

AC- 19/ 04 / 2022

Item No- 6.10



Rayat Shikshan Sanstha's
KARMAVEER BHAURAO PATIL COLLEGE, VASHI
NAVI MUMBAI
(AUTONOMOUS COLLEGE)
Sector-15- A, Vashi, Navi Mumbai - 400 703

Syllabus for F.Y B.Voc.
Program: Bachelor of Vocation
Course: F.Y B.Voc. Food Technology

**(Choice Based Credit, Grading and Semester System with effect from
the academic year 2022-2023)**

Rayat Shikshan Sanstha's
Karmaveer Bhaurao Patil College Vashi, Navi Mumbai
Autonomous College
 [University of Mumbai]
 Syllabus for Approval

Sr. No.	Heading	Particulars
1	Title of Course	F. Y B.Voc Food Technology
2	Eligibility for Admission	10+2 (of recognized board)
3	Passing Marks	40%
4	Ordinances/Regulations (If any)	-
5	No. of Years/Semesters	Three years/ Six semester
6	Level	U.G.
7	Pattern	Semester
8	Status	Revised
9	To be implemented from Academic year	2022-2023

1. UGC Sponsored B. Voc. Program

The University Grants Commission (UGC) had launched a scheme on 27 February, 2014 for skills development based higher education as a part of college/university education, leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exit points. Considering the implementation modalities, the guidelines of the scheme have been revised in the year 2015. The B.Voc. program is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles and their NOSs along with broad based general education. This would enable the graduates completing B. Voc to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

2. Preamble of the Syllabus:

Food Technology is a B.Voc. Course and an under-graduation programme at Karmaveer Bhaurao Patil College Vashi, Navi Mumbai [Autonomous College]

With liberalization of Indian economy, all-round industrial growth has been witnessed in all sectors with improvement in social and economic conditions of our people. This has created demand for more and better-quality foods. With advancement in production technology, high yield levels will lead to large amount of marketable surplus of food grains and crop residues, demanding appropriate handling, processing, preservation, storage, marketing and utilization. The development of processing industries to preserve the perishable agricultural produce will not only improve economic and nutritional status of our population but it may help in employment generation in rural as well as urban areas of the country. This can be achieved by linking production, and post-harvest technology in synergistic way.

At present the export from agro-sector represents about 16% of total Indian exports. The primary export commodities are cereals, fruits, vegetables and their processed products, and marine products but fast-growing specialty products have also penetrated in foreign markets. Considering the contribution of these products in Indian export, it is necessary to have appropriate technology for handling and processing of agricultural produce. The importance of Food processing and Quality Control lies in the fact that it has capability to provide food to our population through scientific conservations, eliminating avoidable losses and making available more balanced and nutritious food. High value products from low grade material can be produced by innovative and appropriate processing and packaging technologies and also from by-products and residue waste using integrated approach. Thus, modernization of post-harvest operations and agro-processing industries through innovative and appropriate technology has a vital role to play in national economy in general and rural economy in particular.

Considering the above aspects, the role of food technologist does not stop at farm level but it continues till the harvested crops and animal products are processed, preserved and further modified into useful and nutritious products, until it utilized by the consumer. So, the post-harvest handling and processing need to be attended on priority basis at national and international level. Moreover, with development of processing industries, it is quite likely that the demand for food scientists and technologists will increase in the next few decades. Hence, specializations offered at graduate level need to be strengthened considering occupational needs as well as demands of the food industries. The field of food quality assurance has evolved substantially over the past decade, and certain key developments have become widely accepted.

These include Quality Systems (e.g., ISO) and HACCP. Consequently, it has become essential for undergraduate Food processes and Quality Control students preparing for careers in the food industry to have some basic training in these systems as part of the curriculum in their university or college programs. The B.Sc. programme integrates the latest principles, practices, and terminology of food safety systems with those of quality management systems to provide an understanding of a single food quality management system.

