

M.Sc. Food Technology (Hons.) Syllabus for 2023-24 (IIIrd & IVth Sem)

Mata Gujri College

An Autonomous College, Fatehgarh Sahib

Affiliated to Punjabi University Patiala

M.Sc. Food Technology (Hons.) - Second Year
(IIIrd & IVth Semester)

SYLLABUS OF COURSES TO BE OFFERED
Core, Open Elective and General Elective



Academic Session 2023-2024

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M.Sc Food Technology (Hons.) Syllabus for 2023-24 (IIIrd & IVth Sem)

M.Sc. (Hons.) Food Technology First Year

Semester-I

Paper code	Paper No.	Name of paper	Period/week	External Marks	Internal Marks*	Total Marks	Credits
MSFT-101 (C-1)	Paper I	Food Biochemistry and Nutrition	4	70	30	100	4
MB-302 (C-2)	Paper II	Food Microbiology	4	70	30	100	4
MSFT-102 (C-3)	Paper III	Principles of Food Processing	4	70	30	100	4
MSFT-103 (GE-1)	Paper IV a	Nutraceutical and Functional Foods	2	35	15	50	2
	Paper IV b	Fermentation Technology					
MB-103 (C-4)	Paper V	Research Methodology	2	35	15	50	2
MSFT-104	LC-101	Food Biochemistry and Nutrition Lab	4			50	2
MB-305	LC-102	Food Microbiology Lab	4			50	2
MSFT-105	LC-103	Principles of Food Processing Lab	4			50	2
MSFT-406	Dissertation (Synopsis submission)					50	2
Total						600	24

*Internal assessment (30%): Seminar and Assignments (25% of total IA) MST (50% of total IA), Attendance (25% of total IA)

Semester – II

Paper code	Paper No.	Name of paper	Period/Week	External Marks	Internal Marks*	Total Marks	Credits
MSFT-201 (C-5)	Paper VI	Food Additives	4	70	30	100	4
MB-402 (C-6)	Paper VII	Industrial Microbiology	4	70	30	100	4
MSFT-202 (C-7)	Paper VIII	Milk and Milk Processing Technology	4	70	30	100	4
MSFT-203 (C-8)	Paper IX	Food Quality Regulations and IPR	2	35	15	50	2
MSMAT001 (OE-1)	Paper X	Biostatistics	4	70	30	100	4
MSFT-204	LC-201	Food Additives Lab	4			50	2
MB-405	LC-202	Industrial Microbiology Lab	4			50	2
MSFT-205	LC-203	Milk and Milk Processing Technology Lab	4			50	2
MSFT-406	Dissertation (Experimental Work)					50	2
Total						650	26

*Internal assessment (30%): Seminar and Assignments (25% of total IA) MST (50% of total IA), Attendance (25% of total IA)

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M.Sc Food Technology (Hons.) Syllabus for 2023-24 (IIIrd & IVth Sem)

Semester III

Paper code	Paper No.	Name of paper	Period/week	External Marks	Internal Marks*	Total Marks	Credits
MSFT-301 (C-9)	Paper XI	Egg, Meat and Fish Technology	2	35	15	50	2
MSFT-302 (C-10)	Paper XII	Food Engineering	4	70	30	100	4
MSFT-303 (C-11)	Paper XIII	Fruits and Vegetable Technology	2	35	15	50	2
MSFT-304 (C-12)	Paper XIV	Bakery and Confectionary Technology	2	35	15	50	2
MSFT-305 (GE-2)	Paper XV	Beverage Technology	2	35	15	50	2
		Enzymes in Food Industry	2	35	15	50	
MSFT-306	LC-301	Egg, Meat and Fish Technology Lab	4			50	2
MSFT-307	LC-302	Food Engineering Lab	4			50	2
MSFT-308	LC-303	Fruits and Vegetable Technology Lab	4			50	2
MSFT-309	LC-304	Bakery and Confectionary Technology Lab	4			50	2
MSFT-310	Industrial Training		Non-Credit				
MSFT-406	Dissertation (Experimental work)					150	6
Total						700	26

*Internal assessment (30%): Seminar and Assignments (25% of total IA) MST (50% of total IA), Attendance (25% of total IA)

Semester – IV

Paper code	Paper No.	Name of paper	Period/Week	External Marks	Internal Marks*	Total Marks	Credits
MSFT-401 (C-13)	Paper XVI	Cereal, Pulses and Legume Technology	4	70	30	100	4
MSFT-402 (C-14)	Paper XVII	Food Packaging and Marketing	4	70	30	100	4
MSFT-403 (C-15)	Paper XVIII	Spices and Flavor Technology	2	35	15	50	2
MSFT-404	LC-401	Cereal, Pulses and Legume Technology Lab	4			50	2
MSFT-405	LC-402	Food Packaging and Marketing Lab	4			50	2
MSFT-406	Dissertation (Submission and Seminar)					250	10
Total						600	24

