Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)

Evaluation Scheme & Syllabus for
Department of Agricultural Engineering

M. Tech.-(Food Technology)

(I to IV Semester)

(Effective from session 2019-20)

EVALUATION SCHEME

M.Tech- Food Technology

Semester-I

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(3)	EXT.(70)	SESS.(25)	EXT.(25)	
MTFT-101	Food Beverages	30	70	NA	NA	100
MTFT-102	Microbiology & Chemistry of Foods	30	70	NA	NA	100
MTFT-103	Advanced Separation Processes	30	70	NA	NA	100
MTFT-104	Therapeutic Foods	30	70	NA	NA	100
MTFT-105	Research Process & Methodology	30	70	NA	NA	100
MTFT-106	Food Microbiology Lab	NA	NA	25	25	50
MTFT-107	Food Chemistry Lab	NA	NA	25	25	50

Semester-II

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTFT-201	Preservation & Processing of Foods	30	70	NA	NA	100
MTFT-202	Cereal and Snack Foods	30	70	NA	NA	100
MTFT-203	Fruits, Vegetables ,Plantation & Spice Products	30	70	NA	NA	100
MTFT-204	Milk and Milk Products Technology	30	70	NA	NA	100
MTFT-205	Advances in Food Processing Technology	30	70	NA	NA	100
MTFT-206	Advanced Food Processing Lab	NA	NA	25	25	50
MTFT-207	Seminar- I	NA	NA	25	25	50

Semester-III

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTFT-301	Dissertation phase-I	NA	NA	250	250	500
MTFT-302	Seminar-II	NA	NA	50	50	100

Semester-IV

SUBJECT CODE	SUBJECT NAME	THEORY		PRACTICAL		TOTAL
		SESS.(30)	EXT.(70)	SESS.(25)	EXT.(25)	
MTFT-401	Dissertation phase-I	NA	NA	300	300	600

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I Year I Semester

MTFT-101- FOOD BEVERAGES

Definition & Classification of Beverages, Potable and sparkling water, Fruit based beverages, still and carbonated beverages, Milk based Beverages, Fermented and Alcoholic Beverages Tea, Coffee and Cocoa

Beverages, Product specifications, Raw materials and ingredients, Product specifications,

Equipment's and plants, Manufacturing process, Quality control. Common faults and their remedies.

Text books:

1. Developments in Soft Drinks Technology-I: L.F.Green, Applied Science Publishers Ltd., London
2. Food Science: Potter & Hotchkiss, CBS Publishers & Distributors, New Delhi.
3. Fermented Beverage Production: A.G.H. Lea & Piggott, Blackie Academic & Professional, London
4. Food Product Development: Arlington

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MTFT-101- MICROBIOLOGY AND CHEMISTRY OF FOODS

Fundamentals of microbiology, Microbial spoilage of Foods, Foods poisonings and its Prevention, Beneficial Microorganisms and their utilization. Microbiological standards. Biochemical changes in Plant and Animal foods and their implications. Enzymes, Enzymatic Reactions. Post Harvest and Post Mortem Changes in Foods. Role of Enzymes in of Food processing.

Major and Minor constituents of foods, Water Activity and its relation with Food Stability, Sorption-Isotherms and Hysterisis. Carbohydrates-classification and Structure. Browning Reactions, Functions of Carbohydrates,Lipids-Classification and Structure, Reactions of Lipids, Rancidity and Control. Modification of Lipids, Refining of Oils. Proteins-Classification and Structure, Functional Properties of Proteins,

Denaturation of proteins and its implications. Vitamins, Minerals and Pigments & their properties.

Text Books:

1. Food Microbiology : W.C.Frazier & D.C.Westhoff, Tata McGraw Hill
2. Microbiology: M.J.Pelczar, Reid & Chann, Tata Mc Graw Publications
3. General Biochemistry: J.H.Weil
4. Food Chemistry: O.R.Fennema
5. Food Facts & Principles: Shakuntala Manay

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MTFT-103- ADVANCED SEPARATION

Uses and characteristics of separation processes, Equilibrium and rate governed multistage processes. Separation Factor. Cascades-Need and Types of Cascade arrangements, Ideal Cascade, total inter-stage flows, Squared off cascades, Separative duty and potential, Energy requirement for separation processes.

Membrane Characterization, Membrane Processes and their utility, Flow patterns through membranes, Membrane Arrangements, , Gas permeation through polymeric membrane, Liquid membrane separation processes. Reverse Osmosis, Dialysis, Ultra filtration, Electro dialysis, Per vaporation,

Concentration polarization. Gel Polarization. Chromatographic separation, Various types of Chromatography processes, Molecular sieve separation processes. Classification and application of Molecular Sieves.

Text Books:

1. Separation Processes, 2nd edition: C.J.King, Tata Mc Graw Hill, NY
2. Unit Operations in Chemical Engineering: McCabe Smith, TMH.

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MTFT-104 THERAPEUTIC FOODS

Nutrition and therapeutic foods. RDA / RDI. Utilization of nutrients in Human body. Balanced Diets, Theraputic diets, Infant and baby foods, Adolescent / Teen-age foods, Geriatric foods, Functional foods and Probiotics. Calorie, and Sodium modified/ restricted foods/ diets. Amino acids and purine restricted foods/ diets.