3. Curricular Aspects and Level of Awards

Awards	Duration
Certificate	6Months
Diploma	2 Semesters (after 1 st year)
Advanced Diploma	4 Semesters (after 2 nd year)
Degree	6 Semesters

10+2 Students
of Category - 2 & 3

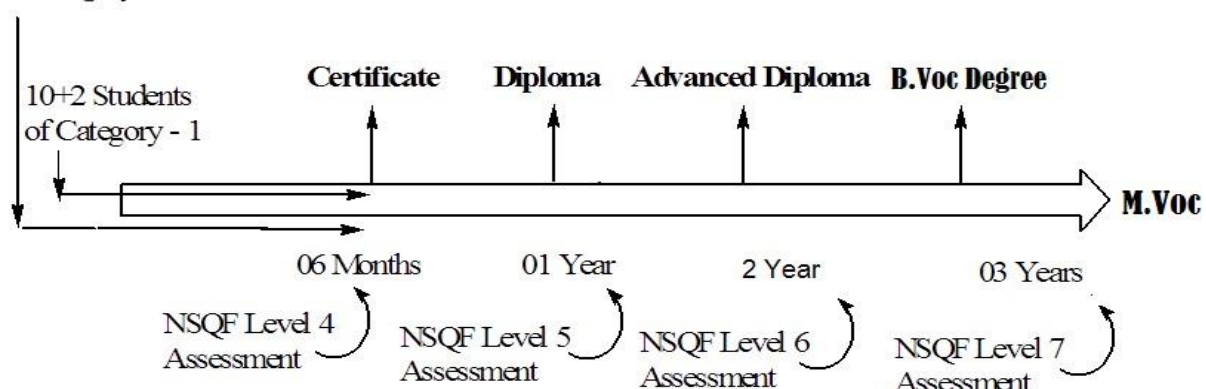


Figure 1: Assessment of Skill Component under NSQF in Vocational Courses

Cumulative credits awarded to the learners in skill based vocational courses

NSQF Level	Skill Component Credits	General Education Credits	Total Credits for Award	Normal Duration	Exit Points/ Awards
4	18	12	30	One sem.	Certificate
5	36	24	60	Two sem.	Diploma
6	72	48	120	Four sem.	Advanced Diploma
7	108	72	180	Six sem.	B.Voc Degree

The curriculum in each of the years of the program would be a suitable mix of general education and skill development components. As is evident from Table 2 above, the General Education Component shall have 40 % of the total credits and balance 60% credits will be of Skill Component. The Curriculum details should be finalized before introduction

of the courses.

4. Assessment

- a. The Skill component of the course will be assessed and certified by the respective Sector skill Councils. In case, there is no Sector Skill Council for a specific trade, the assessment may be done by an allied Sector Council or the Industry partner. The certifying bodies may comply with and obtain accreditation from the National Accreditation Board for Certification Bodies (NABCB) set up under Quality Council of India (QCI). Wherever the university/college may deem fit, it may issue a joint certificate for the course(s) with the respective Sector Skill Council(s).
- b. The credits for the skill component will be awarded in terms of NSQF level certification which will have 60% weightage of total credits of the course in the following manner.

Name of the Course	NSQF Level Certificate	Cumulative Credits
Certificate	Level – 4	18 credits
Diploma	Level – 5	36 credits
Advanced Diploma	Level – 6	72 credits
B.Voc Degree	Level – 7	108 credits

c. The general education component will be assessed by the concerned university as per the prevailing standards and procedures. The following formula may be used for the credit calculation in general education component of the courses:

- i. General Education credit refers to a unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week. Accordingly, one Credit would mean equivalent of 14-15 periods of 60 minutes each or 28– 30 hrs of workshops / labs.
- ii. For internship / field work, the credit weightage for equivalent hours shall be 50% of that for lectures /tutorials.
- iii. For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study shall be 50% of that for lectures /tutorials.

d. Letter grades and grade points

Letter Grades and Grade Points: The UGC recommends a 10-point grading system with the following Letter grades as given below:

Letter Grade	Grade Point
O (Outstanding)	10
A ⁺ (Excellent)	9
A (Very Good)	8
B ⁺ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