*Internal assessment (30%): Seminar and Assignments (25% of total IA) MST (50% of total IA), Attendance (25% of total IA)

Assessment Parameters for Dissertation

Weightage (%)

- | | |
|-------------------------------|----|
| 1. Quality of Dissertation | 40 |
| 2. Quantitative data analysis | 20 |
| 3. Significance of work | 20 |
| 4. Presentation and defense | 20 |

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M.Sc. Food Technology (Semester-III)
Paper-XI, Egg, Meat & Fish Technology (MSFT -301)

Exam Time: 1:30 Hours
Lectures to be delivered: 30 (Credit-2)

Max. Marks: 50
Theory Marks: 35
Internal assessment: 15
Pass Percentage: 40%

Course Objective: To provide an understanding of the technology for handling, processing, preservation and by-product utilization of meat, poultry and fish produce.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections. Section A and B will have four questions each from respective units. Candidates are required to attempt two questions each from section A and B. Each question in section A and B shall carry 6 marks. Section C will consist of 11 short answer type questions of 1 mark each, covering entire syllabus and are compulsory to attempt.

Unit I

Meat: Introduction, Types, Status and scope of meat industry in India. Composition and nutritive value, conversion of muscle into meat, Type of meat cuts, environmental and animal production factors that affect meat quality, post mortem changes in meat, rigor mortis, cold shortening.

Meat tenderization: Meat Cuts, ageing of meat, natural and artificial methods, Properties of fresh meat-water holding capacity, color, palatability, cooking methods for meat

Storage and preservation of meat: Chilling, Freezing, Curing, Smoking, Dehydration, Canning. Meat spoilage, Meat analogs

Unit II

Fish: Factors affecting quality of fresh fish, fish dressing, chilling, freezing, salting and canning of fish, fish oil manufacturing, fish protein concentrate, Surimi processing and fish pickle

Poultry: Types, chemical and nutritive value of poultry meat, poultry dressing and slaughtering methods, preservation, grading and packaging of poultry meat.

Egg: Structure, composition, nutritive and functional properties, Quality of egg: Internal quality evaluation, egg candling, egg grading, microbial spoilage of eggs, preservation and storage methods for eggs, Egg powder, Egg allergens

Course Outcome:

- ✚ Present course will provide in-depth knowledge of handling and processing of Meat, Fish and Poultry
- ✚ Long term preservation and tenderization of meat with sensorial likeness is ahead target of this course

Books recommended:

- ✚ Singh, Kumar and Kumar (2022). *An objective Food Science Compendium*. Brillion Publishers
- ✚ NIIR Board (2009). *Fresh meat technology Handbook*.
- ✚ Mead (2010). *Poultry meat processing & quality*. Woodhead Publishing Ltd.
- ✚ Bremner, (2011). *Safety & quality issues in fish processing*. Woodhead Publishing Ltd.
- ✚ Kerry, Kerry, Ledward (2012). *Meat Processing: Improving Quality*. Woodhead Publishing Ltd.
- ✚ Leo, M.L., Nollet, Terri Boylston. (2012). *Handbook of meat, poultry & seafood quality*, Wiley Blackwell.

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M.Sc. Food Technology (Semester-III)
Paper-XII, Food Engineering (MSFT-302)

Exam Time: 3:00 Hours
Lectures to be delivered: 60 (Credit-4)

Max. Marks: 100
Theory Marks: 70
Internal assessment: 30
Pass Percentage: 40%

Course Objective: To acquaint with basic principle of Food processes underlying engineering rules and principles is the main motive to introduce through this course.

INSTRUCTIONS FOR THE PAPER SETTERS/CANDIDATES

The question paper will consist of three sections A, B and C. Section-A and B will have four questions from the respective sections of the syllabus and carry 12 marks each. Section - C will consist of 11 short answer type questions which will cover the entire syllabus uniformly and will carry 22 marks in all. Candidates are required to attempt two questions each from sections A and B of the question paper and the entire Section-C.

Unit-I

Units and Dimensions: Terms, definitions, measurement systems, SI systems, unit conversion, intensive and extensive properties, equilibrium state, density, specific volume, specific weight, specific heat, enthalpy, entropy, pressure, temperature scales.

Material balances: Basic principles, process flow diagrams, concentration and dehydration

Energy balances: Thermodynamic systems (closed, open and isolated) Basic principles, energy terms, specific heat of solids and liquids, properties of saturated and superheated steam, heat balances.

