

SYLLABUS

FOR

**Master of Vocational Degree,
(M. Voc Food Technology)
AUTONOMOUS**

Under

UGC's National Skill Qualification Framework
(NSQF)

At

TC College, Baramati

Affiliated

To

Savitribai Phule Pune University, Pune

YEAR 2023-2024

Preamble:

AES's, Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous) has made the decision to change the syllabi of across various faculties from June, 2023 by incorporating the guidelines and provisions outlined in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. By establishing a nationally accepted and internationally comparable credit structure and courses framework, the NEP 2020 aims to promote educational excellence, facilitate seamless academic mobility, and enhance the global competitiveness of Indian students. It fosters a system, where educational achievements can be recognized and valued not only within the country but also in the international arena, expanding opportunities and opening doors for students to pursue their aspirations on a global scale.

In response to the rapid advancements in science and technology and the evolving approaches in various domains of Food Technology and related subjects, the Board of Studies in Dept. of Food Technology and Research at Tuljaram Chaturchand College of Arts, Science and Commerce (Autonomous), Baramati - Pune, has developed the curriculum for the first semester of F.Y. M.Voc. Food Technology, which goes beyond traditional academic boundaries. The syllabus is aligned with the NEP 2020 guidelines to ensure that students receive an education that prepares them for the challenges and opportunities of the 21st century. This syllabus has been designed under the framework of the Choice Based Credit System (CBCS), taking into consideration the guidelines set forth by the National Education Policy (NEP) 2020, LOCF (UGC), NCRF, NHEQF, Prof. R.D. Kulkarni's Report, Government of Maharashtra's General Resolution dated 20th April and 16th May 2023, and the Circular issued by SPPU, Pune on 31st May 2023.

A Food Technology Post-Graduates degree equips students with the knowledge and skills necessary for a diverse range of fulfilling career paths. Food Technology post-graduate students find opportunities in various fields, including procurement, Testing and quality control, Processing and Production, Research and Development, Storage and Supply Chain Management, Food Regulatory Agencies, Auditing, Academics, Competitive exams, Biostatistics, Database analysis, Entrepreneurship Development, and many other food and food related organizations. Throughout their Two-year degree program, students explore the significance of Farm to Fork processing by utilization of post harvest technology. They learn tools, techniques, processes which are required to set up agencies including pickles, jam and jelly, fruit processing, vegetable processing, organic product, dairy products, animal product processing, Bakery and Confectionery products producing industries.

Overall, revising the post-graduate Food Technology syllabi in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Specific Outcomes (PSOs)

PSO1. Knowledge and understanding of: 1. The structure, Composition, function & health benefits 2. The agriculture revolution. 3. Identification and classification and of variety of food products 4. Post harvest handling & techniques. 5. Advances in food processing system

PSO2. Intellectual skills – able to: 1. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one concept to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing research field. 5. Plan, conduct and write a report on an independent term project.

PSO3. Practical skills: Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Development of various food products. 2. Food analysis. 3. Analysis of chemical compounds in food material. 4. Analyze data using appropriate statistical methods and computational software 5. Soft skill development & computer application

PSO4. Transferable skills: 1. Use of IT (word-processing, use of internet, statistical & Research methodology). 2. Communication of scientific ideas in writing and orally. 3. Ability to co-ordinate as part of team. 4. Ability to use library resources. 5. Time management. 6. Career planning.

PSO5. Scientific Knowledge: Apply the knowledge of basic food science, food microbiology, nutrition science, food preservation technology, dairy technology, packaging technology and fundamental process of food technology to study and analyze their shelf life, chemical compounds & statistical data.

PSO6. Problem analysis: Identify the chemical compounds in food material, formulate the research literature with substantiated conclusions using techniques in food processing.

PSO7. Design/development of new product: Develop the new innovative product with their health benefits to solve health problems, disorders and disease of human beings which fulfill the specified needs to appropriate consideration for the public health.