5. Syllabus for F.Y B.Voc. Food Technology

This practical and informative course provides participants with foundational knowledge related to all aspects of food science presented by world renowned experts. This course is designed for any one working in food industry or in the field of food processing in order to increase their knowledge in food chemistry, sensory science, food safety, food packaging and functional foods and Nutraceuticals. This course is designed to give a overview of the most relevant aspects of food science typically covered over our three year under graduate programme. Food processing can be defined as the application of basic sciences and engineering to study the basic and fundamental physical, chemical and biochemical nature of foods and the principles of food processing. Food processing and quality management is the science of processing, packaging of food items and quality assurance. Fruits, vegetables, sea foods, meats, cooked foods, snacks, confectionaries, beverages, juices, canned juices and fruits all come under the preview of food processing and quality management.

6. Objectives of the Course:

- To enrich students' knowledge and train them in the food processing technology
- To introduce the concepts of quality assurance, safety management
- To inculcate sense of scientific responsibilities and social and environment awareness
- To help student build-up a progressive and successful career

7. PROGRAM OUTCOMES (POs)

PO-1	Disciplinary Knowledge	Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology & engineering and its other fields related to the program.
PO-2	Communication Skills	Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
PO-3	Critical Thinking	Propose novel ideas in explaining the scientific data, facts and figures related to science and technology.
PO-4	Analytical Reasoning and Problem Solving	To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and devices for the food industry and provide solutions for the challenges in the food industry as well as in agriculture.
PO-5	Sense of Inquiry	Curiously ask relevant questions for better understanding of fundamental concepts and principles, scientific theories and applications related to the study.
PO-6	Use of Modern Tools	Operate modern tools, equipment, instruments and laboratory techniques to perform the experiments and write the programs in different languages.
PO-7	Research Skills	Understand how to design, collect, analyze, interpret and evaluate information/data that is relevant to food technology.
PO-8	Application of Knowledge	Develop a scientific outlook and apply the knowledge with respect to food technology.
PO-9	Ethical Awareness	To train students in professional and ethical attitude, effective communication skills, teamwork skills and multidisciplinary approaches related to food technology and engineering.
PO-10	Teamwork	Understand the basic concepts, fundamental principles and experimental findings and the scientific theories related to food technology, food science and food technology & engineering and its other fields related to the program.
PO-11	Environment and Sustainability	Develop various communication skills such as reading, listening and speaking skills to express ideas and views clearly and effectively.
PO-12	Lifelong Learning	Propose novel ideas in explaining the scientific data, facts and figures related to science and technology.

8. PROGRAM SPECIFIC OUTCOMES

PSO-1:

Students will understand the knowledge of food, food analysis, food spoilage and principles of food preservation, food QA and QC.

PSO-2:

Students will get the practical knowledge of bakery and confectionary technology to become an entrepreneur to develop a skill in Entrepreneurship Development and Project Management.

PSO-3:

Students will demonstrate knowledge of professional and ethical responsibilities.

PSO-4:

Students will understand the importance of preservation and economical value food.

Detailed Distribution of Courses

SEMESTER – I								
Course code	Title	Credits	L	P	Hours/ week	CIE	SEE	Total
<u>General Component</u>								
UGFT101	Introduction to Food	4	4	-	4	40	60	100
UGFT102	Food Microbiology	4	4	-	4	40	60	100
UGFT103	Food Chemistry	4	4	-	4	40	60	100
<u>Skill Component</u>								
UGFTP101	Communication Skills in English	6	-	6	6	-	150	150
UGFTP102	Food Microbiology	6	-	6	6	-	150	150
UGFTP103	Food Chemistry	6	-	6	6	-	150	150
Total Marks		30	12	18	30	120	630	750
SEMESTER – II								
Course code	Title	Credits	L	P	Hours/ week	CIE	SEE	Total
<u>General Component</u>								
UGFT201	Principle of Food Preservation	4	4	-	4	40	60	100
UGFT202	Food Analysis	4	4	-	4	40	60	100
UGFT203	Processing of Fruits and Vegetables	4	4	-	4	40	60	100
<u>Skill Component</u>								
UGFTP201	Principle of Food Preservation	6	-	6	6	-	150	100
UGFTP202	Food Analysis	6	-	6	6	-	150	100
UGFTP203	Processing of Fruits and Vegetables	6	-	6	6	-	150	100
Total Marks		30	18	12	30	120	630	750
L: Lectures				P: Practical				
CIE: Continuous Internal Evaluation				SEE: Semester End Examination				

UGFT 101– INTRODUCTION TO FOOD

(GENERAL COURSE - 01)

Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes: After successful completion of this course, students will be able to:

CO1: Define various food components and learn about their importance in the food.