Heat transfer: Modes of heat transfer (conductive, convective and radiative), conductive heat transfer in a rectangular slab, estimation of convective heat transfer coefficient, forced convection and free convection, Kirchoff's Law, Stefan Boltzman law, Wien displacement law of heat transfer

Heat exchangers: plate, tubular, scraped surface and steam infusion.

Unit II

Thermal process calculations: Commercial sterilization, (D, F and Z values)

Fluid flow: Types of fluids and fluid flows, Concept of Viscosity and Viscometer, Fluid statics and dynamics, Bernoulli's equation, Newtonian and Non-newtonian fluids.

Psychrometrics: Psychrometric chart, Properties of dry air: composition of air, specific heat of dry air, enthalpy of dry air and dry bulb temperature.

Properties of water vapour: specific volume of water vapour, specific heat of water vapour, Gibbs-Dalton law, Dew point temperature, relative humidity, humidity ratio, wet bulb temperature.

Size reduction: Size reduction in solids, Kick's law, Rittinger's Law and Bond's Law, Size reduction in liquids (homogenization and emulsifications)

Course Outcome:

- ✚ Present course give adaptability in terms of process calculations through engineering principles
- ✚ Process variable and response judgment for food processes is another aspect to learn herewith

Books Recommended:

- ✚ Pandey (2010). Fundamentals of food process engineering. New Delhi: CBS Publishers
- ✚ Toledo (2011). Fundamentals of food process engineering. New Delhi: CBS Publishers
- ✚ McCabe & Smith (2013). Unit operations in chemical analysis. New Delhi: Tata McGraw Hill.
- ✚ Singh, Kumar and Kumar (2022). An objective Food Science Compendium. Brillion Publishers

M.Sc. (Hons.) Food Technology (Semester-III)
Paper XIII– Fruits and Vegetable Technology (MSFT-303)

Exam Time: 1:30 Hours
Lectures to be delivered: 30 (Credit-2)

Max. Marks: 50
Theory Marks: 35
Internal assessment: 15
Pass Percentage: 40%

Course Objective: Adaptation to newest technological preservation opportunities that aids in shelf stability of fresh agricultural produce, enhancement of fresh produce alongwith introduction to ongoing processing methods applicable for fruits and vegetables processing.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections. Section A and B will have four questions each from respective units. Candidates are required to attempt two questions each from section A and B. Each question in section A and B shall carry 6 marks. Section C will consist of 11 short answer type questions of 1 mark each, covering entire syllabus and are compulsory to attempt.

Unit I

Introduction: Nutritive value of Fruits & Vegetables, Fundamentals of Harvesting; Maturity indices, Post-harvest technology of Fruits & Vegetables, Climacteric and non-climacteric fruits.

Handling and Storage of Fruits & Vegetables: Ambient, Refrigerated, Modified and Controlled atmosphere, evaporative cold storage, minimally processed foods.

Preparatory Operations for Fruits and Vegetables: Washing, Cleaning, Grading (Size, Color and Shape), Sorting, Peeling and Size reduction

Processing and its Effects on Quality (F&V): Canning (General process and Equipment), Texture, color and flavour variation after processing of fruits and vegetables, nutritive value of processed fruits

Unit II

Fermented fruits & Vegetable: Technology of production for pickles and sauerkraut

Fruit Juice: Method of juice extraction, clarifications of fruit juices, preservation of fruit juices. Problems related to concentration & storage

Fruit and Vegetable based products and their Specifications: Squash, RTS, Syrup, Tomato puree, paste, ketchup, soup, veg sauces. Jam, Jellies & Marmalade, role of pectin in products

Fruit Preserves: Legal standards of processed fruits and vegetables, FSSAI, BIS, Codex Alimentarius Commission (CAC).

Course Outcomes:

- ✚ To acquaint with principles and methods of preservation of fruits and vegetables into various products.
- ✚ To acquaint with the proper handling technologies of fruits and vegetables to reduce post harvest losses.

Books Recommended:

- ✚ Bhutani, R. C. (2003). Fruit and vegetable preservation. Daya Books, 2003.
- ✚ Fellows, P. J. (2009). Food processing technology: principles and practice. Elsevier,
- ✚ NIIR Board (2009). Handbook on Fruits, Vegetables and Food Processing with canning & Preservation.
- ✚ Ranganna, S. (2010). Handbook of Analysis and quality control for fruit and vegetable products. Tata McGraw Hills
- ✚ Jongen. (2011). Fruit & vegetable processing: Improving quality. Woodhead Publishing Ltd.

