B. Sc. Food Science and Technology (5th Semester) w.e.f. 2022-23 & 2023-24 onwards								
Sr. No.	**Subject**	**Course ID**	**Credits**	**Contact Hours per week**	**Internal Assessment (IA)***	**External Exam**	**Maximum Marks**	**Duration of Exam (hours)**
1.	Food Additives (T)	BSc/FST/SM/5/DSC/301	3	3	25	50	75	3
	Food Additives (P)		1	2			25	3
2	Technology of milk and milk products (T)	BSc/FST/SM/5/DSC/302	3	3	25	50	75	3
	Technology of milk and milk products (P)		1	2			25	3
3	Technology of Cereals & Pulses (T)	BSc/FST/SM/5/DSC/303	3	3	25	50	75	3
	Technology of Cereals & Pulses (P)		1	2			25	3
4	Technology of Beverages (T)	BSc/FST/SM/5/DSC/304	3	3	25	50	75	3
	Technology of Beverages (P)		1	2			25	3
5.	A Bakery Technology (T)	BSc/FST/SM/5/MIC/301 A	3	3	25	50	75	3
	A Bakery Technology (P)		1	2			25	3
	B Fermented and unfermented products From fruits and vegetables(T)	BSc/FST/SM/5/MIC/301 B	3	3	25	50	75	3
	B Fermented and unfermented products From fruits and vegetables (P)		1	2			25	3
6.	Internship		4					
Total			24					

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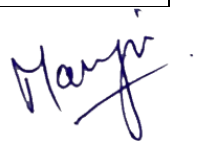
B. Sc. Food Science and Technology (6th Semester) w.e.f. 2022-23 & 2023-24 onwards								
Sr. No.	**Subject**	**Course ID**	**Credits**	**Contact Hours per week**	**Internal Assessment (IA)***	**External Exam**	**Maximum Marks**	**Duration of Exam (hours)**
1.	Technology of Meat, Fish & Poultry (T)	BSc/FST/SM/6/DSC/305	3	3	25	50	75	3
	Technology of Meat, Fish & Poultry (P)		1	2			25	3
2.	Technology of Fruits & Vegetables (T)	BSc/FST/SM/6/DSC/306	3	3	25	50	75	3
	Technology of Fruits & Vegetables (P)		1	2			25	3
3.	Food Packaging (T)	BSc/FST/SM/6/DSC/307	3	3	25	50	75	3
	Food Packaging (P)		1	2			25	3
4.	Confectionery & Sugar Technology (T)	BSc/FST/SM/6/DSC/308	3	3	25	50	75	3
	Confectionery & Sugar Technology (P)		1	2			25	3
5.	A Technology of breakfast cereals (T)	BSc/FST/SM/6/MIC/302 A	3	3	25	50	75	3
.	A Technology of breakfast cereals (P)		1	2			25	3
	B Quality control and packaging of fruits and vegetables (T)	BSc/FST/SM/6/MIC/302 B	3	3	25	50	75	3
	B Quality control and packaging of fruits and vegetables (P)		1	2			25	3
6.	Food Extrusion Technology (T)	SEC	2	2	20	30	50	2
Total			22					



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Food Additives

(CREDITS: THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/5/DSC/301- Food Additives (Theory)

Credits: 3 Duration of exam: 3 Hrs.
Periods per week: 3 Hrs. Max. Marks: 75
Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Introduction to food additives: general classification, their types and uses in different foods. Advantages of additives in food processing and preservation. Natural, synthetic and nature identical food additives. Labelling requirements and safety issues. Classification of spices, condiments and flavoring agents used in foods.

UNIT-II

Food preservatives: Antioxidants, antimicrobial agents and anti-browning agents (uses, funtions and properties). Class-I and Class-II preservatives.

Food colours and pigments: natural, synthetic and nature identical food colours, their properties, uses and functions in foods.

Nutritive and non-nutritive sweeteners: their properties, uses and applications in foods.

Acidulants and pH controlling agents: acids, bases and buffers (properties and uses in foods).

UNIT-III

Emulsifiers/surface active agents, Stabilizers, Thickerners, Firming agents, Gelling agents, Foaming agents, Anti-caking agents/Humectants, Sequestrants/chelating agents, Clarifying agents, flavoring agents/flavor enhancers, bleaching agents and enzymes used in foods: their uses, functions and properties.

