry. Woodhead Publishing, New Delhi.
9. Acton, Eliza., 2020. Modern cookery. Longmans publications, London.
10. Earle, Richard L. 2013. Unit operations in food processing. Elsevier Publications, Dutch.
11. Mark J. K., Coles, Richard, Derek McDowell, 2003. Food packaging technology. Vol. 5. CRC press, Boca Raton.

COURSE BFPT 112: FOOD PACKAGING-I

Course Objectives: Students should be able to...

- understand the importance, functions and types of food packaging.
- know the properties and functions of wood and paper
- list the properties and functions of glass and metal packaging.
- explain the different packaging techniques.

Credits (Total 02 Credits)	BFPT 112 FOOD PACKAGING-I	No. of hours (30 hrs)
UNIT-I	Introduction to Food Packaging	7
	<ul style="list-style-type: none"> • History, Importance and functions of Food packaging. Properties of packaging material in relation to these functions, package design. • Classification of packaging material–On the basis of packaging material, packaging component, Packaging technique. 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	8
	<ul style="list-style-type: none"> • Packaging materials: Wood-structure, types, properties and wooden containers used in packaging, types of wooden boxes. • Paper and paperboard-structure, making, properties, types and uses of paper and paperboard, CFB boxes and their comparison with wooden containers. 	
UNIT-III	Glass and Metal Packaging	7
	<ul style="list-style-type: none"> • 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, aluminum containers, lacquering –type and applications, aluminum foil, corrosion of metal cans. 	

UNIT-IV	Packaging Methods	8
	<ul style="list-style-type: none"> • 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. 	

Course Outcomes- Students will be able to...

1. analyze the types of food packaging materials.
2. determine the types and uses of paper, CFB boxes.
3. describe the manufacturing process of glass and metal .
4. make use of active food packaging.

REFERENCE BOOKS:

1. Robertson G.L., 2012. Food Packaging - Principles and Practice 3rd Ed Narendra Publishing House. New Delhi
2. Robertson G.L., 2009. Food Packaging and Shelf life : A Practical Guide , Narendra Publishing House ,New Delhi
3. Singh R.P. and Heldman D.R. 2010. Introduction to Food Engineering, Academic Press, New Delhi.
4. John, P.J. A. 2008. Handbook on Food Packaging. Narendra Publishing House, New Delhi.
5. Robertson. G. L., Taylor and Francis. G. B., 2006. Food Packaging: Principles and Practice, 3rd Ed. London New York press.
6. Robertson G.L., 2005. Food Packaging: Principles and Practice, 2nd Ed. London New York press.
7. Shrilakshmi. B. 2003. Food Science, New Age International Publishers, New Delhi
8. Ahvenainen. R. 2003 Novel Food Packaging Techniques, 1st Ed, Woodhead Publishing Limited. New Delhi.
9. Richard C., McDowell. M. and Mork. J. 2003 Food Packaging Technology, CRC press, New Delhi.
10. Gosby. N.T. 2001. Food Packaging Materials. Applied Science Publication, New Delhi.
11. Frank A. P. 1983. A Handbook of Food Packaging, ARM publications. Bangalore.

LAB I BFPP 113 (BASED ON BFPT 111 AND BFPT 112)

BFPP 113: - PRINCIPLES OF FOOD PROCESSING AND FOOD PACKAGING-I

Course Objectives: Students should be able to...

1. understand the principle of various cooking methods
2. know the measurement of Cobb's value and GSM value of paper and paperboard.
3. explain the principle and working of vernier caliper to measure thickness of paper and paperboard.
4. develop nutritional labeling of food products.

Credits (Total Credits 2)	BFPP 113 PRINCIPLES FOOD PROCESSING AND FOOD PACKAGING-I	No. of hours (60 hrs)
1	To study the principle and working of baking process.	
2	To study the principle and working of frying process.	
3	To study the principle and working of roasting process.	
4	To study the principle and working of grilling process.	
5	To study the principle and working of blanching process.	
6	To identify different types of packaging materials.	
7	To determine GSM (gram per square meter) of paper and paperboard.	
8	To determine thickness of paper.	
9	To determine Cobb's value of a paperboard.	
10	To determine the thermal shock resistance of a glass container.	
11	To find out the porosity of tin plate.	
12	To determine thickness of paperboard	
13	To determine puncture resistance test	
14	To determine food packaging seal integrity test	
15	To determine edge crush test of a food pack	

Course Outcomes: Students will be able to...

1. identify different equipment's used in cooking
2. analyze different type of packaging material.
3. measure compete strength of different food packaging material.
4. create labeling of food products.

REFERENCE BOOKS:

1. George.W. 2023. Handbook of odors in plastic materials. Elsevier Publications, New Delhi.
2. Fellows. P., Peter J. 2022. Food processing technology: principles and practice. Woodhead publishing, New Delhi.
3. Proctor and Andrew, 2018. Alternatives to Conventional Food Processing 2nd Edition. Vol. 53. Royal Society of Chemistry, London.
4. Robertson, Gordon L. 2016. Food packaging: principles and practice. CRC press, New Delhi.
5. Baker, Christopher. G. J., Ranken. M. D., and Kill. R. C. 2012. Food industries manual. Springer Science & Business Media, Bangalore
6. Kadoya, Takashi, 2012. Food packaging. Academic Press, New Delhi.
7. Heldman, Dennis R., 2012. Food process engineering. Springer Science & Business Media, New Delhi.
8. Ramaswamy, Hosahalli. S., and Michele. M. 2005. Food processing: principles and applications. CRC Press, New Delhi
9. Weaver, Connie M., and James R. D. 2003. The food chemistry laboratory: a manual for experimental foods, dietetics, and food scientists. CRC press, New Delhi.
10. Barham, Peter, John. S.A., Edwards and Joachim M. S. 2001. The science of cooking. Berlin: Springer, New Delhi.

SEMESTER I
MINOR

COURSE BFPT 114:- FOOD MICROBIOLOGY- I

Course Objectives: Students should be able to...

1. understand the important contributions of various scientists in microbiology and scope of microbiology.
2. know the important genera of micro-organisms associated with food and their characteristics.
3. illustrate the microbial nutrition and culture media.
4. explain the control of microorganisms and mode of action of antiseptic and disinfectants.

Credits (Total 02 Credits)	BFPT 114 FOOD MICROBIOLOGY- I	No. of hours (30 hrs)
UNIT-I	History and Scope of Microbiology	8
	<ul style="list-style-type: none">• Important contributions of various scientists, Scope of microbiology.• Introduction to microorganisms-bacteria, algae, fungi, protozoa and viruses, importance of bacteria, yeast, and moulds in foods.	
UNIT-II	General Characteristics of Microorganisms	7
	<ul style="list-style-type: none">• Structure of Prokaryotic and Eukaryotic cell, Morphology of bacteria: Size, Shape and Arrangements.• Cytology of bacteria-structure and functions of cell wall, cell membrane, Capsules and slime layer, flagella, Pilli, nuclear material, mesosome, ribosome and spores.	
UNIT-III	Microbial Nutrition And Culture Media	8
	<ul style="list-style-type: none">• Microbial Nutrition- Nutritional requirements of microorganisms.• Nutritional types of microorganism based on carbon and energy sources, Culture media: Common components of media and their functions, Types of media.	