Foods / Diets in metabolic disorders and disturbances. Foods for allergic and ulcerous conditions.
Foods for pregnant ladies and nursing mothers. Foods in Gastrointestinal disorders; Fever and Infection; Liver, gallbladder and pancreatic disturbances. Foods and Diets in blood, circulatory and Cardiac diseases; Urinary and Musculoskeletal diseases.

Text Books:

1. Human Nutrition : Benzamin T. Burton
2. Dietetics : B. Srilakshmi
3. Nutrition and Dietetics: Shubhangini A. Joshi
4. Nutritive value of Indian Foods : C. Gopalan

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MTFT-105 RESEARCH PROCESS AND METHODOLOGY

UNIT 1:

Introduction to Research and Problem Definition-Meaning, Objective and importance of research, Types of research, steps involved in research, defining research problem.

UNIT 2:

Research Design-Research design, Methods of research design, research process and steps involved, Literature Survey

UNIT 3:

Data Collection-Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research

UNIT 4:

Data Analysis and interpretation-Data analysis, Statistical techniques and choosing an appropriate statistical technique, Hypothesis, Hypothesis testing, Data processing software (e.g. SPSS etc.), statistical inference, Interpretation of results

UNIT 5:

Technical Writing and reporting of research-Types of research report: Dissertation and Thesis, research paper, review article, short communication, conference presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Text Books:

1. C. R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques , New Age International publishers, Third Edition.
2. Ranjit Kumar, Research Methodology: A Step-by-Step Guide for Beginners, 2nd Edition, SAGE, 2005
3. Business Research Methods – Donald Cooper & Pamela Schindler, TMGH, 9th edition

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MTFT-106 FOOD MICROBIOLOGY LAB

LIST OF EXPRIMENTS

1. Familiarization with common techniques for handling pure culture serial dilution, Inoculation, slide preparation incubation, counting etc.
2. Micrometry and determination of size of deferent different microbes.
3. Simple and differential staining of microorganisms and their examination.
4. Preparation and sterilization of media and glass ware for microbial counts.
5. Determination of Standard Plate Count (SPC) in natural and/or processed foods.
6. Microbiological examination of some selected natural and processed foods.
7. Microbiological examination of potable water: Total and coliform count.
8. Direct total, viable, and non-viable count of microorganisms in some selected processed foods.

Text Books:

1.Microbes in action : H. W. Selley Jr. and Paul J. Van.
2.Microbiology: M.J.Pelczar, Reid & Chann, Tata Mc Graw Publications

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MTFT-107 FOOD CHEMISTRY LAB

LIST OF EXPRIMENTS

1. Determination of moisture content of foods by oven drying.
2. Determination of Total and Acid insoluble ash content in foods.
3. Determination of Crude fat content by solvent extraction methods in foods.
4. Determination of crude Protein by Kjeldhal method.
5. Determination of reducing and total sugar content in foods.
6. Analysis of water for potable and food purposes
7. Determination of free fatty acid content in fats and oils.
8. Study of some functional properties of proteins.

Text Books:

1. BIS and AOAC Methods of Food analysis.
2. "Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi.

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MTFT-201 PRESERVATION & PROCESSING OF FOODS

Basics of effective utilization of Food supply, Food Wastage, Causes of Quality deteriorations and quantitative losses of foods and their prevention by physical, chemical and biological means, Infestation control.

Preservation by Lowering of Water Activity, Concentration: Evaporators and Freeze Concentration. Membrane Separation Processes.

Dehydration of foods, Types of Driers and principles involved. Freeze Drying.Preservation of foods using High Temperatures, D, Z and F values, TDT Curves, Adequacy of thermal processing of foods. Preservation of foods using Low Temperatures ,Chilling, Freezing, Immersion Freezing, IQF Foods, Freezer Burn and Chilling Injury, Thawing of foods. Preservation of foods by Radiations, Spices, Osmoanabiosis and Additives: Principles & Methods. Optimal Processing of Foods. Protective Packaging of foods.

Text Books:

1. Principles of Food Preservation Part-II: O.R.Fenema
2. Food Science: Potter & Hotchkiss, CBS Publishers & Distributors, New Delhi.
3. Thermobacteriology in Food Processing: C.R.Stumbo, Academic Press, London.

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MTFT-202 CEREAL AND SNACK FOODS

Processing characteristics & Technologies of Cereals as Paddy, Wheat, Equipment's used. Parboiling of Paddy. Turbo-grinding, Milling of Durum Wheat, Rice and Wheat Products. Legumes & Oilseeds. Pretreatments, Processing characteristics, Equipment and Machinery involved, Quality Grading, Refining of oils and utilization of byproducts. Processing characteristics of Corn and its milling, Wet milling and Dry M milling of Corn. Processed Cereal Foods, Breakfast Cereals: Processing Technologies involved. Bakery products from Cereals, Bread, Biscuits, Cookies and Cakes. Industrial production and Quality parameters.