Recommended books:

1. Branen, A.L., Davidson, P.M., Salminen, S. and Thorngate J.H. III (2002). Food Additives. (2nd edition). Marcel Dekker Inc. New York.
2. Owen R. Fennema (1996). Food Chemistry. (3rd edition). Marcel Dekker Inc. New York.

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3. Belitz, H.-D., Grosch, W. and Schieberle, P. (2009). Food Chemistry. (4th edition). Springer-Verlag Berlin, Heidelberg.
4. N. Shakuntala Manay and M. Shadaksharaswamy (2008). Foods: Facts and Principles. (3rd edition) New Age International (P) Ltd. Publishers, New Delhi.
5. John M. deMan (1999). Principles of Food Chemistry (3rd edition). Aspen Publishers, Inc. Gaithersburg, Maryland.
6. Purseglove, J.W.(1998). 'Spices' (Vol. I and II). Longman Publishers.
7. Tainter, D.R. and Grenis, A.T. (1993). Spices and Seasonings – A Food Technology Handbook. VCH Publishers, Inc.
8. Farrell, K.T. (1985). Spices, Condiments and Seasonings. AVI Publishing, Inc.

BSc/FST/SM/5/DSC/301- Food Additives (Practical)

Credits: 1 Duration of exam: 3 Hrs.

Periods per week: 2 Hrs. Max. Marks: 25

1. Description of generally recommended as safe (GRAS) food additives.
2. Spectrophotometric method for total chlorophyll determination.
3. Clarification of fruit juices with various chemical and physical methods.
4. Use of additives in bakery, fruits, vegetables, milk and meat products.
5. Detection of adulteration in milk.
6. Detection of adulteration in cereals.
7. Detection of adulteration in oils & fats
8. Detection of adulteration in spices.

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Technology of Milk & Milk Products

(CREDITS: THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/5/DSC/302- Technology of Milk & Milk Products (Theory)

Credits: 3
Periods per week: 3 Hrs

Duration of exam: 3 Hrs.
Max. Marks: 75

Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Milk: Definition, composition of milk, important characteristics of major constituents of milk i.e. milk fat, milk proteins, lactose and minerals and minor constituents of milk.

Properties of milk: Physical, chemical and nutritive properties of milk, factors affecting the quality and quantity of milk produced by milch animals.

UNIT-II

Market Milk: Brief introduction to Standard milk, Toned milk, Double toned milk, Flavoured milk, Vitamin enriched milk, Reconstituted milk and recombined milk.

Milk Processing: Straining, filtration and clarification, standardization: definition of standardization, purpose and uses of standardization process, use of Pearson's square method to solve the standardization problems in dairy industry.

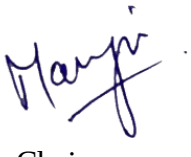
UNIT-III

Homogenization: Definition, Effect of homogenization on milk. Uses of homogenization, **Pasteurization**: Definition, purposes and objects of pasteurization–LTLT and HTST processes of pasteurization.

Sterilization: Definition, Method for manufacturing sterilized flavoured milk, UHT process.

Recommended Books:

1. Outlines of Dairy Technology by Sukumar De, 1980, Oxford University Press, UK.
2. Milk & Milk Products by Eckles, Combs, Henery C, and Willes C, 1997, Tata McGraw Hill Publishers, USA.
3. Principles of Dairy Processing by Warner JN, 1976, Wiley Science Publishers, USA.



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BSc/FST/SM/5/DSC/302-- Technology of Milk & Milk Products (Practical)

Credits: 1 Duration of exam: 3 Hrs.

Periods per week: 2Hrs. Max. Marks: 25

1. Sampling equipment and sampling of milk.
2. Platform tests (Acidity, COB and Alcohol test).
3. Organoleptic Tests.
4. Determination of milk fat percentage by Gerber's method.
5. Determination of specific gravity by lactometer.
6. Determination of SNF percentage and TS percentage of milk with lactometer.
7. Detection of common adulterants and preservatives of milk.
8. Reporting on the suitability of milk for heat processing.
9. Reporting on the quality of given sample of milk.
10. Visit to milk processing plants/NDRI, Karnal.