M.Sc. (Hons.) Food Technology (Semester-III)
Paper XIV – Bakery and Confectionery Technology (MSFT-304)

Exam Time: 1:30 Hours
Lectures to be delivered: 30 (Credit-2)

Max. Marks: 50
Theory Marks: 35
Internal assessment: 15
Pass Percentage: 40%

Course Objective: To provide a technical view of bakery and a full discussion of manufacturing processes in context of technology and related chemistry as well as more fundamental appraisal of the underlying science.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections. Section A and B will have four questions each from respective units. Candidates are required to attempt two questions each from section A and B. Each question in section A and B shall carry 6 marks. Section C will consist of 11 short answer type questions of 1 mark each, covering entire syllabus and are compulsory to attempt.

Unit I

Wheat & Wheat Flour: Types of wheat, Classification, Physico-chemical basis of wheat grain softness or hardness, Proteins (Gluten) and Enzymes (Amylases) of wheat.

Ingredients: Sugar-sources, types and functions in baking. Shortening-functions, Leavening agents; Physical, chemical and biological, their role in baking, **Role of eggs and its parts in bakery.**

Basics of baking operation: basic concepts, batch/continuous dough mixing, dividing, moulding, panning, proofing, baking, Qualitative changes during different unit operations

Technology of Bakery products & defects: Bread making technology, Cookies, Biscuits & crackers technology, cake technology, Quality and defects of Bakery Products

Unit II

Introduction to Confectionery: Trends in confectionery, types of confectionery (sugar, chocolate, bakery confectionery), crystalline and non-crystalline confectionery, nutritional facts.

Manufacturing of Sugar: Composition of cane juice, refining process, carbonation, filtration, evaporation, crystallization, curing and finishing, drying, storage, deterioration of sugar, by products

Manufacture of Sugar Confections: Hard boiled candies, Toffees, Caramel, Chewing gums and marshmallow.

Technology of Chocolate Confectionery & Defects: Cocoa processing, chocolate manufacture, bars and enrobed chocolate, emulsifiers in chocolate, cocoa butter substitutes, Defects (Sugar bloom, Fat bloom)

Course Outcome:

- ✚ Completion of this course, adapt the students with thorough bakery production practices and ingredient role
- ✚ This course will be the basis to formulate new functional bakery products with enhanced health attributes

Books recommended:

- ✚ Edwards, W. P. (2007). The science of sugar confectionery. Royal Society of Chemistry
- ✚ Talbot, G. (2009). Science & tech of enrobed and filled chocolate, confectionery & bakery products. Elsevier.
- ✚ Lees, R. (2012). Sugar confectionery & chocolate manufacture. Springer Science & Business Media

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M.Sc. Food Technology (Semester-III)
Paper XV a (GE-2) – Beverage Technology (MSFT-305)

Exam Time: 1:30 Hours
Lectures to be delivered: 30 (Credit-2)

Max. Marks: 50
Theory Marks: 35
Internal assessment: 15
Pass Percentage: 40%

Course Objective: To impart basic and applied technology of formulation for various fermented, non-fermented and dairy waste utilized thirst quenching drink.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections. Section A and B will have four questions each from respective units. Candidates are required to attempt two questions each from section A and B. Each question in section A and B shall carry 6 marks. Section C will consist of 11 short answer type questions of 1 mark each, covering entire syllabus and are compulsory to attempt.

Unit-I

Beverages: Definition, types, importance of beverages in our diets, process technology of carbonated beverage preparation and technology of carbonation, Technology of soft drinks, ingredients and additives used in production of soft drinks

Whey: beverages and utilization of whey in development of fortified drink, use of low-calorie sweeteners in beverages.

Process technology for production of alcoholic beverages: Distilled beverages (Brandy, Vodka, Rum, Gin, tequila, whisky & scotch) and Un-distilled beverages: (Wine, cider, beer)

Unit-II

Tea: Production, processing and chemistry of tea manufacturing and types

Coffee: Production, processing, roasting and brewing of coffee, soluble coffee, decaffeinated coffee, monsoon coffee, coffee brew concentrates and chicory, cocoa processing.

Packaged drinking water: manufacturing processes, quality evaluation of raw and processed water, methods of water treatment, BIS quality standards of bottled water

Course Outcome:

- ✚ This course will develop Entrepreneurship skills of learner by providing in-depth knowledge of various beverages such as alcoholic, non-alcoholic and whey.
- ✚ Students will also learn utilization of byproducts for the product formulation of thirst quenching and energy drinks.