UNIT-IV	Control of Microorganisms	7
	<ul style="list-style-type: none"> • Definitions Sterilization, Disinfection, Antiseptic, Germicide, Microbiostasis, Antisepsis, Sanitization. • Mode of action, application and advantages of: Physical agents, Chemical Agents, Gaseous Agent. 	

Course Outcomes: Student will be able to...

1. recall history of microbiology.
2. classify the nutritional requirements of micro-organisms.
3. apply the techniques required for control of microorganism
4. explain functions of cell organelles.

REFERENCE BOOKS:

1. Ananthanarayan and Paniker's, 2016. A Textbook of Microbiology, 7th edition. Orient Blackswan, Hyderabad.
2. Tolaro. K.P., 2009. Foundations in Microbiology, 7th International edition. McGraw Hill Education, Bangalore.
3. Michael. T. M., Thomas. D. B., 2008. Brock biology of microorganisms, 12th edition, CA: Pearson/Benjamin Cummings, San Francisco
4. Purohit S. S., 2003. Microbiology fundamentals and applications, 6th edition, Agrobios Publisher, Jodhpur.
5. Frazier W.C. and Westhoff D.C. 2004. Food Microbiology, TMH Publication, New Delhi.
6. Stanier. R.Y., Ingraham. J. L., Wheelis. M. L. and Painter. P. R., 2001. General Microbiology, 5th edition, Macmillan Education Ltd., London.
7. Michael J. P., Chan. C. S., Noel R. K., 1986. Microbiology 5th edition, McGraw Hills Publication, America.
8. Salle. A. J., 1973. Fundamental Principles of Bacteriology. 7th Edition, McGraw-Hill Book Co. New York and London,
9. Martin. F., 1962. Fundamentals of Microbiology W. B. Saunders, 7th edition, Philadelphia. U.S.
10. Adams, Martin R., Maurice O. Moss, and Maurice O. Moss. 2000. Food microbiology. Royal society of chemistry, Cambridge.

COURSE BFPT 115 :- FOOD PRESERVATION-I

Course Objectives: Students should be able to...

1. understand the scope of food preservation
2. know the food preservation by high temperature and low temperature.
3. illustrate the food preservation by drying and dehydration.
4. explain the principles and types of preservation, shelf life of food products

Credits (Total Credits 2)	BFPT 115 FOOD PRESERVATION-I	No. of hours (30 hrs)
UNIT-I	Introduction of food preservation	7
	<ul style="list-style-type: none"> • Definition and scope of food preservation, principles of preservation. • Preservatives and its types, shelf life of food products. 	
UNIT-II	Food Preservation by high temperature	8
	<ul style="list-style-type: none"> • Introduction, classification and method of sterilization, pasteurization, blanching and canning 	
UNIT-III	Food Preservation by Drying and dehydration	7
	<ul style="list-style-type: none"> • Definition, drying as a means of preservation, Differences between sun drying and Dehydration (Mechanical drying). • Factors affecting rate of drying, normal drying curve, Types of driers used in the food industry. 	
UNIT-IV	Food Preservation by Low temperature.	8
	<ul style="list-style-type: none"> • Introduction to refrigeration, cool storage and freezing, definition and principle of freezing, freezing curve, Changes occurring during freezing. • Types of freezing- slow freezing, quick freezing, freeze drying, Introduction to thawing, changes during thawing and its effect on food. 	

Course Outcomes- Students will be able to...

1. explain the principle of preservation
2. compare the between sun drying and dehydration.
3. apply the processes of pasteurization and sterilization.
4. explain principle and type of freezing.

REFERENCE BOOKS:

1. Man. M., John. F., Hurst. W. J., 2018. Chang Lee Principles of Food Chemistry, 4rd Ed., Springer International Publishing, New York.
2. Bawa. A. S., Chauhanetal. O. P., 2013. Food Science, New India Publishing agency, New Delhi.
3. Manual of method of analysis of food for microbial testing–Food Safety and Standard Authority of India, Ministry of family welfare, Government of India, New Delhi-2012
4. Rahman. M. S., 2007. Handbook of food preservation, CRC Press, New Delhi.
5. Ramaswamy H. and Marcotte M., 2005. Food Processing Principles and Applications, CRC Press,
6. Meyer, 2004. Food Chemistry, New Age Publishers, New Delhi.
7. Frazier W.C. and Westhoff D.C., 2004. Food Microbiology, TMH Publication, New Delhi.
8. B. Srilakshmi, 2002. Food science, New Age Publishers, New Delhi.
9. Manay N.S. and Shadaksharaswamy M., 1987. Food-Facts and Principles, New Age International Ltd. Publishers, New Delhi.
10. Marion L. F., 1983. Laboratory manual in food preservation, 4th edition, Avi Publishing, New Delhi.

LAB II BFPP 116 (BASED ON BFPP 114 AND BFPP 115)

BFPP 116 FOOD MICROBIOLOGY AND PRESERVATION

Course Objectives: Student should be able to...

1. understand the principle and working of various laboratory instruments.
2. know the handling techniques of laboratory equipment.
3. explain the role of microbiology in food processing.
4. apply the preservation techniques in food.

Credits (Total Credits2)	BFPP 116 FOOD MICROBIOLOGY AND PRESERVATION	No. of hours (60 hrs)
1	To study the Introduction to the Basic Microbiology Laboratory Practices.	
2	To study the use of instruments for microbiology (Incubator, oven, autoclave, water bath etc).	
3	To study the Principle and working of analytical instrument such as colorimeter, weighing Balances, muffle furnace and centrifuge.	
4	To study the functioning and use of compound microscope.	
5	Cleaning and sterilization of glassware.	
6	To Prepare culture media (Nutrient broth, Nutrient agar, Macconkeys agar, Sabouraud's agar).Sterilization of media	
7	To prepare slant, stab and plates using nutrient agar.	
8	To study the preservation of food by the process of freezing	
9	To study the drying of food using Tray dryer/other dryers	
10	To study the preservation of food by canning. (Fruit/Vegetable/meat)	
11	To study the cut-out analysis of canned food.	
12	To study the preservation of food by osmotic dehydration.	
13	To Identify the class I preservatives from different food products	
14	To study the preservation of food by using chemical preservatives.	
15	To study the preservation of food by using sugar as preservative.	

Course Outcomes- Students will be able to...

1. recall basic microbiology laboratory practices.
2. formulate media required for cultivation of different microorganism.
3. apply techniques of cleaning and sterilization and preparation, sterilization of different media
4. elaborate the preservation of food by canning and osmotic dehydration.