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Technology of Cereals & Pulses

CREDITS: (THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/5/DSC/303 Technology of Cereals & Pulses (Theory)

Credits: 3 Duration of exam: 3 Hrs.

Periods per week: 3 Hrs Max. Marks: 75

Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Wheat: Wheat milling, flour types and usage, Improvers and Bleachers: their principle and action. Quality criteria for wheat flour, physical dough testing instruments,

Wheat based bakery products: Major and minor ingredients used for bakery products, leavening agents. Preparation methods of bread, cookies and cakes.

UNIT-II

Rice: Traditional and modern milling of paddy. Parboiling of paddy: various methods of parboiling and their advantages and disadvantages, changes in rice during parboiling Storage and uses of rice bran, Rice Bran Oil: extraction of rice bran oil, processing and its applications in food industry.

Corn: Corn dry and wet milling, products of wet and dry milling and their application. Corn starch and corn sweeteners, corn germ oil extraction and its application in food.

UNIT-III

Pulses: Introduction and chemical composition of pulses, Milling of pulses: Decortication and polishing of pulses.

Pulses based food products: Pulse protein concentrates, process of concentrates formation and their application, Soybean curd and milk. Protein enriched cereal foods. Extruded soybean products: processing and advantages.

Recommended Books:

1. Technology of Cereals by Kent N. L. and Evers AD, 4th Ed., 1983, Woodhead Publishing Ltd., UK.

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2. Principle of Cereal Science & Technology by Kent. NL, 1983, Pergamon Press, London, UK.
3. The Chemistry & Technology of Cereal as Food & Feed by Maiz S.A, 1996, CBS Publishers, New Delhi.
4. Food Science by Potter N, 5th Ed., 2006, CBS Publisher, New Delhi.

BSc/FST/SM/5/DSC/303- Technology of Cereals & Pulses (Practical)

Credits:1 Duration of exam: 3 Hrs.
Periods per week: 2 Hrs. Max. Marks: 25

1. Physico-chemical testing of wheat and rice.
2. Milling of rice and assessment of per cent of head, broken, immature kernels degree of polishing etc.
3. Parboiling and evaluation of quality of parboiled rice.
4. Evaluation of cooking quality of rice.
5. Conditioning and milling of wheat.
6. Determination of quality characteristics of flours.
7. Rheological properties of dough using Farinograph/Extensograph/Mixograph.
8. Pasting properties of starches using Visco-amylograph/RVA.
9. Baking of bread, cookies and cakes and evaluation of their quality.
10. Processing of paste goods and evaluation of their quality.
11. Extrusion cooking and quality evaluation of extrudates.
12. Visit to wheat and rice, processing plants.

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Technology of Beverage

(CREDITS: THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/5/DSC/304 Technology of Beverage (Theory)

Credits: 3 | Duration of exam: 3 Hrs.
Periods per week: 3 Hrs | Max. Marks: 75
Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Unit I

Beverages: Definition, types, importance of beverages in our diets.Treatment of water for food industry.

Technology of alcoholic beverages: Wine, cider, brandy, Perry, toddy, bear and whisky.

Unit II

Manufacturing of carbonated beverages and technology of carbonation.

Technology of soft drinks, ingredients and additives used in production of soft drinks.

Citrus beverages, whey beverages and utilization of whey in development of fortified drinks, use oflow calorie sweeteners in beverages.

Unit III

Production, processing and chemistry of tea manufacturing and types of tea.

Production, processing, roasting and brewing of coffee, soluble coffee, decaffeinated coffee, monsooncoffee, coffee brew concentrate and chicory.

Recommended Books:

1. Tressler, Donald K. and Joslyn, Maynard A. 1971 Fruit and Vegetable Juice processinTechnology,Second Edition. The AVI Pub. Com., Inc. USA.

2. ManayShakuntala N and Shadaksharaswamy, M. Foods : Facts and Principles. 2nd edition New AgeInter. Publishers, New Delhi.

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3. Haard, N.F. and Salunkhe, D.K. 1975. Postharvest Biology and Handling of Fruits and Vegetables.AVI, Westport.
4. Kader, A. A. 1992. Postharvest Technology of Horticultural Crops, 2nd Ed. University ofCalifornia, Division of Agriculture and National Resources, California

BSc/FST/SM/5/DSC/304 Technology of Beverage (Practical)

Credits:1 Duration of exam: 3 Hrs.