PSO8. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide scientific conclusions.

PSO9. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern instruments and equipment for chemical estimation, food microbiology, food analytical techniques experiments with an understanding of the application and limitations.

PSO10. Environment and sustainability: Understand the impact of the food processing technology in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable agricultural and environmental development.

PSO11. Ethics: Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.

PSO12. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary task settings.

PSO13. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and interpret effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PSO14. Project management and finance: Apply knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary eco-friendly environments.

PSO15. Life-long learning: Identify the necessity, and have the preparation and ability to engage in independent and life-long learning in the broadest context of upcoming advanced technological.

PSO16. The AFSTI Society: Apply reasoning informed by the contextual knowledge to assess food diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

Board of Studies (BOS) B.Voc Food Technology & Research

Sr.No	Name of the BOS members	Designation
1.	Dr. Wajid A. Khan Head & Associate Professor, Department of Food Technology & Research, T. C. College, Baramati	Chairman
2.	Ms. Vaibhavi A. Bhosale Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
3.	Ms. Asawari D. Katekar Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
4.	Ms. Tilotama R. Pawar Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
5.	Ms. Shreeja R. Deokar Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
6.	Ms. Gayatri T. Deshmukh Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
7.	Dr. A.K. Sahoo, Professor, Dept. of Food Technology, Shivaji University, Kolhapur	External Member VC nominee
8.	Dr. Rinku Agarwal Assistant Professor, Dept. of Food Technology, MIT- ADT University	External Member VC nominee
9.	Ms. Meenaz Wadgaonkar, General Manager- Operation, Gits Food Products Pvt. Ltd., Hadapsar	External Member VC nominee
10.	Mr. Sagar Salunkhe Plant Manager, Bauli India Bakes & Sweets, MIDC, Baramati	Meritorious Alumni

Information:

1. **One semester** = 15 weeks (12 weeks actual teaching and 3 weeks for internal evaluation, tutorials, problem solutions, student's difficulty solution, etc.)

2. As per NCrF :

- Theory course: A minimum of 15 hours of teaching per credit is required.
- Laboratory course: A minimum of 30 hours in laboratory activities per credit is required.

3. **1-credit theory** = 15 hours i.e. for 1 credit, 1 hour per week teaching is to be performed.

15 hours of 1-credit are splinted as 12 hours actual teaching + 3 hours Tutorial (practice, problem solving sessions, repeated discussion on difficult topics, discussion on student's difficulties, questions discussion and internal evaluation)

4. **1-credit practical** = 30 hours. Thus, 1 credit practical = 2 contact hours in laboratory per week

30 hours splinted as 24 hours' actual table work and 6 hours for journal competition, oral on each practical and other internal evaluation.

5. **Each theory courses of any type** (Major, Minor, VSC, VEC, OE/GE, VEC, SEC, CC, etc.) **is of 2 credits.**

a. **Theory per semester:** Contact hours = 24 teaching + 6 tutorials (problem solving sessions, repeated discussion on difficult topics, difficult solution, questions discussion and internal evaluation)

b. Each course will be of two modules, One module = 15 hours

c. Each module may consist of one or more than one chapter.

6. **Each practical course of any course is of 2 credits = 60 hours per semester**

a. Minimum 12 laboratory sessions must be conducted in one semester.

b. Each laboratory sessions should be 4 hours.

c. If practical is short, then two short practicals should be included in one laboratory sessions.

d. In 12 laboratory sessions maximum 2 demonstration sessions or table work sessions may be included and must be designed carefully for 4 hours' sessions.

e. 4 hours' laboratory sessions include - performing table work (practical), calculation, writing results and conclusion, and submission of practical in written form to practical in charge.

f. Prelab oratory reading and post laboratory work / questions should be assigned on each practical and this will be the part of internal evaluation.