Text Books:

1. C.F.T.R.I. Mysore Manuals on Rice and its Processing
2. Bakery Technology and Engineering: Samuel A.Matz, CBS Publishers & Distributors, Delhi
3. The Science of Cookie & Cracker Production: Hamed Faridi, CBS Publishers & Distributors, Delhi

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MTFT-203 FRUITS, VEGETABLES, PLANTATION & SPICE PRODUCTS

General Composition and Characteristics of fruits and Vegetables, Harvesting and Storage of Fruits and Vegetables, Climacteric and Senescence, Preservation & Processing of Fruits & Vegetables by low temperatures & high temperatures. Preservation by Dehydration. Extraction of Fruit Juices, Principle and Machinery Involved. Preservation of Fruit Juices. Fruit Juice Concentrates, Squashes, Cordials, Nectars and Syrups.

Fruit Pulps, Purees & Paste. Technical aspects of production and quality of Fruit products as Jam, Jelly, Marmalades, Pickles, Candied and Crystallized Fruits, Chutneys, Preserves. Processing of Spices, Cryogenic grinding, Spice oils, extracts & Oleoresins. Processing of plantation products as Tea, Coffee,
Cocoa, Cashew-nut etc.

Text Books:

1. Preservation of Fruits & Vegetables: G. Lal, G.S. Siddappa and G.L. Tandan
2. An introduction to the Post-harvest physiology & handling of fruits and vegetables: R.H.H. Wills
3. Hand Book of analysis and quality control for fruit and Vegetable Products. IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi.

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MTFT-204 MILK AND MILK PRODUCTS TECHNOLOGY

Structure and status of Indian Dairy Industry, Composition and Quality of Fresh Milk, Milk reception and handling, Methods of examination and Quality evaluation, Adulteration and it's detection, Processing and distribution of fluid milks. Concentrated, Condensed, Dried & Instantized milk, Desiccated Milk Products, Heat / Acid Coagulated Products. Technical aspects of production and Quality of Butter and Ghee, Ice cream , Cheese, Cultures and Fermented Milk Products, Malted Milk foods. Packaging Materials and Techniques, Packaging Machines, Plant Layout, Quality Assurance & CIP in dairy industry, By-Products utilization and Waste Treatment.

Text Books:

1. Technology of Indian Milk Products: R.P.Aneja, Mathur & Bannerji, Dairy India Publication
2. Chemistry and Testing of Dairy Products: H.V.Athortone
2. Principles of Dairy Processing: N.Warner
3. Outlines of Dairy Technology: Sukumar De

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MTFT-205 ADVANCES IN FOOD PROCESSING TECHNOLOGY

Membrane technology: Introduction to pressure activated membrane processes, Types of membrane and configuration, Membrane Processes: Micro- filtration, UF, NF, RO and Electro-dialysis and their industrial applications in Food Industry. Supercritical-fluid extraction. Dielectric and Ohmic heating of Foods, ISM frequencies, Microwave and Radio Frequency Processing: Definition, Advantages, Mechanism of Heat Generation, Applications in Food Processing, Limitations.

Solar Energy and its use in Food Processing Operations. High Pressure processing: Concept, equipment's for HPP treatment, mechanism of microbial inactivation and its application in food processing. Ultrasonic processing: Properties of Ultrasonics, Application of Ultrasonics as Processing Techniques.

Newer Image Processing Techniques and their applications in Food Processing, Use of Computers and Robotics in Food Processing Industry. Electronic Sorting, Grading and Packaging devices. Rheological, Structural and Textural properties of Foods and their measurement. Correlation between Textural food Attributes. Texture Profile analysis of foods. Hurdle technology: Concept of hurdle technology, Types of Hurdles and their applications.

Text Books:

1. Barbosa-Canovas 2002. Novel Food Processing Technologies. CRC.
2. Dutta AK & Anantheswaran RC.1999. Hand Book of Microwave Technology for Food Applications.
3. Cheryan M. 1998. Ultra-filtration and Micro-filtration Handbook. Technomic Publ.
4. Glasbey CA. 2004. Image Analysis for Biological Sciences.
5. Moskowitz 1999. Food Texture. AVI Publ.

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MTFT-206 ADVANCES IN FOOD PROCESSING LAB

LIST OF EXPRIMENTS

1. Detection / Estimation of some additives in foods
2. Detection/Estimation of adulterants in some foods
3. Extension of shelf life/ preservation of foods by use of low temperature.
4. Processing and preservation of foods by use of high temperature.
5. Preservation and processing of certain vegetables by drying and dehydration
6. Preservation of foods by Sugar/ chemical preservatives.
7. Sensitivity tests (Threshold/Dilution) to measure individual ability for sensory analysis. Difference tests to evaluate qualitative and' quantitative differences and/or preference between test products.
8. Assessment of quality of wheat flour (Water Absorption Power, Gluten Content, and Sedimentation Value etc.).

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MTFT-207 SEMINAR-I

The student(s) will be required to prepare and deliver a Seminar, on the assigned topic with the help of Power Point Presentation as well as submit a type written report.