Periods per week: 2 Hrs. Max. Marks: 25

1. Determination of water quality parameters for beverage industry:

   i. Hardness of water
   ii. Determination of pH
   iii. Microbiology of water

2. Determination of quality parameters for alcoholic and non-alcoholic beverages.

3. Extraction and clarification of juices from different sources.

4. Extraction and debittering of citrus juice.

5. Evaluation of quality testing parameters of wines.

6. Chemical and sensory quality analysis of soft drink.

7. Preparation of whey based beverages.

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Bakery Technology
(CREDITS: THEORY - 03 PRACTICAL - 01)
BSc/FST/SM/5/MIC/301 A - Bakery Technology (Theory)

Credits: 03 Duration of exam: 03 Hrs
Periods per week: 03Hrs Max. Marks: 75 Theory:50 IA:25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Unit-I

History of Bakery - Present Trends - Prospects - Nutrition facts of Bakery goods

Raw materials used in Bakery - Flour - Types of flour - Flour characteristics - Water - Sources - Functions - Usage of Water; Salt - Role of Salt

Yeast, Yeast Production - Enzymes - their functions in dough

Sugar and Milk - Properties and Role of milk and Sugar in Bakery

Different Leavening agents - their functions in Baking Industry

Spices used in baking and their functions

Flavoring - Nuts and fruits - their function in bread making

Food colours

Setting materials - types - their function in baking;

Unit-II

Bakery unit operations including mixing - fermentation - Proofing - baking

Formula construction and computation of yeast raised products; types of breads, bread faults and remedies.

Setting up of a Bakery Unit - Bakery equipment required - types - Selection - Maintenance - Bakery norms and Standards

Unit-III

Biscuits - Ingredients - Types of biscuits - Processing of biscuits - faults & Remedies

Cream crackers, soda crackers, wafer biscuits & matzos, puff biscuits

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Hard sweet, Semi Sweet and Garibaldi fruit sandwich biscuit

Short dough biscuits, Wafers.

Cakes - types - Ingredients - Processing of cakes - Problems - Remedies

Pizza and pastries - their ingredients and Processing

Suggested readings:

US wheat Associates .Baker's Handbook on Practical Baking .

John Kingslee .A Professional Text to Bakery and Confectionery. New Age International, New Delhi.

BSc/FST/SM/5/MIC/301 A - Bakery Technology (Practical)

Credits: 01 Duration of exam: 03 Hrs
Periods per week: 02Hrs Max. Marks: 25

1. Study of different equipments used in Bakery
2. Estimation of Gluten
3. Determination of alcoholic acidity
4. Determination of falling number/amylase
5. Determination of Pelshenke value
6. Determination of sedimentation value
7. Preparation of bread by straight dough methods
8. Preparation of buns by sponge
9. Preparation of yeast dough products
10. Preparation of soda crackers
11. Preparation of Cakes and Cake decorations, cookies
12. Visit to bakery and confectionery unit

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Fermented and Unfermented Products From Fruits and Vegetables (CREDITS: THEORY - 03 PRACTICAL - 01)

BSc/FST/SM/5/MIC/301 B - Fermented and Unfermented Products From Fruits and Vegetables (Theory)

Credits: 03 Duration of exam: 03 Hrs
Periods per week: 03Hrs Max. Marks: 75 Theory:50 IA:25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Unit-I

Desirable characteristics of fruits & vegetables for processing. Preparing fruits & vegetables for processing, washing, sorting, grading, peeling, blanching, cutting, destoning and pitting. Canning & Bottling of fruits & vegetables products.

Method of juice extraction, Equipment, preservation and clarification. Squashes & Cordials, Fruit syrups, Nectar. Fruit juice concentrates. Jams, jellies & Marmalades

Unit-II

Fermented products from fruits and vegetables - Vinegar - types of vinegar - methods of vinegar production - Quick method - Orleans slow process - Generator process - problems in vinegar production

Fermented fruit beverages - Wine - types of wines - equipment required - preparation – problems

Sparkling clear wines - Champagne and Cider; Fortified wines - Sherry, vermouths; orange wine, Perry, Tokay, Port

Unit - III

Fermented vegetables - Sauerkraut – pickles - cucumbers Silage – Kimchi and their microbiological spoilages

Fermented and non-fermented pickles,

Cultivated mushrooms: preservation and processing

Definition, Formulation, Preparation & FPO standards of Fruit juices

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Suggested readings

Handbook of Vegetable Preservation and Processing by Y. H. Hui and E. Ozgul Evranuz

Baiely, J.E. and Ollis, D.F. Bio Chemical Engineering Fundamentals (1986), Mcgraw Hills.