7. **Design syllabus of each theory and practical course as per above guidelines.**

a. **Theory syllabus** should be given module wise and chapter wise.

b. **Theory syllabus** should include name of topic, number of teaching hours allotted, detailed point wise syllabus, page numbers, references book no.

- c. It is recommended that, **design syllabus of one theory course from maximum two references books** and they will be called as main reference books/text books. Below that, you can add names of more reference books and they will be supplementary reference books.
- d. **Syllabus of practical** must be given practical wise. Name of experiment and aim of the experiment should be clearly mentioned. Mention reference book number or bibliography for each practical. At least 16 practicals must be included in syllabus from which 12 practicals will be actually conducted. If practical is short, then two short practicals will be considered as one practical.
- e. At the end of syllabus of theory and practical course, a list of references book should be given number wise.
- f. **At the end of each theory and practical course 6 CO should be given.**

Course Structure for F. Y. M. Voc. (Food Technology) 2023-2024

SEMESTER -I

Level	Semester	Major		Research Methodology	OJT/FP	RP	Cum. Cr.
		Mandatory	Elective				
6.0	I	FTR-501-MJM- Food Microbiology (T) (4 C)	FTR-511-MJE- Bakery Technology (T) (2 C) OR	FTR-521-RM Research Methodology (T)(4C)			22 Cr.
		FTR-502-MJM- Food Chemistry & Analysis (T) (4C)	FTR-511-MJE- Confectionery Technology(T) (2 C)				
		FTR-503-MJM- Nutrition Science (T) (2 C)	FTR-512-MJE- Bakery Technology (P) (2 C)				
		FTR-504-MJM- Food Microbiology (P) (2 C)	OR				
		FTR-505-MJM- Food Chemistry & Analysis (P) (2 C)	FTR-512-MJE- Confectionery Technology(P) (2 C)				
	II	FTR-551-MJM- Food Processing & Packaging (T) (4 C)	FTR-561-MJE- Beverage Technology (T) (2 C)				22 Cr.
		FTR-552-MJM- Food Additives & Toxicology (T) (4 C)	OR				
		FTR-553-MJM Fermentation Technology (T) (2C)	FTR-561-MJE- Snacks Technology (T) (2 C)				
		FTR-504-MJM- Food Processing & Packaging (P) (2 C)	OR				
		FTR-505-MJM- Fruits & Vegetables (P) (2 C)	FTR-562-MJE Snacks Technology (P) (2 C)				
Cum. Cr.	28	8	4	4	-	44	

First Year

Semester I

Theory Paper No. FTR-501-MJM, Food Microbiology

Maximum Marks: 100

Credits: 4

Teaching Period: 4/week

Teaching Load: 60 Theory Period/Semester

Learning objectives:

- To develop skills to understand the theoretical concepts related to food microbiology
- To learn about microorganisms which inhabit, create or contaminate food.
- To study about the food poisoning and microbial toxin present in food.
- To know about the processing of various fermented product.

Learning Outcomes:

Students will able to,

1. Explain pathogens and spoilage microorganisms in foods and the conditions under which they will grow, conditions under which the important pathogens are commonly inactivated, killed or made harmless in food describe the processes, contamination and advantages of microbial involvement
2. Explain the theoretical basis of the tools, technologies and methods common to microbiology
3. Explain the Food poisoning and microbial toxins occur in food.
4. Explain the microorganisms in food fermentation, Processing of Fermented Food Products

Unit-1 Microorganisms and their growth

12P

History of microbiology of food. Types of micro-organism normally associated with food mold, yeast, and bacteria, Microbial growth pattern, physical and chemical factors influencing destruction of micro-organisms.

Unit-2 Contamination of food

08P

Contaminants of foods-stuffs, vegetables, cereals, pulses, oilseeds, milk and meat during handling and processing

Unit-3 Spoilage of Food

10P

Micro-organisms in natural food products and their control, Biochemical changes caused by micro-organisms, deterioration and spoilage of various types of food products, microbial food fermentation

Unit-4 Control of microorganisms

10P

Quality of food, control at source training, facilities and operation, equipments, Cleaning and disinfection, physical and chemical control methods.