REFERENCE BOOKS:

1. Ronald. A., 2013. Handbook of Media for Clinical and Public Health Microbiology, CRC Press, New Delhi.
2. Food Safety Standard Authority of India, 2012. Ministry of family welfare, Government of India, New Delhi.
3. Jayraman. J., 2011. Laboratory Methods in Biochemistry New Age International, New Delhi.
4. William G. W., 2011. Laboratory manual for food microbiology, 4th edition, I. K. Publishers, New Delhi.
5. Singh. R., Sawhney. S. K., 2009. Introductory Practical Biochemistry, Narosa,
6. Patel. R., 2009. Experimental Microbiology 5th edition, Vol. I and Vol. II, Aditya Book Centre, New Delhi.
7. Emanuel. G. and Lorrence. G., 2008. Practical Handbook of Microbiology, Taylor and Francis
8. Frazier W. C. and Westhoff D. C., 2004. Food Microbiology, TMH Publication, New Delhi,
9. Shafiur R. M., 2007. Handbook of food preservation, CRC Press, New Delhi.
10. Stanier. R. Y. Palgrave. M., 1987. General microbiology, 5th revised edition, Palgrave Macmillan, New York.
11. Wilson. K., Goulding. K. H., 1986. Principles and techniques of Practical biochemistry, 3rd edition, Edward Arnold, London.
12. Marion L. F., 1983. Laboratory manual in food preservation, 4th edition, Avi Publishing, New Delhi.
13. David T. P., 1978. An Introduction to practical biochemistry, 2nd edition, McGraw-Hill Book Company (U.K.) Ltd., London
14. Frobisher, Hinsdill, Crabtree, Good heart, 1974. Fundamentals of microbiology, 9th edition, W.B. Saunders. Company,
15. Dey and Dey, 1973. Medical bacteriology, 7th edition, Allied agency,
16. Baker F.J., 1967. Bacteriological techniques, Butterworth & Co-Publishers Ltd, New York.

SEMESTER I
OPEN ELECTIVE

SEMESTER I

COURSE BFPT 117: - FOOD SERVICE MANAGEMENT

Course Objectives: Students should be able to...

1. explain organization and management of food service institutions.
2. explain the food service and their responsibilities.
3. understand the staff management.
4. know the legal requirements in food service management.

Credits (Total Credits 02)	BFPT 117 FOOD SERVICE MANAGEMENT	No. of hours (30 hrs)
Unit-I	Definition and scope of food service Management	7
	<ul style="list-style-type: none">• Food industries - classification review of objectives and classification of food service.• Definition, principles and scope of management administrative leadership: qualifications of effective food service administrator and /or dietitians.• Responsibilities, communications, academic requirements and opportunities. Professional and trade associations. Evaluation of self and department.	
Unit-II	Planning	8
	<ul style="list-style-type: none">• Nature, importance, steps in: Planning, steps and kinds of forecasting, assessment of needs of food service based on present and future trends.• Organizing-present and future trends. Process of organization in food service.• Principles of organization, types of organization, tools of management.	
Unit-III	Staffing	7
	<ul style="list-style-type: none">• Man power planning, labor sources, selection, recruitment and training, wages, salaries, incentives, promotion, demotion, transfer, dismissal.• Directing and controlling: Direction, leadership, delegation, decentralization, centralization, supervision, human relations in industry, authority and responsibility, motivation, communication, evaluation techniques	

Unit-IV	Food cost and Accountability	8
	<ul style="list-style-type: none"> • Review of maintenance of accounts daily, weekly, monthly accounts for food, lab equipment and furnishing, rent, water, fuel, light, licenses, cleaning supplies, maintenance and miscellaneous. • Double entry book keeping, ledger accounts, journal and balance sheet, budgetary control, non-budgetary control. Cost control, fixed variable, average, marginal and unit cost, break even analysis- production planning control. 	

Course Outcomes- Students will be able to...

1. classify food services.
2. examine need of food service management.
3. make use of manpower.
4. estimate food cost and make use of accountability.

REFERENCE BOOKS:

1. Okumus, Bendegul. 2023. Norovirus and Coronavirus Risks in Food Service Settings: A Systematic Review for Future Research. Journal of Culinary Science & Technology.
2. Overbosch, Peter, and Sarah. B. 2023. "Principles and systems for quality and food safety management." In Food safety management, Academic Press, New Delhi.
3. Xu., Xiaotian, and Wai Nga Leong. 2023. "Importance of Managing Service Quality." Information Systems and Economics.
4. Yudelman, Montague, Annu R., and David F. N. 1998. Pest management and food production: looking to the future. Vol. 25. Intl Food Policy Research institute. New Delhi.
5. Singh, Prakash, sLokesh. A., and Abdulaziz C. 2023. "Consumer Behavior in the Service Industry: An Integrative Literature Review and Research Agenda." Sustainability
6. Edwards, Ferne. 2023. Food Resistance Movements: Journeying through Alternative Food Networks. Springer Nature, New Delhi.
7. Keith, Kent. 2023. The case for servant leadership. Terrace Press, New Delhi.
8. Keith, Kent. 2023. The case for servant leadership. Terrace Press, New Delhi.
9. Manay N.S. and Shadaksharaswamy M., 1987. Food-Facts and Principles, New Age International Ltd. Publishers, New Delhi.
10. Man. M., John. F., Hurst. W. J., 2018. Chang Lee Principles of Food Chemistry, 4th Edition, Springer International Publishing, New York.

COURSE BFPT 118: FOOD PRODUCTION MANAGEMENT

Course Objectives: Students should be able to...

1. understand the importance of food production management
2. illustrate the operations required for food production.
3. apply the technologies for food manufacturing.
4. know about the supply chain and management of food.

Credits (Total Credits 2)	BFPT 118 FOOD PRODUCTION MANAGEMENT	No. of hours (30 hrs)
Unit-I	Factory Design and Operations for Food Production	7
	<ul style="list-style-type: none"> • Manufacturing Principles: factory design/layout, location, HACCP, Hygiene, cleaning. • Business Operations: food law, labeling, brands, entrepreneurship, auditing, specifications 	
Unit-II	Core Skills and Technologies of Food Manufacture	8
	<ul style="list-style-type: none"> • Food composition: physical and chemical properties of key components used in food production, functionality of each ingredient to create the final product, the principle of food preservation and hygiene requirements within food industry. • Food processing: role of water in food industry and thermal processing; pasteurization, sterilization, heat flow and unit operation required to transform the materials to a food product, the effect of operations on each ingredient 	
Unit-III	Food Analysis and Developing Reporting Skills	7
	<ul style="list-style-type: none"> • Food Analysis: quality of final product in terms of safety, quality measurements and sensory evaluation, measuring the key components of food, appropriate use of data and statistics for quality management. • Developing reporting skills: designing experiment, practical and analyze the data 	
Unit-IV	Supply chain planning and management	8
	<ul style="list-style-type: none"> • Supply chain concepts and definitions: fundamental planning and control concepts for supply chain and operations planning, classification of operational and supply systems • Inventory: forms, functions, decisions, models Forecasting for supply chain and production management. 	

Course Outcomes- Students will be able to...

1. recall the food laws and specification.
2. explain the physical and chemical properties of key components in Food Production.
3. justify the effect of operations on each ingredient.
4. implement the key components of food and statistics for quality management.