CO2: Understand the basic principle, working mechanisms of various food components, and various chemical reactions that take place in food

CO3: Identify and apply various biochemical and enzymatic reactions, to prevent food spoilage

CO4: Analyse different chemical and enzymatic reaction

CO5: Evaluate methods of food processing and preservation.

Unit 1.1: Basic concept of Food

12 Lectures

Basic concept of Food: Nutrient, Nutrition, Classification of Food, Classification of Nutrients. Food constituents - Definition, occurrence, properties and metabolism of Protein, Carbohydrate and Lipids. Concept of food and nutrition - Elements of nutrition, Food groups and role of nutrients. Energy metabolism – BMR.

Unit 1.2: Enzymes

12 Lectures

Enzymes - Definition, classification, enzyme kinetics. Browning reactions in foods:

- i. Non enzymic browning: Maillard reaction, browning of ascorbic acid, caramelization of sugars.
- ii. Enzymic browning: Definition, mechanism, control measures.

Unit 1.3: Biochemical changes in foods

12 Lectures

Biochemical changes in foods of plant and animal origin: fruits, vegetables, cereals, pulses, oilseeds, meat, poultry, seafood, dairy and their products).

Unit 1.4: Food spoilage

12 Lectures

Food spoilage – Introduction, spoilage in cereals, vegetables and fruits, meat, eggs, poultry, fish, milk and milk products, canned foods, nuts and oil seeds, fats and oil seeds. Definition - food infection and food intoxication.

Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage, Mechanism of spoilage and its end products, shelf-life determination.

Unit 1.5: Microorganisms important in causing food spoilage

12 Lectures

Microorganisms important in causing food spoilage: Bacterial and fungal food spoilage, food poisoning, food borne infection, food borne intoxication. Toxins produced by

Staphylococcus, Clostridium, Aspergillus; Bacterial Pathogens-Salmonella, Bacillus, Listeria, E. coli, Shigella, Campylobacter.

References:

1. Industrial Enzymes: Structure, Function and Applications - Julio Polaina and Andrew P. MacCabe.
2. Food and Nutrition: - M. Swaminathan.
3. Human Nutrition: - S. Mudambi
4. B. Shreelakshmi: "Food Science" (second edition)
5. Prakash Triveni: Food Preservation, Aadi Publication, Delhi.
6. M. Shafiur Rahman: Hand Book of Food Preservation, Marcel Dekker Inc, New York
7. McWillims and Paine: Modern Food Preservation, Surjeet Publication.

UGFT 102– FOOD MICROBIOLOGY

(GENERAL COURSE - 02)

Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

CO1: Learn the basics of microorganisms, their growth medium fermentation process

CO2: To understand isolation techniques growth pattern of microorganisms their metabolism and their application in real life.

CO3: Utilize various kinds of microorganisms in food processing

CO4: Characterize microorganisms according to their properties

Unit-1.1: Fermented Foods introduction and products 12 Lectures

Fermented Foods introduction and products: FSSAI Regulations for Fermented Food Products. Range of fermentation process-Microbial Biomass, Microbial enzymes, Microbial Metabolites, Recombinant products. Classification of fermentation process- Lactic acid fermentation, alcoholic fermentation. Importance of fermentation in food industry-Flavour, Enhancement, Nutritional value, Preservation, Antibiotic properties Fermented soy products- soy sauce, fermented tofu, Tempeh, Fermented Vegetables- kimchi, sauerkraut.

Unit-1.2: Media and inoculum for fermentation 12 Lectures

Media and inoculum for fermentation: Typical media, medium formulation, Water source, energy source, carbon source, nitrogen source, mineral. Growth factors, nutrient recycle oxygen requirement, anti-foams, medium optimization Inoculum – criteria for transfer of inoculums, development of inoculum for yeast, bacterial and mycelia process, aseptic inoculation of plant fermenters.