Rehm, H.J. and Reed, G. (ed), Biotechnology, Vol 1-2, Verlag chemie. Stanbury, P.E. and Whitaker A., Principles of Fermentation Technology (1984), Prgamon Press. Pirt, S.J.

Principles of Microbial and Cell Cultivation. Blackwell Scientific Publication, London.

Moo-young, M. Comprehensive Biotechnology, Vol. 1-4, Pergamon Press, Oxford.

Industrial Microbiology by Prescott SC & Dunn CG, 2006 CBS Publishers, New Delhi.

Industrial Microbiology by Casida LE,1968, New Age International Publishers Ltd., New Delhi.

BSc/FST/SM/5/MIC/301 B - Fermented and Unfermented Products From Fruits and Vegetables (Practical)

Credits: 01 Duration of exam: 03 Hrs
Periods per week: 02Hrs Max. Marks: 25

1. To study of design of fermentor (batch and continuous for production of yeast)
2. To determine the Dissolved oxygen concentration of fermented broth.
3. To study the production of wine, vinegar, amylase, protease.
4. To study the kinetics of growth of yeast in batch/continuous culture.
5. Preparation of Sauerkraut
6. Preparation of cider
7. Preparation of citrus fruit wine
8. Preparation of grape wine

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Technology of Meat, Fish & Poultry

(CREDITS: THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/6/DSC/305-- Technology of Meat, Fish & Poultry (Theory)

Credits: 3 Duration of exam: 3 Hrs.

Periods per week: 3 Hrs Max. Marks: 75

Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Egg: Structure and composition of egg, nutritive value, interior qualities, grading, handling, packaging, storage, transportation. **Processing of egg:** Functional properties of eggs, freezing, pasteurization, de-sugarization, dehydration.

Poultry: Introduction, Types of poultry (Hen, Turkey, Ducks, Geese), chemical composition and nutritive value of poultry meat. **Poultry processing:** Poultry dressing, slaughtering methods, preservation and packaging of poultry meat.

UNIT-II

Meat: Scope of meat processing industry in India, structure, composition & nutritive value of meat.

Classification of meat: Mutton, pork and sheep, meat quality parameters, meat color, water holding capacity, marbling, firmness and factors affecting it.

UNIT-III

Meat tenderization: Methods of tenderization (natural & artificial), factors affecting tenderness.

Meat processing: Mechanical deboning of meat, restructured meat products, inter-mediate moisture meats, meat by-products, fermented meat sausages.

Books Recommended:

1. The Meat We Eat by Romans. JR and Costllo WJ, Carlson WC, Greaser ML and Jones KW, 2004, Interstate Publishers, USA.

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2. Meat Science & Applications by Y.H.Hui, Wai-Kit Nip, Robert W. Rogers and Owen A. Young

3.Egg Science and Technology by Stadelman WJ, and Cotterill OJ, 2002, CBS Publishers, New Delhi.

4. Poultry Meat and Egg Production by Parkhurst C. and Mountney GJ, 2002, CBS Publishers, New Delhi.

BSc/FST/SM/6/DSC/305-- Technology of Meat, Fish & Poultry (Practical)

Credits: 1 Duration of exam: 3 Hrs.

Periods per week: 2 Hrs. Max. Marks: 25

1. Estimation of moisture content of meat
2. Cut out analysis of canned meats/retort pouches
3. Estimation of protein content of meat
4. Analysis of frozen meat/meat emulsion products
5. To study shelf-life of eggs by different methods of preservation
6. Evaluation of eggs for quality parameters (market eggs, branded eggs)
7. To perform freezing of yolk/albumen.
8. Meat/Egg product formulation.

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Technology of Fruits & Vegetables

(CREDITS: THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/6/DSC/306- Technology of Fruits & Vegetables (Theory)

Credits: 3 Duration of exam: 3 Hrs.