Suggested Readings:

- ✚ Woodroof JG & Phillips GF. (1974). Beverages: Carbonated and Non-carbonated. AVI Publ.
- ✚ Varnam AH & Sutherland JP. (1994). Beverages: Technology, Chemistry and Microbiology. Chapman & Hall
- ✚ Hardwick WA. (1995). Handbook of Brewing. Marcel Dekker
- ✚ Hui YH. et al (2004). Handbook of Food and Beverage Fermentation Technology.
- ✚ Marcel Dekker. Priest FG & Stewart GG. (2006). Handbook of Brewing. 2nd Ed. CRC.

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M.Sc. (Hons.) Food Technology (Semester-III)
Paper XV b (GE-2) – Enzymes in Food Industry (MSFT-305)

Exam Time: 1:30 Hours
Lectures to be delivered: 30 (Credit-2)

Max. Marks: 50
Theory Marks: 35
Internal assessment: 15
Pass Percentage: 40%

Course Objective: Role of microbial enzymes for food preparation and other ingredient production alongwith learning of their purification is the novel terms to adapt by the learner under this course.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections. Section A and B will have four questions each from respective units. Candidates are required to attempt two questions each from section A and B. Each question in section A and B shall carry 6 marks. Section C will consist of 11 short answer type questions of 1 mark each, covering entire syllabus and are compulsory to attempt.

Unit I

Introduction and Mechanism of Enzyme Catalysis: Enzyme classification, enzyme activity, Factors responsible for catalytic efficiency of enzymes (proximity and orientation effects, acid base catalysis, covalent catalysis, pH and temperature). Single substrate (Michaelis-Menten) & double substrate reaction (Ping-pong mechanism)

Industrial Enzyme Production: Microbial sources of enzymes, criteria for the selection of microbes for enzyme production, Microbial production of amylase, pectinase or cellulase

Immobilization of Enzymes: Methods of enzyme immobilization (ionic bonding, adsorption, covalent bonding, microencapsulation and gel entrapment). Comparison of free and immobilized enzyme systems, Co-immobilization

Enzymes in Starch Industry: Production of modified starches and corn syrups (HFCS)

Unit II

Application of Enzymes in Fruits and Vegetables Products: Distribution of pectic substances & pectinases in fruits, Specific applications of enzymes in juice technology like clarification, debittering.

Application of Enzymes in Dairy and Meat Industry: Rennin application for cheese preparation and Proteases for meat.

Application of Enzymes in Brewing Industry: Production and post processing technology of beer formation, role of enzymes in mashing and finishing operation

Recent Advances in Enzyme Technology: Enzymatic reactions in biphasic liquid systems, stabilization of enzymes in biphasic aqueous-organic systems, Equilibria in biphasic aqueous-organic systems, Enzyme based biosensor for food analysis.

Course Outcome:

✚ This course laid the basis for bio-processing aspect applicable for production of food fermented produce

Books recommended:

- ✚ Reed, G. (2012) Enzymes in food processing. Elsevier.
- ✚ Damodaran, S. Kirk L. P and Owen R. Fennema. (2007) Fennema's food chemistry. CRC press.
- ✚ Whitehurst, R. J and Maarten V. O. (2009) Enzymes in food technology. John Wiley & Sons.
- ✚ Palmer, T. (2007) Enzymes. Horwood Publishing, Chichester

M.Sc. Food Technology (Semester-III)
(LC-301 Practical) Egg, Meat & Fish Technology Lab (MSFT-306)

(Credit -2) Period/Week-4

Max. Marks: 50
Pass Marks: 40%

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The Final practical paper will consist of three sections A, B and C. Section A will contain write up (12 Marks) from the list of practical pertaining to lab course. Section B will contain practical to perform in examination (25 Marks). Section C will contain practical note Book Evaluation and Viva Voce (13 Marks).

Practicals:

1. Quality determination and grading of egg through candling and floating test
2. Effect of high temperature on coagulation time of egg contents
3. Find out effect of different time and temp. combination on formation of iron sulphide in egg
4. Determine specific gravity of eggs
5. To determine protein in meat sample through Lowry method
6. Determination of egg constituents such as ash, Total solid, moisture
7. To determine % fraction of egg and express as (Haugh unit, A & Y Index)
8. Microbiological test for egg and meat in special reference to *E.coli*
9. Grading of egg on size basis from jumbo to pee wee
10. Comparative test to judge efficacy of heat in controlling total viable count in a given sample of raw and processed market meat sample

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M.Sc. Food Technology (Semester-III)
(LC-302 Practical) – Food Engineering Lab (MSFT-307)

(Credit -2) Period/Week-4

Max. Marks: 50
Pass Marks: 40%

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The Final practical paper will consist of three sections A, B and C. Section A comprises of write up (12 Marks) from the list of practical pertaining to lab course. Section B comprises of practical to be perform in examination (25 Marks). Section C meant to evaluate practical note Book Evaluation and Viva Voce (13 Marks).