Unit-1.3: Introduction to food microbiology 12 Lectures

Introduction to food microbiology: FSSAI Regulations for Food Microbiology. Discovery, role of food microbiology, sources of micro-organisms in food, purification, and lipolysis. Growth and survival of microorganisms in foods, biological, chemical and physical changes caused by microorganisms.

Unit-1.4: Characteristics of microorganisms 12 Lectures

Characteristics of microorganisms: Classification of microorganisms, nomenclature, morphology- yeast and moulds, bacterial cells, viruses. Importance microbes in food, microbial growth characteristics- microbial reproduction, nature of growth in food. CFU, TPC counting, microbiological analysis of food.

Unit-1.5: Food Preservation**12 Lectures**

Food Preservation: Factors influencing microbial growth in food- intrinsic and extrinsic factor, Hydrogen ion concentration, moisture requirement, concept of water activity, temperature, oxidation reduction potential, inhibitory substances and biological structure.

References: -

1. Principles of fermentation technology by Stanburry Whittaker.
2. M. ShafiurRahman: Hand Book of Food Preservation, Marcel Dekker Inc, New York
3. Food Microbiology Paperback – 1 Sep 2018 by M.R. Adams
4. Modern Food Microbiology by James M. Jay, Martin J. Loessner David A. Golden

UGFT 103– FOOD CHEMISTRY

(GENERAL COURSE - 03)

Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes:

Upon successful completion of this course, students will be able to:

CO1: Know the definitions, functions, and classification of carbohydrates, proteins, lipids, vitamins, and water.

CO2: Study the mechanism and principles of food constituents.

CO3: Apply the principles and properties of food constituents in food processing.

CO4: Analyse the changes that occur in the different constituents during storage and ways and means to prevent them.

Unit-1.1: Water

12 Lectures

Water: Introduction to food chemistry, Role and type of water in foods; Functional properties of water; role of water in food spoilage; Water activity, estimation of moisture in foods, determination of moisture and water activity.

Unit-1.2: Carbohydrates

12 Lectures

Carbohydrates: Nomenclature, composition, sources, structure, functions, classification, Properties of Starch – gelatinisation, gel formation, syneresis, starch degradation, dextrinization, retrogradation.

Unit-1.3: Lipids

12 Lectures

Lipids: Nomenclature, composition, sources, structure, functions, classification, Physical and chemical properties-hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point

Unit-1.4: Proteins

12 Lectures

Proteins: Nomenclature, sources, structure, functions, classification, Physical, chemical and functional properties - denaturation, hydrolysis. Enzymes - Specificity, mechanism of enzyme action

Unit- 1.5: Vitamin

12 Lectures

Vitamin: Chemistry, bioavailability and role of vitamins in food- outline.

UGFTP 101 – COMMUNICATION SKILLS IN ENGLISH

(SKILLED COURSE - 01)

Semester I

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

1. Public speaking in English
2. Introduction
3. Characteristics of an effective speech
4. Analysis of model speeches
5. Drafting and presenting a speech in formal and informal gatherings.
6. Conversation in English
7. Opening a conversation
8. Introducing oneself in various contexts
9. Introducing others formality and informally.
10. Building a conversation
11. Leaving and closing a conversation
12. Conversation in group in various situation
13. Speaking at an event
14. Anchoring / compering an event
15. Introducing guest / speaker /dignitaries
16. Proposing a vote of thanks

UGFTP 102– FOOD MICROBIOLOGY

(SKILLED COURSE - 02)

Semester I

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

1. Study of a Bio fermenter – its design and operation, Down Stream Processing and Product recovery.
2. Preparation of Bread.
3. Preparation of Tempeh.
4. Preparation of kimchi / Soy-sauce.
5. Introduction to the Basic Microbiology Laboratory Practices and Equipment.
6. Functioning and use of compound microscope.
7. Cleaning and sterilization of glassware.
8. Preparation and sterilization of nutrient Agar.
9. Preparation of slant, stab and plates using nutrient agar.
10. Simple staining and Gram's staining.
11. Standard Plate Count Method.
12. Determination of sugar tolerance.