REFERENCE BOOKS

1. Yudelman, Montague, Annu R., and David. F. N. 1998 Pest management and food production: looking to the future. Vol. 25. Intl Food Policy Res Inst,
2. Panghal, Anil, Navnidhi Chhikara, Neelesh Sindhu, and Sundeep Jaglan. 2018 "Role of Food Safety Management Systems in safe food production: A review." Journal of food safety 38.
3. Khan, Rao. S., John. G., Ray. W., and Alan. W. 2013 "Functional food product development–Opportunities and challenges for food manufacturers." Trends in food science & technology 30, no. 1
4. Aramyan, Lusine, Christien JM Ondersteijn, Olaf Van Kooten, and A. Oude Lansink. 2006 "Performance indicators in agri-food production chains." Frontis
5. Russ, Winfried and Roland. M. 2004 "Utilizing waste products from the food production and processing industries." Critical reviews in food science and nutrition 44, no. 1
6. Baker, Philip J., Luigi B., Stephen H., Glen. S., and Piran. C. L. 2008. "Terrestrial carnivores and human food production: impact and management." Mammal Review 38.
7. Baker, Philip. J., Luigi. B., Stephen. H., Glen Saunders, and Piran. C. L. 2008 "Terrestrial carnivores and human food production: impact and management." Mammal Review 38
8. Oenema, Oene, and Stefan. P. 2002. "Nutrient management in food production: achieving agronomic and environmental targets." AMBIO: A Journal of the Human Environment 31, no. 2
9. Rudder, Alison, Paul. A. and David. H. 2001 "New food product development: strategies for success?" British Food Journal 103,
10. Leach, Gerald. 1976. Energy and food production. IPC Science and Technology Press Ltd.

LAB III BFPP 119 (BASED ON BFPT 117 AND BFPT 118)

COURSE BFPP 119: FOOD SERVICE MANAGEMENT AND FOOD PRODUCTION MANAGEMENT

Course Objectives: Students should be able to...

1. understand the principle and working of instruments such as incubator, oven, autoclave, muffle furnace and centrifuge, etc.
2. know the method of weighing, adjusting the pH of media and sterilize the media and sterilize the media by autoclaving.
3. develop etiquettes of food service personnel.
4. explain the preservation of food by canning and osmotic dehydration.

Credits (Total Credits 2)	BFPP 119 FOOD SERVICE MANAGEMENT AND FOOD PRODUCTION MANAGEMENT	No. of hours (60 hrs)
1	To Assess student's daily diet	
2	To study Food Service equipment's	
3	To study Food Preservation techniques: Drying	
4	To prepare Menus and Cuisines: Preparation of south Indian cuisines	
5	To study general etiquettes of food service personnel	
6	To identify commonly used raw vegetables.	
7	To demonstrate and identify commonly used meat products	
8	To prepare white stock/fish stock	
9	To prepare Tomato Puree	
10	To prepare Vegetable recipes	
11	To demonstrate use of Hygienic protective clothing	
12	To demonstrate disposal procedure of waste food material	
13	To demonstrate safety practices to be observed in food in industry	
14	To demonstrate cooking methods: blanching, frying, steaming, poaching, roasting, grilling	
15	To Prepare two varieties of chutney	

Course Outcomes: Students will be able to...

1. identify commonly used raw vegetables
2. analyze different cooking methods
3. make use of cooking methods
4. formulate recipes like chutney, soup.

REFERENCE BOOKS:

1. Jose M. Lorenzo, Paulo E.S., Munekata, 2021 Sustainable Production Technology in Food , New Delhi.
2. Bali, P.S. 2019. Quantity Food Production Operations.. Oxford Press Publication, New Delhi
3. Yogesh. S. 2017. Principles of Food Production Operations, New Delhi.
4. Ayman. A. E. 2015. Food Production and Industry , TMH Publication, New Delhi,
5. Bali. P. S., 2015 International Cuisine and Food Production Management. Oxford Press Publication, New Delhi.
6. Reddy. C. S., 2015. Food Security and Food Production, TMH Publication, New Delhi.
7. Sandra. Q., Patricia. B., 2013. Encyclopedia of Biodiversity.
8. Fosket, D. and Ceserani, V. 2012. Theory of Catering. Book Power, London.
9. Tulli. K. K., 2009. Fundamentals of Food Production, TMH Publication, New Delhi.
10. Curriculum Center for Family and Consumer Sciences, 2006. Texas Tech University,
11. John B. K., 2000. Quantity : Food Production, Planning and Management, 3rd Edition, TMH Publication, New Delhi.

SEMESTER I

IKS

INDIAN KNOWLEDGE SYSTEM (IKS)

COURSE IKS 101 INDIAN TRADITIONAL FOODS

Course Objectives: Students should be able to...

1. understand the importance of Indian traditional food.
2. know the government policies for food industries
3. determine the historical and cultural perspective of traditional food
4. explain the health aspects of traditional foods.

Credits (Total Credits 2)	IKS 101 INDIAN TRADITIONAL FOODS	No. of hours (30 hrs)
Unit I	Indian Traditional Foods	7
	<ul style="list-style-type: none">• Historical and Cultural perspective• Traditional Food Patterns (typical breakfast, meal and snack foods of different regions of India, fermented foods, pickles, preserves)• Health aspects of Traditional Foods	
Unit II	South Indian Traditional Foods	8
	<ul style="list-style-type: none">• Introduction to South Indian Traditional Foods• South Indian Traditional Food Patterns(Idli, Dosa, Vada, Uttapam)• Benefits and Health Aspects of South Indian Traditional foods• Commodities and their usage in Indian Kitchen	
Unit III	North Indian Traditional Foods	7
	<ul style="list-style-type: none">• North Indian Traditional Food Patterns (Dal Makhani, Chole Bhature, Paratha, KadhiChawal)• Benefits and Health Aspects of North Indian Traditional Foods• Energy, shelf life and environmental costs of North Indian Traditional Foods	
Unit IV	Government Initiative to boost the Food Processing Industry	8
	<ul style="list-style-type: none">• Pradhan Mantri Kisan Sampada Yojana(PMKSJ)• Pradhan Mantri Formalization of Micro Food Processing Enterprises Scheme (PMFME)• Production Linked Incentive Scheme for Food Processing Industry(PLISFPI)	

Course Outcomes-Students will be able to...

1. understand the health aspects of traditional food.
2. analyze the commodities and their usage in Indian kitchen
3. determine the North Indian traditional food patterns
4. implement the government initiative to boost food processing industry

REFERENCE BOOKS :

1. Tulli. K. K., 2019. Innovations in Traditional Foods ,
2. Kristbergsson. K., Oliveira. J. 2016. Traditional Foods: General and Consumer Aspects.
3. Saunders, Raine. 2010. "What Are Traditional Foods?" Agriculture Society. New Delhi.
4. Rat. R. C., Didier. M. 2014. Microorganisms and Fermentation of Traditional Foods.
5. Gabriel. J. 2014. How to cook like a Southerner : Classic Recipes from the South's Best Down - Home Cooks
6. Jeyaram. K., Singh. A., Romi. W., Devi. A. R., Singh. W. M., Dayanithi H, 2009. Traditional fermented foods of Manipur. Indian J Traditional Knowledge,
7. Bradenton. H. 2008. Try traditional southern foods for New Years.
8. Allende. A., Tomas. F. and Gil. M. 2006. Minimal processing for healthy and Traditional Foods.
9. Sen, Colleen. T. 2005. Food Culture in India Greenwood Press, New Delhi.
10. Davidar, Ruth. N. 2001. Indian Food Science : A Health and Nutrition Guide to Traditional Recipes: East West Books, New Delhi
11. Ferrando, R. 1981. Traditional and Non Traditional Foods. FAO Food and Nutrition series, New Delhi.