Unit-5 Food Poisoning

10P

Food poisoning and microbial toxins, standards for different foods, Food borne intoxicants and mycotoxins

Unit-6 Fermentation**10P**

Concept of Fermentation, important microorganisms in food fermentation, Processing of Fermented Food Products: Bread, traditional Indian foods, malt beverages, wines, vinegar, fermented vegetables, fermented dairy products, oriental fermented products and Spoilage and defects of fermented food products.

References:

- Food microbiology (IVth edition) - William C. Frazier and Dennis C. Westoff- Tata McGraw Hill Pub. Co. Ltd, New Delhi, 1995)
- Basic food microbiology-George G. Banwart (CBS publishers & distributors, New Delhi, 1987)
- Food microbiology- M. R. Adams & M. O. Moss (New Age International (P). Ltd. 2000)
- Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000
- Introduction to Microbiology, M.H.Gajbhiye& S.J. Sathe et al, Career Publications, Nashik, 2015

First Year

Semester I

Theory Paper No, FTR-502-MJM, Food Chemistry & Analysis

Maximum Marks: 100

Credits: 4

Teaching Period: 4/week

Teaching Load: 60 Theory Period/Semester

Learning objectives:

- To develop the skills for structure, functions, metabolism of various components of food
- To study about the food groups
- To learn about working and principles of analytical instruments
- To learn about different methods of food analysis

Learning Outcomes:

- Understand the properties of food components
- Develop an understanding of the principles of interactions of food molecules.
- Able to learn about analytical techniques and its importance in food industry
- Knowledge of proper procedures and methodologies in analytical.

Unit I: Introduction to basic concepts of food chemistry

06P

Overview of food chemistry, Introduction to food groups, moisture in food, physico-chemical properties of water and ice, water structure, water interactions, water activity

Unit II: Carbohydrates and proteins

15 P

Carbohydrates– sources, simple and complex sugars-basic chemistry, sugar derivatives, structures and properties of starch, cellulose, gums, hydrocolloids and dietary fibres.

Proteins– sources, properties and structure of amino acid, protein denaturation, functional properties of protein in food, wheat proteins (dough formation), common food proteins

Unit III: Lipids, enzymes and minerals

12 P

Lipids– Introduction, nomenclature and structure, characteristics, classes, processing, lipid oxidation, physical properties

Enzymes – nature, chemistry, applications in food industry, control of enzyme action in food

Minerals and vitamins – sources and structure, effect of processing and storage, pro-vitamin A & D as antioxidants, food pigments and flavouring agents – importance, types and sources changes during processing and storage

Unit IV: Basics in food analysis

10 P

Introduction, sample preparations, sampling methods, importance of analysis in industry, Basic Electrophoresis techniques used in food analysis

Unit V: Chromatographic techniques– classification, Paper, TLC, HPLC, Column, Affinity, Ion-exchange **07P**

Unit VI: Determinative Techniques

10 P

Methods used for Extraction, distillation, titration. Protein, fat, moisture, ash, fibre and carbohydrate analysis methods

References:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
4. Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995
5. DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999
6. Desrosier, Norman W. and Desrosier.,James N.,The technology of food preservation , 4th Ed.,Westport, Conn. : AVI Pub. Co., 1977.
7. Fuller, Gordon W, New Product Development From Concept to Marketplace, CRC Press,2004.
8. Manay, S. & Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004
9. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd ed. TMH Education Pvt. Ltd, 1986
10. Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Chrishtian

First Year

Semester I

Theory Paper No-FTR-503-MJM, Nutrition Science

Maximum Marks: 50

Credits: 2

Teaching Period: 3/week

Teaching Load: 30 Theory Period/Semester

Learning Objective:

- To acquaint the students about importance of nutrition, balanced diets, therapeutic diets for health and role of food and nutraceuticals in health.
- TO understand the significance of food in our daily life
- To understand the terms food, health, nutrition, malnutrition and nutritional status
- To identify the food sources of sugar, starch and fibre

Learning Outcome:

- The student will understand the protein in our daily diet.
- The student will understand the role of fat, vitamin and minerals in our daily life.
- The student will get knowledge of balanced diet.
- Students will learn about Digestion, absorption and assimilation of nutrients.