UGFTP 103– FOOD CHEMISTRY

(SKILLED COURSE - 03)

Semester I

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

1. Principle and working of analytical instrument such as hot air oven, colorimeter, balances, muffle furnace, spectrophotometer, centrifuge
2. Preparation of standard solutions
3. Estimation of Moisture from food sample
4. Estimation of ash from food sample
5. Estimation of Protein from food sample
6. Estimation of Fat from food sample
7. Determination of acidity of juice sample
8. Estimation of vitamin C
9. Estimation of Fibre from food sample
10. Qualitative test for carbohydrates
11. Water analysis- PH and Hardness
12. Determination of percent free fatty acids and Acid value of fat /oil
13. Iodine value of fat / oil
14. Estimation of saponification value
15. Effect of Acid & alkali on colour of fruits & vegetables.
16. Visit to Food testing laboratory

SEMESTER II

UGFT 201– PRINCIPLES OF FOOD PRESERVATION

(GENERAL COURSE - 01)

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes: After successful completion of this course, students will be able to:

CO-1: Remember different methods of food preservation traditional and modern.

CO-2: Understand the role of food additives and their use in food making.

CO-3: Study how the different foods are preserved.

Unit 1: Fermented Foods introduction and products **12 Lectures**

Basic considerations: Aims and objectives of preservation & processing of foods, Characteristics of tissues and non-tissues foods, Degree of perishability of unmodified foods, Causes of quality deterioration and spoilage of perishable foods, intermediate moisture foods, wastage of foods.

Unit 2: Food Preservation by Heat and Cold **12 Lectures**

Principles and Methods of food preservation, High Temperature Preservation: Blanching; Pasteurization; Sterilization; Canning, Low temperature preservation: Introduction; methods of low temperature preservation; chilling; refrigeration and cold storage

Unit 3: Food Preservation by Drying, Irradiation **12 Lectures**

Drying, dehydration and concentration: Introduction; purpose; water activity and relative humidity; factors affecting rate of drying and dehydration; drying methods; Concentration- methods of concentration.

Food Irradiation: Introduction; Radiation sources; Measurement of radiation dose; Mechanism of Action; Type of irradiation; Factors affecting food irradiation; Effect of irradiation, applications

Unit 4: Food Preservation by Preservatives and fermented foods **12 Lectures**

Preservation by Natural preservatives, Sugar, Salt and Acids: Sugar – Introduction, Factors affecting osmotic pressure of sugar solution, Foods preserved using sugar; Salt: Introduction, Antimicrobial activity of salt, Food products preserved using salt; Acid – Introduction, Mechanism, and Common foods preserved using acids

Preservation by Use of Chemical preservatives: Introduction; Objectives; Factors affecting antimicrobial activity of preservatives; Type of chemical preservatives; Sulphur dioxide, Benzoic acid, etc;

UNIT 5: Food Fermentation: Introduction, methods, common fermented foods 12

Lectures

Principles, Technological aspects and application of sugar and salt, antimicrobial agents, biological agents, non-ionizing and ionizing radiations in preservation of foods. Hurdle technology.

References: -

1. Principles of fermentation technology- Stanburry & Whittaker.
2. M. Shafiur Rahman: Hand Book of Food Preservation, Marcel Dekker Inc, New York
3. Food Microbiology Paperback – 1 Sep 2018 by M.R. Adams
4. Modern Food Microbiology By James M. Jay, Martin J. Loessner David A. Golden

UGFT 202– FOOD ANALYSIS

(GENERAL COURSE - 02)

Semester II

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes: After successful completion of this course, students will be able to:

CO-1: Students will remember various food analysis techniques, followed by analysis, interpretation, and presentation of the results.

CO-2: Understand the principles of food analysis by conducting various analytical techniques

CO-3: Apply a range of chemical analyses of food components and apply valid sampling techniques to food materials having widely diverse properties and volumes.