SEMESTER II

MAJOR

Semester II

COURSE BFPT 121: - PRINCIPLES OF FOOD PROCESSING–II

Course Objectives: Students should be able to...

1. understand importance and future prospects of food processing industry.
2. know the classification, scope and importance of animal food processing.
3. illustrate packaging of food material.
4. explain objectives and functions of food packaging.

Credits (Total 02 Credits)	BFPT 121 PRINCIPLES OF FOOD PROCESSING-II	No. of hours (30 hours)
UNIT-I	Processing Industry	7
	<ul style="list-style-type: none">• Scope of food processing industry, importance and future Prospects.• Sectors of food processing industry, Classification of food – perishable and semi perishable food.	
UNIT-II	Principle of Plant Food Processing	8
	<ul style="list-style-type: none">• Introduction, classification, scope and importance of plant food processing industries.• Fruit and vegetable processing, cereal and legume processing, oilseeds processing	
UNIT-III	Principle of Animal Food Processing	7
	<ul style="list-style-type: none">• Introduction, classification, Scope and Importance of animal food processing industries.• Milk processing, meat processing, fish processing, poultry processing	
UNIT-IV	Effect of processing on nutritional value of food.	8
	<ul style="list-style-type: none">• Introduction, consuming raw foods, changes during meat grilling• Effect of processing on vitamins, minerals, carbohydrates, lipids.	

Course Outcomes: Student will be able to...

1. explain scope of food processing sector.
2. categorize food on the basis of perishability.
3. distinguish food processing industries.
4. protect the nutritional value of food.

REFERENCE BOOKS:

1. Mishra. J. P., Mohapatra. S., Rastogi. M, Verma. S. and Singh. V. 2023. Textbook of Integrated Farming Systems for Sustainable Agriculture. B. P. International, Kolkata.
2. Mercer, Donald G. 2023. Bridging the gap in the communication of food science knowledge and technology. Science Direct.
3. Porter, M. E. 2023. Mrs. Porter's New Southern Cookery Book. Andrews McMeel Publishing LLC. Sydney, London.
4. Greer, Sandra C., 2023. Chemistry for Cooks: An Introduction to the Science of Cooking. MIT Press, Cambridge.
5. Jafari. S. M., Hedayati, Sara, Vahid B., 2023, Cooking equipment for the food industry. In High-Temperature Processing of Food Products, Woodhead Publishing, New Delhi.
6. Girdharilal, Siddapa. G. S., Tandon. G. L., 2022. Preservation of fruits and vegetables. 3rd ed. Indian Council of Agricultural research, New Delhi.
7. Fellows, Peter John., 2021. Food processing technology: principles and practice. Woodhead publishing,
8. Jafari, Seid. M., 2021. Engineering Principles of Unit Operations in Food Processing: Unit Operations and Processing Equipment in the Food Industry. Woodhead Publishing, New Delhi.
9. Acton, Eliza., 2020. Modern cookery. Longmans publications, London.
10. Earle, Richard L. 2013. Unit operations in food processing. Elsevier Publications, Dutch.
11. Mark J. K., Coles, Richard, Derek McDowell, 2003. Food packaging technology. Vol. 5. CRC press, Boca Raton.

COURSE BFPT 122: FOOD PACKAGING–II

Course Objectives: Students should be able to...

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

Credits (Total 02 Credits)	BFPT 122 FOOD PACKAGING–II	No. of hours (30 hrs)
UNIT-I	Plastic Packaging	7
	<ul style="list-style-type: none">• 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	8
	<ul style="list-style-type: none">• 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	7
	<ul style="list-style-type: none">• 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	8
	<ul style="list-style-type: none"> • Labeling, Types of food safety problems associated with package, package labeling and food safety. • Food packaging and environment-recycling, composting, thermal treatment and landfilling 	

Course Outcomes: Students will be able to...

1. recall functional and mechanical properties of polymers.
2. implement the methods used for packaging
3. examine the labeling and food safety problems associated with package.
4. create awareness regarding recycling, composting, thermal treatment and landfill.

REFERENCE BOOKS:

1. Robertson G.L., 2012. Food Packaging - Principles and Practice 3rd Ed Narendra Publishing House. New Delhi
2. Robertson G.L., 2009. Food Packaging and Shelf life : A Practical Guide , Narendra Publishing House ,New Delhi
3. Singh R.P. and Heldman D.R. 2010. Introduction to Food Engineering, Academic Press, New Delhi.
4. John, P.J. A. 2008. Handbook on Food Packaging. Narendra Publishing House, New Delhi.
5. Robertson. G. L., Taylor and Francis. G. B., 2006. Food Packaging: Principles and Practice, 3rd Ed. London New York press.
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7. Shrilakshmi. B. 2003. Food Science, New Age International Publishers, New Delhi
8. Ahvenainen. R. 2003 Novel Food Packaging Techniques, 1st Ed, Woodhead Publishing Limited. New Delhi.
9. Richard C., McDowell. M. and Mork. J. 2003 Food Packaging Technology, CRC press, New Delhi.
10. Gosby. N.T. 2001. Food Packaging Materials. Applied Science Publication, New Delhi.
11. Frank A. P. 1983. A Handbook of Food Packaging, ARM publications. Bangalore

LAB BFPP 123 (BASED ON BFPT 121 AND BFPT 122)
BFPP 123: - PRINCIPLES OF FOOD PROCESSING AND PACKAGING-II

Course Objectives: Students should be able to...

1. know the principle and working of pulping and paste making.
2. explain the principle and working of frying and toasting processes.
3. know the principle and working of tearing, bursting and tensile strength.
4. compare transmission rate of various packaging materials.

Credits (Total Credits 2)	BFPP 123 PRINCIPLES OF FOOD PROCESSING AND PACKAGING-II	No. of hours (60 hrs.)
1	To study the principle and working of pulping process.	
2	To study the principle and working of Paste process.	
3	To study the principle and working of frying process.	
4	To study the principle and working of toasting process.	
5	To study and determine grease resistance of packaging materials.	
6	To study and determine water vapor transmission rate of various packaging materials.	
7	To study the preparation of labels for different types of food products according to package labeling laws.	
8	To study and determine tear resistance of different packaging materials.	
9	To study and determine bursting strength of different packaging materials.	
10	To study and determine tensile strength of different packaging materials.	
11	To study and determine folding endurance of paper, plastic and other packaging material.	
12	To study the measurement of stiffness of packaging material (Paperboard).	
13	To study and measure the quantity of oxygen, carbon dioxide and nitrogen in headspace of packaged product.	
14	To study and determine tin coating weight.	
15	To identify and separate different types of plastic	

Course Outcomes: Students will be able to...