Unit-I: Basics of nutrition

07P

Introduction to human nutrition, Macronutrients and micronutrients- Classification and functions, Digestion, absorption and assimilation of nutrients

Unit-II: Energy metabolism

07P

Energy metabolism - Components of energy expenditure, Basal Metabolic Requirements and Activity, Recommended Dietary Allowances, Food Groups, Concept of a balanced diet, Methods of evaluation of nutritive value of foods. Nutrition a assessment and nutritional policies-Salient features, concept of community nutrition.

Unit-III: Carbohydrates and Proteins

08P

Carbohydrates- Types, functions, sources, requirement, storage, Effect of deficiency and excess, Proteins- Types, functions, sources, requirement, storage, Effect of deficiency and excess.

Unit-IV: Fat, Vitamins and Minerals

08P

Fat-Types, functions, sources, requirement, storage, Effect of deficiency and excess
Vitamin Types, functions, sources, requirement, storage, Effect of deficiency and excess. Minerals-Types, functions, sources, requirement, storage, Effect of deficiency and excess. Water and electrolytes- Concept and importance

Reference books:

1. Nutrition Science by B. Srilakshmi Fundamentals of Foods & Nutrition by SumatiR. Mudambi Textbook of Nutrition: A Lifecycle approach by Ravinder Chadha.

First Year

Semester I

Practical Paper No-FTR-504-MJM, Food Microbiology

Maximum Marks: 50

Credits: 2

Teaching Period: 3 /week

Teaching Load: 30 Theory Period/Semester

Learning Objectives:

- To learn about the basic laboratory practices.
- To study the basic laboratory instruments, material & glasswares.
- To study about the functioning & use of microscope.
- To learn about Preparation of media & inoculation techniques.

Learning Outcome:

- Students will get knowledge about the laboratory practices.
- Students will have a thorough understanding of different types of staining process.
- The students will know the cultivation of microbes by using various food samples.
- Student will learn about the working of microscope.

Practicals:

Sr. No.	Practical Name	Periods
1.	Introduction to basic laboratory practices	1P
2.	Working principle of basic laboratory instruments	4P
3.	Study of aseptic techniques	2P
4.	Study of microscopy & micrometry	4P
5.	Cleaning and sterilization of glasswares	4P
6.	To study inoculation techniques	4 P
7.	Preparation & sterilization of media & disinfectants	4P
8.	Methods of determining conc. of micro-organisms in a sample	4P
9.	Methods of determining concentration of micro-organisms in a sample	2P
10.	Preparation of broth/ slant/ stab & plates	3P
11.	Isolation& preparation of pure culture of bacteria	3P
12.	To study the different types of staining process	4P
13.	Preparation of saline & smear	4P
14.	Various biochemical test to identification of commonly found bacteria in food	2P
15.	Hazard Analysis Critical Control Points-Case Study	3P
16.	Maintain of stock culture	

References:

- Food microbiology (IVth edition) - William C. Frazier and Dennis C. Westoff- Tata McGraw Hill Pub. Co. Ltd, New Delhi, 1995)
- Basic food microbiology-George G. Banwart (CBS publishers & distributors, New Delhi, 1987)
- Food microbiology- M. R. Adams & M. O. Moss (New Age International (P). Ltd. 2000)
- Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000
- Introduction to Microbiology, M.H.Gajbhiye& S.J. Sathe et al, Career Publications, Nashik, 2