Practicals :

1. To study the working principle and operation of various types of grinders
2. To study the distillation operation
3. Determination of Viscosity of liquid foods.
4. Determination of Reynolds number and nature of fluid flow in pipe
5. Determination of freezing time of selected food material
6. Study of an evaporator
7. Determination of heat transfer coefficient in free and forced convection

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M.Sc. (Hons.) Food Technology (Semester-III)
(LC -303 Practical) – Fruits and Vegetable Technology Lab (MSFT-308)

(Credit -2) Period/Week-4

Max Marks: 50
Pass Marks: 40%

INSTRUCTIONS FOR THE PAPER SETTERS /CANDIDATES

The Final practical paper will consist of three sections A, B and C. Section A will contain write up (12 Marks) from the list of practical pertaining to lab course. Section B will contain practical to perform in examination (25 Marks). Section C will contain practical note Book Evaluation and Viva Voce (13 Marks).

Practicals :

1. Extraction of juice and its clarification
2. Preparation of RTS, Nectar and Cordial
3. Cold and Hot extraction of tomato pulp
4. Estimation of pectin content
5. Preparation of jelly from given fruit sample
6. Check the ascorbic acid content and antioxidant activity of given sample
7. Check the lycopene content of given sample
8. Preparation of pickle
9. Drying of carrot pomace and its uses as dietary fiber
10. Perform the blanching process and check efficiency

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M.Sc. (Hons.) Food Technology (Semester-III)
(LC-304 Practical) –Bakery and Confectionery Technology Lab (MSFT-309)

(Credit -2) Period/Week-4

Max Marks: 50

Pass Marks: 40%

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The Final practical paper will consist of three sections A, B and C. Section A will contain write up (12 Marks) from the list of practical pertaining to lab course. Section B will contain practical to perform in examination (25 Marks). Section C will contain practical note Book Evaluation and Viva Voce (13 Marks).

Practicals :

1. To perform cookery stages of sugar syrup (soft ball, firm ball, hard ball, soft crack & hard crack)
2. A lab activity for the preparation of confections: Milk cake
3. Sensory evaluation of various confectionery products.
4. A practice for chocolate preparation
5. Preparation of invert sugar
6. Preparation of caramel and Toffee
7. Preparation of marshmallow
8. Production of Bread, Cookies, Biscuits and Cake and their evaluation
9. Bread preparation via Straight Dough, Sponge and Dough, Automated Dough method
10. Preparation of varieties of Bakery Products – Rusk, Buns, Doughnuts Pizza, Puff Pastry
11. Visit to Bakery and confectionery industry

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M. Sc Food Technology (III Semester)
Industrial Training (MFT-310)

(Credit - 0)

INSTRUCTIONS FOR THE PAPER SETTERS / CANDIDATES

Students have to undergone a compulsory 6 weeks industrial training (Food industry/ NABL lab/ Research institute) after IInd Semester, they have to submit a copy of training report along with issued certificate attested from the head of training organization as per the format provided. Students will be evaluated on the basis of **Seminar / Presentation / Viva-voce** to be conducted in IIIrd Semester and are evaluated.

2023-2024

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M.Sc. Food Technology (III Semester)
Research Project (Experimental work) (MFT- 406)

(Credit -6)

Max Marks: 150

INSTRUCTIONS FOR THE PAPER SETTERS / CANDIDATES

This is performance-based activity. Research project undertaken by student as per their induction and literature survey during first semester is still ongoing as wet lab activities for data collection. All the findings have to be communicated by researcher to the concerned mentor which is evaluated on marks basis (Out of 100).

2023-2024

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M.Sc. Food Technology (Semester – IV)
Paper – XVI, Cereal, Pulses and Legume Technology (MSFT-401)

Exam Time: 3:00 Hours

Lectures to be delivered: 60 (Credit-4)

Max. Marks: 100

Theory Marks: 70

Internal assessment: 30

Pass Percentage: 40%

Course Objective: To acquaint with production, consumption trends, structure, composition and quality evaluation for cereal, pulses and oilseed based optimized product with value addition pass onto students through this course.

INSTRUCTIONS FOR THE PAPER SETTERS / CANDIDATES

The question paper will consist of three sections A, B and C. Section A and B will have four questions from the respective sections of the syllabus and carry 12 marks each. Section C will consist of 11 short answer type questions which will cover the entire syllabus uniformly and will carry 22 marks in all. Candidates are required to attempt two questions each from sections A and B of the question paper and entire section C.