1. make use of pulping, paste making, frying and toasting principle.
2. analyze tear resistance, bursting strength, tensile strength of packaging material.
3. design labels for different food products.
4. compare different type food packaging materials.

REFERENCE BOOKS:

1. George.W. 2023. Handbook of odors in plastic materials. Elsevier Publications, New Delhi.
2. Fellows. P., Peter J. 2022. Food processing technology: principles and practice. Woodhead publishing, New Delhi.
3. Proctor and Andrew, 2018. Alternatives to Conventional Food Processing 2nd Edition. Vol. 53. Royal Society of Chemistry, London.
4. Robertson, Gordon L. 2016. Food packaging: principles and practice. CRC press, New Delhi.
5. Baker, Christopher. G. J., Ranken. M. D., and Kill. R. C. 2012. Food industries manual. Springer Science & Business Media, Bangalore
6. Kadoya, Takashi, 2012. Food packaging. Academic Press, New Delhi.
7. Heldman, Dennis R., 2012. Food process engineering. Springer Science & Business Media, New Delhi.
8. Ramaswamy, Hosahalli. S., and Michele. M. 2005. Food processing: principles and applications. CRC Press, New Delhi
9. Weaver, Connie M., and James R. D. 2003. The food chemistry laboratory: a manual for experimental foods, dietetics, and food scientists. CRC press, New Delhi.
10. Barham, Peter, John. S.A., Edwards and Joachim M. S. 2001. The science of cooking. Berlin: Springer, New Delhi.

SEMESTER II

MINOR

COURSE BFPT 124: FOOD MICROBIOLOGY –II

Course Objectives: Students should be able to...

1. understand the role of microbes in contamination of food and spoilage of food.
2. know the cultivation of micro-organisms
3. demonstrate the stains and staining techniques.
4. illustrate identification of bacteria.

Credits (Total Credits 2)	BFPT 124 FOOD MICROBIOLOGY-II	No. of hours (30 hours)
UNIT-I	Microbial contamination of food and spoilage of food.	7
	<ul style="list-style-type: none"> • Contamination from air, water, soil, sewage, Techniques for evaluation of contamination, Spoilage of Specific Food Products. • Food poisoning, Intoxication, Food borne illness. 	
UNIT-II	Cultivation of Micro-organisms	8
	<ul style="list-style-type: none"> • Pure culture technique, Methods of isolation and cultivation. • Enumeration of Microorganisms- qualitative and quantitative 	
UNIT-III	Stains and staining techniques	7
	<ul style="list-style-type: none"> • Classification of stains- acidic, basic and neutral, Principles, Procedures, mechanisms and applications of staining procedures. • Simple staining, Negative staining, Gram staining, Differential staining. 	
UNIT-IV	Identification of bacteria	8
	<ul style="list-style-type: none"> • Maintenance of stock cultures – (Agar slants and Agar stabs) Systematic study of pure cultures: • Morphological characteristics. • Cultural characteristics • Biochemical Characteristics-Sugar fermentation, Production of metabolites -H₂S gas, Production of enzymes - Amylase, Caseinase and Catalase Serological and genetic characteristic 	

Course Outcomes: Students will be able to...

1. find the microbial contamination of food and techniques for evaluation of contamination.
2. examine microorganisms from food.
3. explain the principle, mechanism, procedure and applications of different staining procedures.
4. elaborate the biochemical characteristics for identification of microorganism.

REFERENCE BOOKS:

1. Ananthanarayan and Paniker's, 2016. A Textbook of Microbiology, 7th edition. Orient Blackswan, Hyderabad.
2. Tolaro. K.P., 2009. Foundations in Microbiology, 7th International edition. McGraw Hill Education, Bangalore.
3. Michael. T. M., Thomas. D. B., 2008. Brock biology of microorganisms, 12th edition, CA: Pearson/Benjamin Cummings, San Francisco
4. Purohit S. S., 2003. Microbiology fundamentals and applications, 6th edition, Agrobios Publisher, Jodhpur.
5. Frazier W.C. and Westhoff D.C. 2004. Food Microbiology, TMH Publication, New Delhi.
6. Stanier. R.Y., Ingraham. J. L., Wheelis. M. L. and Painter. P. R., 2001. General Microbiology, 5th edition, Macmillan Education Ltd., London.
7. Michael J. P., Chan. C. S., Noel R. K., 1986. Microbiology 5th edition, McGraw Hills Publication, America.
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9. Martin. F., 1962. Fundamentals of Microbiology W. B. Saunders, 7th edition, Philadelphia. U.S.
10. Adams, Martin R., Maurice O. Moss, and Maurice O. Moss. 2000. Food microbiology. Royal society of chemistry, Cambridge.

COURSE BFPT 125 : FOOD PRESERVATION II

Course Objectives: Students should be able to ...

1. understand mechanism of action of radiation in food preservation.
2. know effect of radiation on microorganisms.
3. illustrate the non-thermal preservation of food.
4. explain the plasma, bio-preservation and hurdle technology.

Credits (Total Credits-2)	BFPT 125 FOOD PRESERVATION-II	No. of hours (30 hrs)
UNIT-I	Food preservation by radiation	7
	<ul style="list-style-type: none">•Introduction and units of irradiation, Mechanism of action of radiation, Radiation process•Effect of radiation on food, Effect of radiation on Microorganisms	
UNIT-II	Non-thermal preservation of food	8
	<ul style="list-style-type: none">•Pulsed electric field processing, Ohmic heating, Dielectric heating, Microwave processing	
UNIT-III	Other methods non-thermal food preservation	7
	<ul style="list-style-type: none">•Infrared heating• High pressure processing• Processing using ultrasound	
UNIT-IV	Recent methods of food preservation	8
	<ul style="list-style-type: none">•Plasma• Bio-preservation• Hurdle technology	

Course Outcomes- Students will be able to...

1. choose the non-thermal preservation techniques for food preservation.
2. apply non-thermal preservation techniques as dielectric heating and Microwave processing.
3. explain thermal preservation techniques as high-pressure processing and ultrasound.
4. elaborate the preservation techniques-plasma and bio-preservation.

REFERENCE BOOKS:

1. Man. M., John. F., Hurst. W. J., 2018. Chang Lee Principles of Food Chemistry, 4rd Ed., Springer International Publishing, New York.
2. Bawa. A. S., Chauhanetal. O. P., 2013. Food Science, New India Publishing agency, New Delhi.
3. Manual of method of analysis of food for microbial testing–Food Safety and Standard Authority of India, Ministry of family welfare, Government of India, New Delhi-2012
4. Rahman. M. S., 2007. Handbook of food preservation, CRC Press, New Delhi.
5. Ramaswamy H. and Marcotte M., 2005. Food Processing Principles and Applications, CRC Press,
6. Meyer, 2004. Food Chemistry, New Age Publishers, New Delhi.
7. Frazier W.C. and Westhoff D.C., 2004. Food Microbiology, TMH Publication, New Delhi.
8. B. Srilakshmi, 2002. Food science, New Age Publishers, New Delhi.
9. Manay N.S. and Shadaksharaswamy M., 1987. Food-Facts and Principles, New Age International Ltd. Publishers, New Delhi.
10. Marion L. F., 1983. Laboratory manual in food preservation, 4th edition, Avi Publishing, New Delhi.