First Year**Semester I****Practical Paper No-FTR-505-MJM, Food Chemistry & Analysis****Maximum Marks: 50****Credits: 2****Teaching Period: 3 /week****Teaching Load: 30 Theory Period/Semester****Learning objectives:**

- To develop the skills for structure, functions, metabolism of various components of food
- To study about the Analysis of water
- To learn about working and principles of analytical instruments
- To learn about different methods of food analysis

Learning Outcomes:

- Understand the properties of food components
- Able to learn about the procedure used for analysis of oil.
- Able to learn about analytical techniques and its importance in food industry
- Knowledge of proper procedures and methodologies in analytical.

Practicals:

Sr. No.	a. Practical Name	Periods
1.	Working principle of instruments used in food analysis	1P
2.	Estimation of moisture by oven method	4P
3.	Estimation of ash by muffle furnace	2P
4.	Estimation of fat by Soxhlet method	4P
5.	Estimation of protein by: a) Biuret method b) Kjeldahl method	4P
6.	Estimation of iron in food sample	4 P
7.	Determination of pigments in food sample	4P
8.	Determination of Vitamin C in food sample	4P
9.	Determination of acidity of beverages and juices	2P
10.	Determination of reducing and non-reducing sugars	3P
11.	Determination of starch in food sample	3P
12.	Analysis of oil: a) Saponification value, b) Acid value, c)Iodine number, d)Iodine number	4P
c)	Determination of essential amino acids	4P
d)	Quality analysis of food products	2P
e)	Analysis of water	3P

References:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
4. Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995
5. DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999
6. Desrosier, Norman W. and Desrosier.,James N.,The technology of food preservation , 4th Ed.,Westport, Conn. : AVI Pub. Co., 1977.
7. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd ed. TMH Education Pvt. Ltd, 1986

First Year

Semester I

Theory Paper No, FTR-511-MJE, Bakery Technology

Maximum Marks: 50

Credits: 2

Teaching Period: 3 /week

Teaching Load: 30 Theory Period/Semester

Learning Objective:

- To know about role, chemistry, manufacturing of various ingredients and products in bakery industry.
- To develop knowledge and skills in the preparation and storage of Bakery items
- To develop the skills on development of popular snack foods present in Indian Market.
- To learn about start-up project in bakery industry.

Learning Outcome:

- Students will have a thorough understanding the processing and preservation of appetizers.
- Students will have a thorough understanding on effect of blending and baking on final product of bakery.
- The students will know the various extruded product development.
- The students will understand about start-up project in bakery industry.

Unit-1 Wheat and bakery ingredients, baking technology:

08P

Variety, qualities, Types of Wheat, Grading system, Chemical constituents, physiological and rheological properties, Enzymes and wheat flour.

Unit-2: Types & role of ingredients

07P

Major and Minor ingredients and their functions in bakery products

Unit-3 Bakery products and unit operations

09P

The reactions of baking (Mixing, leavening, baking) preparation method of bread, cake, biscuits, cookies, pastry, buns, crackers, types of quick bread, Non-dairy creamer/toppings in bakery industries: source, method of preparations.

Unit-4 Bakery organization and start-up project in bakery industry

06P

References:

1. Morris B. Jacobs The chemical analysis of foods and food products, III Edition, CBS Publishers and distributors New Delhi.
2. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
3. D.T.Plummer An introduction to practical biochemistry, III Ed. Tata McGraw Hill Publishing Co. New Delhi
4. Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis: Theory and practice, 3rd Edn. IS: 6273 (Part-1& Part-2). Chapman and Hall. 8
5. Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi.