Unit I

Introduction: Cereals (wheat, rice, barley) and coarse cereals (millets, sorghum, amaranth and quinoa). Structure and composition of cereal grains and legumes

Wheat Technology: Conditioning and milling, different grades of flour, improvers, Technology of manufacturing for biscuit, bread, cakes & pasta

Rice processing: Rice quality and grading standards, Methods of parboiling, Changes during aging of rice, enrichment of rice with vitamins and mineral. Rice milling, degree of Milling, Factors affecting yield and quality of rice

Processing of Corn: Wet and Dry corn milling, corn types, functional properties of corn starch, products of wet milling, Syrups, HFCS, alkaline cooked products

Unit II

Barley Technology: Malting, milling of barley, functional characteristics of barley

Oats Technology: Structure of oat grains, composition, and applications of technology.

Legumes: Production, varieties and structure, chemical composition, Anti-nutrients, processing and cooking methods, utilization of legumes,

Extraction and refining of oils: Solvent extraction, refining and hydrogenation of oils, significance of omega-3 and omega-6 fatty acids in edible oils. Canola (GMF), Anti-nutrients in oilseeds

Course Outcome:

- ✚ This course reveals in depth understanding of all the basic cereals, coarse-cereals and legumes.
- ✚ Also give access to the students regarding the milling, nutritional and technological application aspects of the discussed cereals and legumes.

Books Recommended:

- ✚ Kent, N.L. (2009). Technology of cereals. England: Woodhead Publishing Ltd.
- ✚ Fellows, P.J. (2009). Food processing technology, principles & practices. CRC Press.
- ✚ Chakraverty, A. (2011). Postharvest technology of cereals, pulses & oilseeds. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.

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M.Sc. Food Technology (Semester-IV)
Paper XVII– Food Packaging and Marketing (MSFT-402)

Exam Time: 3:00 Hours
Lectures to be delivered: 60 (Credit-4)

Max. Marks: 100
Theory Marks: 70
Internal assessment: 30
Pass Percentage: 40%

Course Objective: To acquaint the students with packaging methods, packaging materials, packaging machineries, modern packaging techniques etc.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections A, B and C. Section-A and B will have four questions from the respective sections of the syllabus and carry 12 marks each. Section - C will consist of 11 short answer type questions which will cover the entire syllabus uniformly and will carry 22 marks in all. Candidates are required to attempt two questions each from sections A and B of the question paper and the entire Section-C.

Unit-I

Introduction, Paper and Plastics in Food Packaging: Food Packaging types, Properties and classification. Paper manufacturing processes viz; mechanical and chemical, (rigid & flexible). Recyclable food plastics (PET, HDPE, PVC, LDPE, PP, PS, Others) and their properties

Metal and Glass Food Packaging: Tin free steel, ECCS (Electroplating/Galvanization), Two piece & three piece can manufacture, Lacquering & Enamelling, Glass bottle and glass jar formation technology (Parison/ Gob/ Labelling of bottle)

Packaging methods & Machinery: Vacuum, Gas packaging, shrink packaging, Retortable pouch technology. Edible films and coatings, Active and Intelligent packaging techniques, Aseptic Packaging, Nano-composites in food packaging, CAS and MAP, Form, Fill and seal, thermoform, shrink wrap,

Unit-II

Introduction to Human Resource Management: Definition, Functions of HRM and its relation to other Managerial functions, Importance of human resource management in Industry, EDP programme, Human Resource Planning, Methods of Recruitment, Psychological tests and Interviewing

Market: Introduction, scope, types of markets, marketing functions, marketing of food produce in India. Storage and Warehousing, Four P's of market (Market Mix), management problems to improve productivity in food industry

Industrial Environment and Industrial Relations: Induction, Job satisfaction and its importance. Grievances and Grievance Handling Procedure, Discipline and Disciplinary action. Differences between Human Relations and Industrial Relation, Women entrepreneurship, Human values at workplace

Course Outcome:

- ✚ Completion of course give students clarity about food packaging and storage stability relations of food
- ✚ Also help to incorporate marketing techniques and managerial skills.
- ✚ Appraise critically the advantages and limitations of various food packaging techniques

Books Recommended:

- ✚ NIIR Board (2010). Food packaging technology handbook.
- ✚ CB Mamoria. (2011) Personnel Management.
- ✚ CB Mamoria, RC Joshi. (2014) Principle and Practice of Marketing in India.

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M.Sc. (Hons.) Food Technology (Semester-IV)
Paper XVIII – Spices and Flavor Technology (MSFT-403)

Exam Time: 1:30 Hours
Lectures to be delivered: 30 (Credit-2)

Max. Marks: 50
Theory Marks: 35
Internal assessment: 15
Pass Percentage: 40%

Course Objective: To impart basic knowledge about the importance, production, technology and processing aspects of Indian spices, associated benefits and flavor importance in foods.