Periods per week: 3 Hrs Max. Marks: 75

Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Introduction: Classification, chemical composition and nutritive value of fruits and vegetables.

Unit operations in fruit and vegetable processing: Preparing fruits and vegetables for processing-washing, sorting, grading, peeling, blanching, cutting, destoning and pitting.

UNIT-II

Fruit processing: Preparation methods of jam, jelly, marmalades, preserve candied and crystallized fruits.

Pickles: Processing, types, causes of spoilage in pickling.

Tomato processing: Tomato juice, puree, paste, chutney, sauce, soup and ketchup.

UNIT-III

Canning and bottling of fruits and vegetables: Selection of fruits and vegetables, process of canning, factors affecting the process-time and temperature, containers of packing, lacquering, syrups and brines for canning,

Spoilage in canned foods: types of spoilage in canned foods, methods to control the spoilage of canned foods.

Books Recommended:

1. Preservation of fruits and vegetables by GirdhariLal, Sidappa G S and Tandon G L, 1960, ICAR, New Delhi.
2. Food facts & principles by ShanuntalaManay N &Shadoksharaswamy N, 1996, New Age World Publisher, CA.
3. Food Science by Potter, N.N., CBS Publisher, New Delhi

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BSc/FST/SM/6/DSC/306 Technology of Fruits & Vegetables (Practical)

Credits: 1 Duration of exam: 3 Hrs.

Periods per week: 2 Hrs. Max. Marks: 25

1. Preparation of fruit juice.
2. Preparation of squashes.
3. Preparation of jam, jellies, marmalade.
4. Preparation of potato chips.
5. Preparation of pickles- sweet and sour.
6. Dehydration and sun-drying of fruits and vegetables.
7. Preparation of tomato puree, paste and ketchup.
8. Organoleptic evaluation of fruits and vegetable products.
9. Visit to food industry.

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Food Packaging

(CREDITS: THEORY – 4 PRACTICAL - 2)

BSc/FST/SM/6/DSC/307- Food Packaging (Theory)

Credits: 3 Duration of exam: 3 Hrs.

Periods per week: 3 Hrs. Max. Marks: 75

Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Packaging Technology: Definitions and functions of packaging, Properties of packaging material in relation to these functions.

Package design: Types of containers-primary and secondary. Package labeling and food safety.

UNIT-II

Packaging materials:

Paper and paper board: structure, making, properties, types (kraft, bleached and greaseproof) and uses of paper and paper board.

Wood: structures, types, properties and wooden containers used in packaging, types of wooden boxes.

UNIT-III

Plastic containers: bottles, cans, jars, cups, tubes, cartons, retort pouch and laminates, biodegradable plastics.

Metals: Properties of metals, different metals used in food packaging, formation of two piece and three piece cans.

Recommended Books

1. Food Packaging Materials – M. T. Crospy.
2. Food Packaging Materials – M. Mahadevish R.V. Gowramma.
3. Food Packaging – Stanley Sacharow
4. Food Packaging –Principles & Practices - Gordon L. Robertson
5. A Handbook of Food Packaging, Frank – A – Paine, Heather Y. Paine

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BSc/FST/SM/6/DSC/307- Food Packaging (Practical)

Credits: 1 Duration of exam: 3 Hrs.

Periods per week: 2 Hrs. Max. Marks: 25

1. Identification of different types of packaging materials.
2. To determine basis weight of paper and paper board.
3. To determine thickness of paper and paper board.
4. Shelf life studies of packaging foods.
5. To determine grease resistance of packaging materials.
6. To see the chemical resistance of packaging material.
7. Determination of water vapour transmission rate of various packaging materials.
8. To determine the thermal shock resistance of a glass container.
9. Visit to various industries, dealing with food packaging materials like / paper, board and metal cans.

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BOS

Confectionary & Sugar Technology

(CREDITS: THEORY – 3 PRACTICAL - 1)

BSc/FST/SM/6/DSC/308- Confectionary & Sugar Technology (Theory)

Credits: 3 Duration of exam: 3 Hrs.

Periods per week: 3 Hrs Max. Marks: 75

Theory: 50 IA: 25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

UNIT-I

Cocoa: Cocoa beans and production; microbial and chemical changes occurring during fermentation; drying, storage and transportation of cocoa beans.