First Year

Semester I

Theory Paper No, FTR-511, MJE, Confectionery Technology

Maximum Marks: 50

Credits: 2

Teaching Period: 3 /week

Teaching Load: 30 Theory Period/Semester

Learning Objective:

- To know about role, chemistry, manufacturing of various ingredients and products in confectionery industry.
- To develop knowledge and skills in the preparation and storage of Confectionery items
- To develop the skills on development of popular confectionary foods present in Indian Market.
- To learn about the caramel manufacture process.

Learning Outcome:

- Students will have a thorough understanding the processing and preservation of appetizers.
- Students will have a thorough understanding on effect of blending and baking on final product of bakery.
- The students will know the various Chocolate based confectionery.
- The students will learn about the caramel manufacture process.

Unit-1: Introduction to confectionery

08P

History, traditional confectionery goods, types of confectionary, classification, invert sugar, glucose syrup, Manufacturing of food starches, heating of starch granules, gelatinization, retro gradation, factors affecting gelatinization.

Unit-2: Sugar based

07P

Manufacturing of raw, refined and White sugar, forms of sugar, liquid sweeteners, reactions of sugar, crystalline and amorphous confectionery

Unit-3 Chocolate based Confectionery

08P

Chocolate based confectionery: History and development, cocoa processes, cocoa butter, emulsifiers used in chocolate confectionery coatings and cocoa, chocolate manufacture, chocolate bars and covered confectionery

Unit-4: Caramel, High boiled sweets, Toffee

07P

Definition, composition, caramel manufacture process, properties of high boiled sweets, preparation of high boiled sweets, types of toffee ingredient and their role, Fondant, Fudge preparation.

References:

1. Morris B. Jacobs The chemical analysis of foods and food products, III Edition, CBS Publishers and distributors New Delhi.
2. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
3. D.T.Plummer An introduction to practical biochemistry, III Ed. Tata McGraw Hill Publishing Co. New Delhi
4. Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis : Theory and practice, 3rd Edn. IS: 6273 (Part-1& Part-2). Chapman and Hall. 8
5. Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi

First Year

Semester I

Practical Paper No.FTR-512-MJE-Bakery Technology

Maximum Marks: 50

Credits: 2

Teaching Period: 3 /week

Teaching Load: 30 Theory Period/Semester

Learning Objective:

- To know about Classification of wheat based on physico-chemical properties.
- To develop knowledge and skills in the preparation and storage of Bakery items
- To develop the skills on development of popular bakery foods present in Indian Market.
- To learn about equipments used in bakery industry.

Learning Outcome:

- Students will have a thorough understanding the processing of bakery products.
- Students will have a thorough understanding on effect of blending and baking on final product of bakery.
- The students will know the various evaluations of quality parameters in bakery industry.
- The students will understand about working of bakery industry.

Practicals:

Sr. No.	Practical Name	Periods
1.	Classification of wheat based on physico-chemical properties	1P
2.	Quality testing of flour and yeast	3P
3.	Preparation of cookies & evaluation of physical properties	4P
4.	Preparation of biscuit	4P
5.	Preparation of bread and evaluation of quality parameters	4P
6.	Preparation of Cream roll	4P
7.	Preparation of chocolate muffins	4P
8.	Preparation of Buns	4P
9.	Preparation of sponge cake	3P
10.	Preparation of Pastry	3P
11.	Preparation of breadsticks	3P
12.	Preparation of chocolate mousse	3P
13.	Preparation of lava cake	3P
14.	Visit to bakery industry	3P
15.	Preparation of report	2P

References:

1. Matz S. A. (1996): Bakery technology and engineering, 1st edition, Arya book depot New delhi.
2. Practical Baking Cooking, 1st edition, Queen street house, U.K.
3. Kamel B. S. and Stauffer C. E. (1993): Advances in baking technology, 1st edition, Blackie academic and professional.
4. Aylwaed F. (2001): Food Technology Processing and Quality control \, 1st edition, Agrobios (India)
5. Khetarpaul N, Grewal R. B. and Jood S. (2005): Bakery Science and Cereal Technology, 1st edition, Daya publishing house, Delhi.
6. Minife B.W. (1997): Chocolate, cocoa and confectionery science and technology, 3rd edition, CBS Publishers and Distributors, New Delhi.