CO-4: Analyse, interpret and report on results obtained in a scientific format.

Unit 1: Nature and Concept of Food analysis, Basic instrumentation **12 Lectures**

Principle for pH meter, Dialysis, ultra-filtration, Reverse osmosis, Centrifugation: Principle, Theory (RCF, Sedimentation coefficient) and types of Rotors, Ultracentrifugation, and Calorimetry: Bomb calorimeter, Principle of Rheological Analysis- Rheological parameters, rheological methods, instruments and application, Texture profile analysis, Densimetry, Refractometry.

Unit 2: Introduction to samples **12 Lectures**

Types of samples analysed, steps in analysis, choice of methods; sampling procedures, considerations and sample preparation; Evaluation of analytical data – accuracy and precision, sources of errors, specificity, sensitivity.

Unit 3: Analysis of chemical constituents **12 Lectures**

Their characterization and significance- moisture, ash, minerals, lipids, fat, proteins, fibre, titratable acidity, starch, reducing sugars

Unit 4: Analysis of Food **12 Lectures**

Spectroscopic analysis of foods – basic principles, UV, visible, fluorescence, Chromatographic analysis of foods – basic principles

Unit 5: Microscopic analysis of foods **12 Lectures**

Analysis of vitamins, pigments, flavours, extraneous matter, pesticides and mycotoxins, Microscopic analysis of foods other methods- potentiometry, enzymatic, immunoassays, thermal analysis, Analysis of genetically modified foods.

References-

1. Food Processing Operations Analysis” by H Das
2. Food Analysis: Theory and Practice” by Pomeranz / Meloan
3. Food Chemistry, Aurand, L.W. and Woods, A.E. 1973.AVI, Westport.
4. Principles of Food Science: Part-I Food Chemistry. Fennema, O.R. Ed. 1976 Marcel Dekker, New York.
5. Methods in Food Analysis. Joslyn, M.A. Ed. 1970.Academic Press, New York.
6. Developments in Food Analysis Techniques-1. Applied Science King, R.D. Ed. 1978 Publishers Ltd., London.
7. Separation Methods in Biochemistry 2nd Ed Morris, C.J. and Morris, P. 1976. PitmanPub., London.

UGFT 203 – PROCESSING OF FRUIT AND VEGETABLES

(GENERAL COURSE - 01)

Semester II

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Upon successful completion of this course, students will be able to:

CO1: Acquire knowledge of the different physical, chemical, and nutritional properties of fruits and vegetables

CO2: Acquire insight into the various chemical and biochemical changes which can influence the functional properties of the product.

CO3: Identify the spoilage in fruits and vegetables and state the reason for the spoilage following proper storage precautions.

CO4: Analyse the sugar content in fruit and vegetable products.

Unit 1: Introduction

12 Lectures

Composition and nutritive value of fruits and vegetables; Factors effecting composition source and receiving at processing plants, primary processing: cleaning, washing, peeling, slicing and blanching. Types of grading and used machines- Hand Grader, Flat screen grader. Types of sorter- cylinder separator, roller sorter, spiral sorter

Unit 2: Spoilage of fruits and vegetables

12 Lectures

Different types of spoilages in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention; General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Spoilage of pickles - The methods of preparation, curing techniques, defects and remedies types of preservatives commonly used in fruits and vegetables processing industry, limits of usage of preservatives

Unit 3: Processing of fruits and vegetables

12 Lectures

Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (Natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; application to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables. Fruits powder using spray drying. Technology of extraction of juices from different types of fruits

Unit 4: Manufacture of fruits products**12 Lectures**

Manufacturing process of juice, soup, puree and paste; Jams, jellies and marmalade: selection, preparation, production. Differences between jam and jelly, Theory of jelly formation, failure and remedies in jam and jelly making, General Principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits.

Unit 5: Manufacture of vegetables product**12 Lectures**

Manufacturing process of sauce, ketchup, vegetable juices and concentrated products; Pickles- Processing

References:

1. Nirmal Sinha, Y. H. Hui, et al; (2010), “Handbook of Vegetables and Vegetable Processing”, John Wiley & Sons.
2. Olga Martin-Belloso, Robert Soliva Fortuny, (2010), “Advances in Fresh-Cut Fruits and Vegetables Processing”. CRC Press.
3. W Jongen (2002), “Fruit and Vegetable Processing: Improving Quality”, Elsevier Publications.