LAB V BFP 126 (BASED ON BFPP 124 AND BFPP 125)

LAB BFP 126: FOOD MICROBIOLOGY AND PRESERVATION-II

Course Objectives: Students should be able to...

1. recall the isolation of bacteria by streak plate technique, isolation of molds from foods.
2. know detection ability of bacteria to produce casein enzyme and sugar fermentation.
3. illustrate use of natural and chemical preservatives in food preservation.
4. explain the effect of surface area of food on drying rate.

Credits (Total Credits 2)	BFFP 126 FOOD MICROBIOLOGY AND PRESERVATION-II	No. of hours (60 hours)
1	To study the isolation of bacteria by streak plate technique.	
2	To study the staining methods- (Mono chrome staining, Gram staining, Negative staining).	
3	To study the isolation of molds from foods.	
4	To determine SPC of food sample.	
5	To detect the ability of bacteria to produce casein as enzyme.	
6	To detect the ability of bacteria to ferment sugar	
7	To study the cultivation of anaerobic bacteria	
8	To determine quality characteristics of foods preserved by drying/dehydration/freezing	
9	To study the pasteurization of fluids using different methods	
10	To study the effect of surface area of food on drying rate.	
11	To study the preservation of food by using natural preservatives.	
12	To study the preservation of food by using chemical preservatives	
13	To study the preservation of food using sugar as a preservative	
14	To study the preservation of food by using oil as a preservative	
15	To study the preservation of food by using salt as a preservative	

Course Outcomes:- students will be able to...

1. recall techniques of isolation of bacteria by streak plate, isolation of molds from foods.
2. apply the staining methods.
3. examine the detection the ability of bacteria to produce caseins enzyme and sugar fermentation.
4. choose the method of food preservation to preserve the different types of food.

REFERENCE BOOKS

1. Ronald. A., 2013. Handbook of Media for Clinical and Public Health Microbiology, CRC Press, New Delhi.
2. Food Safety Standard Authority of India, 2012. Ministry of family welfare, Government of India, New Delhi.
3. Jayraman. J., 2011. Laboratory Methods in Biochemistry New Age International, New Delhi.
4. William G. W., 2011. Laboratory manual for food microbiology, 4th edition, I. K. Publishers, New Delhi.
5. Singh. R., Sawhney. S. K., 2009. Introductory Practical Biochemistry, Narosa,
6. Patel. R., 2009. Experimental Microbiology 5th edition, Vol. I and Vol. II, Aditya Book Centre, New Delhi.
7. Emanuel. G. and Lorrence. G., 2008. Practical Handbook of Microbiology, Taylor and Francis
8. Frazier W. C. and Westhoff D. C., 2004. Food Microbiology, TMH Publication, New Delhi,
9. Shafiur R. M., 2007. Handbook of food preservation, CRC Press, New Delhi.
10. Stanier. R. Y. Palgrave. M., 1987. General microbiology, 5th revised edition, Palgrave Macmillan, New York.
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13. David T. P., 1978. An Introduction to practical biochemistry, 2nd edition, McGraw-Hill Book Company (U.K.) Ltd., London
14. Frobisher, Hinsdill, Crabtree, Good heart, 1974. Fundamentals of microbiology, 9th edition, W.B. Saunders. Company,
15. Dey and Dey, 1973. Medical bacteriology, 7th edition, Allied agency,
16. Baker F.J., 1967. Bacteriological techniques, Butterworth & Co-Publishers Ltd, New York.

SEMESTER II
OPEN ELECTIVE

SEMESTER –II

COURSE-BFPT 127:- DAIRY PRODUCTION AND MANAGEMENT

Course Objectives: Student should be able to...

1. understand the basics of dairy product management.
2. know the implementation of food safety quality management system.
3. illustrate and conduct the various audits.
4. explain and maintain the documentation and book keeping records.
- 5.

Credits (Total 02 Credits)	BFPT 127 DAIRY PRODUCTION AND MANAGEMENT	No. of hours (30 hours)
UNIT-I	Dairy Production management	7
	<ul style="list-style-type: none">• Introduction to Dairy, Importance of Dairy management, management and supervision, production efficiency, Inventory management.• Organizational structure:-director, human resource management, production, quality control and quality assurance, SAP and dispatch	
UNIT-II	Food safety and quality management system in Dairy Industries	8
	<ul style="list-style-type: none">• Food safety and management system, total quality management, statistical quality control, FSSAI schedule IV• GMP, GHP, GLP, HACCP, Kaizen, 5-S. Training individuals, traceability and recall procedures, risk analysis, cleaning and maintenance.	
UNIT-III	Management system and auditing	7
	<ul style="list-style-type: none">• Introduction to management system, ISO 22000, ISO 9001, ISO14001, OHSAS18001, ISO27001. Different certifications required for the food industries. PDCA cycle.• Introduction to auditing, types of audits, classification of audit, Auditing bodies, clauses, principles of auditing, managing an audit program.	
UNIT-IV	Accreditation and Documentation	8
	<ul style="list-style-type: none">• Introduction to Accreditation, standardization and validation. International accreditation forum, international laboratory accreditation co-operation, quality council of India, NABL accreditation.• Documentation and records: Quality manual, SOP document records.	

Course Outcomes: Student will be able to...

5. analyze the organizational management of industry.
6. apply about food quality management system of food industries.
7. participate in various certifications and auditing bodies.
8. implement documental need of the food industry.

REFERENCE BOOKS:

1. Pascal Dennis, quality safety and environment-synergy in 21st century, ASQC quality press, Milwaukee, Wisconsin, 1997.
2. ISO 9001: 2008 quality management systems- requirements, International organization for standardization, Geneva.
3. FSSAI training manual bakery level II
4. Handbook of confectionary industries- SIRI Board of consultants and Engineers
5. Codex Alimentarius Commission recommended international code of practice, general principles of food hygiene, CAC/RCP1-1969, REV. 4-2003.
6. March, M. D., M. J. Haskell, M. G. G. Chagunda, F. M. Langford, and D. J. Roberts. "Current trends in British dairy management regimens." *Journal of dairy science* 97, no. 12 (2014): 7985-7994.
7. Butler, Gillian, Jacob Holm Nielsen, Mette Krogh Larsen, Brita Rehberger, Sokratis Stergiadis, A. Canever, and Carlo Leifert. "The effects of dairy management and processing on quality characteristics of milk and dairy products." *NJAS-Wageningen Journal of Life Sciences* 58, no. 3-4 (2011): 97-102.
8. Petrov, Pylyp, Yaroslava Zhukova, and Demikhov Yuriy. "The effects of dairy management on milk quality characteristics." *Turkish Journal of Agriculture-Food Science and Technology* 4, no. 9 (2016): 782-786.
9. Devir, S., J. A. Renkema, R. B. M. Huirne, and A. H. Ipema. "A new dairy control and management system in the automatic milking farm: Basic concepts and components." *Journal of Dairy Science* 76, no. 11 (1993): 3607-3616.
10. Barnouin, Jacques, Severine Bord, S. Bazin, and Michelle Chassagne. "Dairy management practices associated with incidence rate of clinical mastitis in low somatic cell score herds in France." *Journal of dairy science* 88, no. 10 (2005): 3700-3709.