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The question paper will consist of three sections. Section A and B will have four questions each from respective units. Candidates are required to attempt two questions each from section A and B. Each question in section A and B shall carry 6 marks. Section C will consist of 11 short answer type questions of 1 mark each, covering entire syllabus and are compulsory to attempt.

Unit-I

Introduction: Production statistics about spices in India, importance, nutritional value

Spices: Turmeric, Ginger, Cardamom, Clove, Saffron, Black pepper and Coriander (Botanical description, processing aspect, processed products and food utilization.

Oleoresin and Essential Oils: Definition, Composition and therapeutic potential

Unit-II

Technological Upgradation in Flavor Application: Encapsulation, Powder Technology and Extrusion

Cryomilling (Freezer Grinding): Cryogen and cryogenic grinding, Benefit over traditional milling, Advantage and Disadvantages of freezer grinding, Health hazards of cryogenic liquids.

Sterilization of Spices and Antimicrobial capacity of Spices: Steam sterilization of spices (HTST “In Flow” steam decontamination of spices), Antibacterial and Antimycotic effect of spice extracts.

Course Outcomes:

- ✚ This course helps students to learn processing methods of different spices
- ✚ Also, get access to students regarding nutritional significance and bioactive constituents of Indian spices.

Books Recommended

- ✚ Shanmugavelu, Katuputur Gnanamurthi, N. Kumar, and K. V. Peter. Production technology of spices and plantation crops. Agrobios, 2002.
- ✚ Kumar, N. J. B. M. Introduction to spices, plantation crops, medicinal and aromatic plants. Oxford and IBH Publishing, 2006.
- ✚ Panda, H. Handbook on spices and condiments (cultivation, processing and extraction). Asia Pacific Business Press Inc., 2010.

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M.Sc. Food Technology (Semester-IV)
(LC-401 Practical)– Cereal, Pulses and Legume Technology Lab (MSFT-404)

(Credit -2) Period/Week-4

Max Marks: 50
Pass Marks: 40%

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The Final practical paper will consist of three sections A, B and C. Section A will contain write up (12 Marks) from the list of practical pertaining to lab course. Section B will contain practical to perform in examination (25 Marks). Section C will contain practical note Book Evaluation and Viva Voce (13 Marks).

Practicals :

1. Milling of wheat and rice and calculate % bran and flour recovery.
2. Physical characterization of wheat and rice kernel.
3. Determination of quality characteristics of flours.
4. Parboiling and evaluation of quality of parboiled rice.
5. Milling of rice and assessment of per cent of head, broken, immature kernels degree of polish.
6. Determination and conditioning of moisture in given sample of kernels/flours
7. Baking practice for the preparation of bread, cookies and cakes
8. Sensory changes and ant- nutrient minimization in millets using minimal pre-processing treatments.
9. Lab demonstration of dried and cake yeast application for bread formation

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M.Sc. Food Technology (Semester-IV)
(LC-402 Practical) – Food Packaging and Marketing Lab (MSFT-405)

(Credit -2) Period/Week-4

Max Marks: 50

Pass Marks: 40%

INSTRUCTIONS FOR THE PAPER SETTERS/ CANDIDATES

The Final practical paper will consist of three sections A, B and C. Section A will contain write up (12 Marks) from the list of practical pertaining to lab course. Section B will contain practical to perform in examination (25 Marks). Section C will contain practical note Book Evaluation and Viva Voce (13 Marks).

Practicals :

1. Symbolic identification and collection of plastic packaging material.
2. Physico-chemical identification of different plastics (Density & flame test)
3. To determine grease proof resistance test for different plastic packaging material
4. To determine autoclavable heat stability for the given plastic samples
5. To determine the total moisture available in given paper (cardboard/corrugated fibre) sample
6. To determine the WVTR of given plastic sample
7. Comparative evaluation of glass package (amber and transparent) on free radical antioxidants
8. To determine the total amount of wax loaded in a given sample of wax paper
9. Visit to nearby industry to have a demonstration for thermoform (form, fill & seal) blow moulding machine

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M.Sc. Food Technology (Semester-IV)
Research project & Seminar (Experimental work & Thesis Writing) (MSFT-406)

(Credit -10)

Max Marks: 250

INSTRUCTIONS FOR THE PAPER SETTERS /CANDIDATES

Ongoing project work (Introduced from first semester) is meant for thesis writing, its compilation and deliverables at the end of semester. Compiled project report sent to the external examiner and evaluated on the day of result seminar. Satisfactory viva-voce and corrected thesis resubmission thereafter will only be the criteria to successfully award of degree on marks basis (Out of 100).

2023-2024

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