Processing of cocoa beans: cleaning, roasting and winnowing; grinding of nib, production of cocoa butter and cocoa powder.

UNIT-II

Chocolate: Ingredients-crystalline and amorphous sugar; lactose, glucose and fructose; milk and other dairy ingredients.

Sugar confectionary: Types of sugar- production, storage , alternative bulk sweeteners, corn syrup and glucose syrup, sorbitol, xylitol, maltitol, isomalt, lactitol, mannitol, polydextrose.

UNIT-III

Fondant: structure and manufacturing, remelting and casting of fondant. Hard Boiled candy- formulation, ingredients, syrup cooking, forming, pulled sugar, aerated boiling, marsh mallows, naugat.

Hard and soft boiled sugar confectionary: Frappe, caramel, toffee, butterscotch and fudge: formulation and manufacturing process.

Recommended Books:

1. Chocolate, Cocoa and Confectionary: Science & Technology by Minife, 1997, AVI Publishing Co., New York.

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2. Handbook of Cane Sugar Technology by Mathur RBL, 1986, Oxford & IBH Publishing Co., New Delhi.
3. The Science of Cookie & Cracker Production by Faridi H., 1994, Chapman & Hall, UK.
4. The Science of Sugar Confectionary by W.P. Edwards, RSC Publishers.
5. The Science of Chocolate by StephentBecett, RSC Publisher.
6. Chocolate, Cocoa and Confectionary Science and Technology by Bernard W. Minifie.

BSc/FST/SM/6/DSC/308- Confectionary & Sugar Technology (Practical)

Credits: 1 Duration of exam: 3Hrs.

Periods per week:2 Hrs. Max. Marks: 25

1. Determine the effect of heat on sugar solution and perform the thread and cold water test.
2. To study the process of inversion, melting and caramelization in sucrose.
3. Preparation of amla candy, fudge and brittles.
4. Preparation of shakarpara and chenna murki.
5. Preparation of candy and toffee and to perform quality assessment tests.
6. Preparation of icing and other cake decorations.

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Technology of Breakfast Cereals
(CREDITS: THEORY - 03 PRACTICAL - 01)
BSc/FST/SM/6/MIC/302 A - Technology of Breakfast Cereals (Theory)

Credits: 03 Duration of exam: 03 Hrs
Periods per week: 03Hrs Max. Marks: 75 Theory:50 IA:25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Unit-I

Breakfast cereals: introduction and classification

Breakfast cereal foods - Flaked breakfast cereals, puffed breakfast cereals, shredded and granular breakfast cereals and cereals puffed by extrusion

Specifications of oatmeals and oatflakes. Flaked products from maize.

Unit-II

Sanitary and quality aspects of breakfast cereal preparations. Nutritional and functional aspects of breakfast cereals.

Unit-III

Breakfast cereals industry and its structure. Recent developments in breakfast cereals cooking, drying and tempering

Future of breakfast cereal industry.

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Suggested readings:

1. Technology of Cereals. by N.L. Kent, 1994

2. Wheat Chemistry and Technology- Pomerenz.

3. Corn chemistry and Technology by Tanley A Watson and Paul E. Ramstad.

4. Legumes: Chemistry, Technology and Human Nutrition by Ruth H. Matthews, 1989.

5. Pulse Chemistry and Technology by B. Tiwari and N. Singh (RSC).

BSc/FST/SM/6/MIC/302 A - Technology of Breakfast Cereals (Practical)

Credits: 01 Duration of exam: 03 Hrs
Periods per week: 02Hrs Max. Marks: 25

1. Processing of oat flakes
2. Preparation of corn flakes
3. Processing of pop corn
4. Processing of puffed rice
5. Processing of flaked rice
6. Processing of cereal and millet malts
7. Visit to rice bran oil extraction industry
8. Visit to a commercial cereal processing unit

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Quality Control and Packaging of Fruits and Vegetables

(CREDITS: THEORY - 03 PRACTICAL - 01)

BSc/FST/SM/6/MIC/302 B - Quality Control and Packaging of Fruits and Vegetables

(Theory)

Credits: 03 Duration of exam: 03 Hrs
Periods per week: 03Hrs Max. Marks: 75 Theory:50 IA:25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Unit- I