First Year

Semester I

Practical Paper No. FTR-512-MJE-Confectionery Technology

Maximum Marks: 50

Credits: 2

Teaching Period: 3 /week

**Teaching Load: 60 Practical
Period/Semester**

Learning Objective:

- To know about role, chemistry, manufacturing of various ingredients and products in confectionery industry.
- To develop knowledge and skills in the preparation and storage of Confectionery items
- To develop the skills on development of popular confectionary foods present in Indian Market.
- To learn about the caramel manufacture process.

Learning Outcome:

- Students will have a thorough understanding the processing of confectionary products.
- Students will have a thorough understanding on effect of high temperature on final product of confectionary.
- The students will know the various Chocolate based confectionery.
- The students will learn about the caramel manufacture process.

Practicals:

Sr. No.	h. Practical Name	Periods
1.	Preparation of high boiled sweets	2P
2.	Preparation of chocolates	3P
3.	Preparation of Fondant	4P
4.	Preparation of groundnut chikki	4P
5.	Preparation of milk chocolate	4P
6.	Preparation of toffee	2P
7.	Preparation of jelly candy	4P
8.	Preparation of Marshmallow	4P
9.	Preparation of Taffy or chews	3P
10.	Preparation of Mysure Pak	3P
11.	Preparation of Fudge	3P
12.	Preparation of Son Papdi	3P
13.	Preparation of Petha	4P
14.	Visit to Confectionary industry and Preparation of report	3P
15.	Preparation of report	2P

References:

1. Matz S. A. (1996): Bakery technology & engg, 1stedition, Arya book depo New delhi.
2. Practical Baking Cooking, 1st edition, Queen street house, U.K.
3. Kamel B. S. and Stauffer C. E. (1993): Advances in baking technology, 1st edition, Blackie academic and professional.
4. Aylwaed F. (2001): Food Technology Processing and Quality control \, 1st edition, Agrobios (India)
5. Khetarpaul N, Grewal R. B. and Jood S. (2005): Bakery Science and Cereal Technology, 1st edition, Daya publishing house, Delhi.
6. Minife B.W. (1997): Chocolate, cocoa and confectionery science and technology, 3rd edition, CBS Publishers and Distributors, New Delhi.

First Year

Semester I

Theory Paper No.FTR-521-RM Research Methodology

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- Study of research methodologies.
- To study about the review writing.
- To gain knowledge of different technical aspect of research and statistical steps involved in research process.
- To learn about the Plagiarism.

Learning Outcome:

- Students will understand the statistical error in the research and to overcome the research problems.
- The students will acknowledge the methods of research as well as Stastical background of any research.
- The students will get knowledge of review article, research paper, patents.
- The students will learn about IP & IPR.

Module-1: Introduction of Research Design

10P

Steps in the Process of Research

Identifying a hypothesis and/or research problem, specifying a purpose, creating research questions, Reviewing literature, Ethics of research and informed consent

Module II: Introduction to Qualitative Research

10P

Essence of Qualitative data, Data Sampling and Collection Techniques

Module III: Introduction to Quantitative Research

12 P

Essence of Quantitative Data and Collection and Analysis Techniques

Module IV: Interpreting Qualitative Data

08 P

Qualitative Data Analysis Procedures, Coding and Thematic development

Module V: Preparation of Research article

08 P

Use of techniques and writing about findings, Review paper, Research paper, article etc

Module VI: Intellectual property rights (IPRs)

12P

Concept of IP and IPR; Patents; Copyright; Industrial designs; Trade secrets; Ethics in publication; Plagiarism and open access publishing

References:

John Creswell Research Design: Qualitative, Quantitative, and Mixed Methods Approaches