COURSE BFPT 128:- MANAGEMENT OF BAKERY AND CONFECTIONARY INDUSTRIES

Course Objectives: Students should be able to...

1. understand the basics of bakery and confectionary management.
2. know the implementation of food safety quality management system.
3. illustrate and conduct the various audits.
4. explain and maintain the documentation and book keeping records.

Credits (Total 02 Credits)	BFPT 128 MANAGEMENT OF BAKERY AND CONFECTIONARY INDUSTRIES	No. of hours (30 hours)
UNIT-I	Bakery and Confectionary Management	7
	<ul style="list-style-type: none"> • Introduction to bakery and confectionary, importance of bakery and confectionary management, management and supervision, production efficiency, inventory management. • Organizational structure: - director, human resource management, production, quality control and quality assurance, SAP and dispatch, etc. 	
UNIT-II	Food Safety and Quality Management System in Bakery and Confectionary Industries	8
	<ul style="list-style-type: none"> • Food safety and management system, total quality management, statistical quality control, FSSAI schedule IV • GMP, GHP, GLP, HACCP, Kaizen, 5-S. Training individuals traceability and recall procedures, risk analysis, cleaning and maintenance. 	
UNIT-III	Management System and Auditing	7
	<ul style="list-style-type: none"> • Introduction to management system, ISO22000, ISO9001, SO14001, OHSAS 18001, ISO 27001. Different certifications required for the food industries. PDCA cycle • Introduction to auditing, types of audits, classification of audit, Auditing bodies, clauses, principles of auditing, managing an audit programme. 	

UNIT-IV	Accreditation and Documentation	8
	<ul style="list-style-type: none"> • Introduction to Accreditation, standardization and validation. International accreditation forum, international laboratory accreditation co-operation, quality council of India, NABL accreditation, etc. • Documentation and records: Quality manual, SOP document, records. 	

Course Outcomes: Student will be able to...

1. analyze organizational management of industry.
2. apply food quality management system of food industries.
3. participate in various certifications and auditing bodies.
4. implement documental need of the food industry.

REFERENCE BOOKS:

1. Lipper, Leslie, Philip Thornton, Bruce M. Campbell, Tobias Baedeker, Ademola Braimoh, Martin Bwalya, Patrick Caron et al. "Climate-smart agriculture for food security." Nature climate change 4, no. 12 (2021)
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LAB VI BFPP 129 (BASED ON BFPT 127 AND BFPT 128)

BFPP 129: - DAIRY PRODUCTION MANAGEMENT AND MANAGEMENT OF BAKERY AND CONFECTIONARY INDUSTRIES

Course Objectives: Students should be able to...

1. understand the role of quality control and quality assurance.
2. know the quality management system.
3. explain the process of auditing.
4. develop the sops and documental process.

Credits (Total Credits 2)	BFPP 129 DAIRY PRODUCTION MANAGEMENT AND MANAGEMENT OF BAKERY AND CONFECTIONARY INDUSTRIES	No. of hours (60 hours)
1	To study the quality assurance procedure of dairy industry.	
2	To study the documentation of good manufacturing practices of dairy industry.	
3	To prepare quality manual of dairy industry	
4	To study various terms use in the HACCP system of dairy industry.	
5	To study the applications of HACCP of dairy industry	
6	To study the surveillance audit of dairy industry.	
7	Study of plan documents and records of dairy industry.	
8	To study the quality assurance procedure of bakery and confectionary industry.	
9	To study the documentation of good manufacturing practices of bakery and confectionary industry.	
10	To prepare quality manual of bakery and confectionary industry.	
11	To study various terms use in the HACCP system of bakery and confectionary industry.	
12	To study the applications of HACCP of bakery and confectionary industry.	
13	To study the surveillance audit of bakery and confectionary industry	
14	Study of plan documents and records of bakery and confectionary industry	
15	Study of post audit activities.	

Course Outcomes: Students will be able to...

1. identify the audit procedure.
2. analyze food safety management system in food industry.
3. measure the hazard analysis critical control point.
4. create the documents required in food industry.

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11. Pomeranz Y and Meloan C. Food Analysis: Theory and Practice. Aspen Publication, Maryland. 2000
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SEMESTER II

SEC

SEC- 103 ANALYTICAL TECHNIQUES – I

Course Objectives: Student should be able to...

1. Understand the methods of proximate analysis of food.
2. Know different types of solution

Credits (Total Credits 1)	SEC-103 ANALYTICAL TECHNIQUES – I	No. of hours (15 hours)
UNIT I	Proximate Analysis of Food	8
	Introduction, Preparation of sample, Methods for estimation of moisture, protein, fat, fiber, ash and carbohydrate.	
UNIT II	Types of Solution	7
	Molar Solution, Normal solution, Colloidal solutions, Buffer solutions, Measurement of pH, acidity.	

Course Outcomes: Students will be able to...

1. apply the methods of proximate analysis of food.
2. prepare different types of solution

Reference Books:

1. Morris B. Jacobs, The chemical analysis of foods and food products, CBS Publishers and distributors New Delhi, III Edition, 2000.
2. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, Tata McGraw Hill Publishing Co. New Delhi.,3rd edition,2007.
3. D.T. Plummer, An introduction to practical biochemistry, Tata McGraw Hill Publishing Co. New Delhi, 3rd edition, 2004.
4. Pomeranz Y., Meloan, Food Analysis: Theory and practice, Clifton E. 1994. 3 Edn. IS: 6273 (Part- 1and Part-2). Chapman and Hall, 3rd edition, 2004.

LAB-I
ANALYTICAL TECHNIQUES –I

Course Objectives: Student should be able to...

1. Know the primary and secondary solution.
2. explain methods of the determination of moisture content, ash content, fat content, fiber content, protein content of indifferent food sample.

Credits (Total Credits 1)	ANALYTICAL TECHNIQUES – I	No. of hours (30 hours)
1	To estimate carbohydrates by phenol sulfuric acid method.	
2	To estimate protein by Biuret method.	
3	To estimate reducing sugar from food	
4	To estimate non- reducing sugar from food	
5	To study the preparation of primary solutions.	
6	To study the preparation of secondary solutions.	
7	To determine the pH of different food samples.	
8	To determine the acidity of given food samples	
9	To determine the moisture Content from given food samples	
10	To determine the ash content from given food samples.	
11	To determine the fiber content from given food samples.	
12	To determine the fat content from given food samples.	
13	To determine dietary fiber from food	
14	To study the preparation of Normal solution	
15	To study the preparation of Molar solution	

Course Outcomes: Students will be able to...

1. analyze the fat and acidity indifferent food sample.
2. determine moisture content, ash content, fat content, fiber content, protein content of indifferent food sample.

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