Storage - Factors influencing - Shelf Life of fruits and vegetables - Atmospheric packaging - Respiratory Metabolism

Controlled Atmospheric Packaging Technology (CAP) - Modified Atmospheric Packaging Technology (MAP) - Advantages of CAP and MAP - Effect of gases on MAP foods - N_2 ,O_2 , CO_2

Types of paper - Kraft paper - Bleached paper - Grease proof paper - Glassine paper - Vegetable parchment Waxed paper

Unit-II

Metal canning of fruits and vegetables; types of containers and cans in fruits and vegetables canning

Glass packaging materials for products prepared from fruits and vegetables

Plastic packaging materials for products prepared from fruits and vegetables

Unit-III

Packaging of fruits and vegetables stored at low temperature. Recent advanced techniques in packaging of premium quality fruits and vegetables.

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Suggested Readings:

Crosby NT.1981. Food Packaging: Aspects of Analysis and Migration Contaminants. App. Sci. Publ. Kadoya T. (Ed). 1990.

Food Packaging. Academic Press. Mahadeviah M & Gowramma RV. 1996.

Food Packaging Materials. Tata McGraw Hill. Palling SJ. (Ed). 1980.

Developments in Food Packaging. App. Sci. Publ. Painy FA. 1992.

A Handbook of Food Packaging. Blackie Academic. Sacharow S & Griffin RC. 1980.

Principles of Food Packaging. AVI Publ. Stanley S & Roger CG.1970. Food Packaging. AVI Publ.

G.L. Robertson (2010): Food Packaging and Shelf Life: APractical Guide. CRC Press.

BSc/FST/SM/6/MIC/302 B - Quality Control and Packaging of Fruits and Vegetables

(Practical)

Credits: 01 Duration of exam: 03 Hrs
Periods per week: 02Hrs Max. Marks: 25

1. Classification of various packages based on material and rigidity
2. Prepackaging practices followed for packing fruits and vegetables
3. Measurement of thickness of paper, paper boards
4. Measurement of basic weight of paper and paperboards
5. Measurement of grammage and water absorption of paper, paperboards
6. Measurement of grease resistance of papers
7. Determination of gas transmission rate of package films
8. Determination of WVTR and QTR of films
9. Determination of coating on package materials
10. Identification of plastic films
11. Finding chemical resistance of films
12. Measurement of tensile strength of plastics

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Food Extrusion Technology

(CREDITS: THEORY - 03)

CDLU/FST/6/SEC/301 Food Extrusion Technology (Theory)

Credits: 03 Duration of exam: 03 Hrs
Periods per week: 03Hrs Max. Marks: 75 Theory:50 IA:25

Note for the paper setter: The question paper will consist of 7 questions in all. The first question will be compulsory and will consist of 4 short questions of 2 marks each covering the whole syllabus. In addition six more questions of 14 marks is will be set unit-wise comprising of two questions from each unit. The candidates are required to attempt one compulsory question and three more questions selecting one question from each unit.

Unit I

Food Extrusion: Definition, introduction to extruders, principles and types, Uses of extruders in the food industry, Pre-conditioning of raw materials used in extrusion process, Extruder Selection, Design, and Operation for Different Food Applications

Single screw extruder: Principle of working, Operations, manufacturing of pasta and vermicelli

Unit II

Twin screw extruder: Counter rotating and co-rotating twin screw extruder, Process characteristics of the twin screw extruder, Rheological Properties of Materials During the Extrusion Process, Advantages of Twin Screw Extruder.

Effect of extrusion on food products: Chemical and nutritional changes in food during extrusion, factors affecting extrusion, Packaging materials for extruded products

Unit III

Texturized vegetable protein: Definition, Manufacturing process and quality parameters of TVP

Recent Advances in extrusion technology: Carbon dioxide or Nitrogen assisted extrusion technology, Extrusion in confectionary technology, Non-thermal Extrusion of Protein Products

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Suggested Readings:

1. Extruded foods by S. Matza Publisher Springer

2 Technology of Extrusion Cooking by N.D. Frame Publisher Springer

3 Extruders in Food Application by Riaz M.N. Publisher CRC Press

4 Extrusion of Foods by J.M. Harper Publisher CRC Press

5 Advances in Food Extrusion Technology by Maskan and Altan Publisher CRC Pres

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