UGFTP 201– PRINCIPLES OF FOOD PRESERVATION

(SKILLED COURSE - 01)

Semester II

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

1. Introduction to drying equipment's
2. Applications of driers.
3. Classification of food based on pH value and moisture content.
4. Physiological change in food after drying
5. Preparation of food product by drying 1. Onion flakes 2. Raw mango powder / Leafy vegetable powder 3. Raisins
6. Preservation of food by using chemicals. 8. Preservation of coconut shreds using humectants.
7. Osmotic dehydration of foods e.g., candy, Grapes
8. Demonstration of preserving foods under cold v/s freezing process.
9. Demonstration on effect of blanching on quality of foods. 3. Demonstration on canning and bottling of fruits and vegetables.
10. Preservation of food by using salt e.g., Pickle
11. Preservation of food by using acidulants i.e., pickling by acid, vinegar or acetic acid.
12. Visit to any food processing industry/unit.

UGFTP 202 – FOOD ANALYSIS

(SKILLED COURSE - 02)

Semester II

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

1. To determine the moisture content in food (Using hot air oven).
2. To determine the oil content in oil seeds.
3. To determine the total ash content in food.
4. Determination of Crude Fiber.
5. Determination of Protein from Biscuit.
6. Collection and preservation of food samples for routine analysis.
7. Qualitative detection of adulterants in Atta, Maida, Besan, Biscuit, Black pepper, Butter, Ghee, Chilli, Powder, Honey, Tea, Turmeric powder, soft drink.
8. M.B.R.T. of milk.
9. Determination of Standard plate count of Milk Powder.
10. Determination of Non-Volatile Ether Extract of Chilli.
11. Determination of B.R. of Groundnut oil.

UGFTP 203– PROCESSING OF FRUIT AND VEGETABLES

(SKILLED COURSE - 03)

Semester II

Total Credits: 6

Total Lecture Hours: 90 (6 Hours/ Week)

1. Studies on maturity indices of fruits and vegetables
2. Studies on use of chemicals for ripening of fruits and vegetables
3. Studies on physiological disorders - chilling injury of banana and custard apple
4. Preparation of natural and synthetic fruit juice
5. Preparation of nectar and cordial
6. Canning/bottling of mango/guava/papaya fruits
7. Preparation of fruit jam: Mixed/apple/mango/guava/ papaya/ aonla/ strawberry.
8. Preparation of fruit jelly/marmalade: wood apple/ sweet orange/mandarin/guava/tamarind
9. Preparation of marmalade
10. Preparation of fruit preserve
11. Preparation of fruit candy
12. Preparation of petha/ tuti fruity
13. Preparation of grape raisin/ anardana/ dried fig
14. Preparation of ketchup or sauce from chilli/ tomato/ tamarind
15. Preparation of pickle/ mixed pickle
16. Visit to fruit and vegetable processing industrial

Evaluation Pattern

The performance of the learners shall be evaluated into two components viz. by Internal Assessment with 40% marks in the first component and by conducting the Semester End Examinations with 60% marks as the second component. The allocation of marks for the Internal Assessment and Semester End Examinations are as shown below: -

A) Internal Assessment – 40% (40 Marks)

20 Marks mid-term Online Test (MCQ Based Questions)

20 Marks [Any Two activities of 10 marks each] Presentation/Group Discussion /Project/
Field visit / Subject related Individual activity

B) Semester End Examinations – 60% (60 Marks)

Question Paper Pattern

Maximum Marks: 60

Questions to be set: 03

Duration: 2 Hrs.

All Questions are Compulsory Carrying 20 Marks each.

Q:1	Answer the following (Any 4)	20 marks
Q:2	Answer the following (Any 4)	20 marks
Q:3	Answer the following (Any 4)	20 marks

Note: Full length question of 20 marks may be divided into four sub questions of each 5 marks.
