

Anekant Education Society's
TULJARAM CHATURCHAND COLLEGE, BARAMATI,
DIST- PUNE – 413102

B. Voc. (Food Processing & Post Harvest Technology)
Revised Syllabus – F.Y 2019-20 (Autonomous)

First Year

Semester I

Theory Paper No, FP-1, Principles of Food Preservation

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- To study methods of preservation of foods
- To develop the skills for processing of food after postharvest and use of various preservation techniques in food processing industries

Learning Outcomes:

- Students will have a thorough understanding of various food processing techniques.
- The students will know the importance of various preservation techniques.

Unit-1: Introduction to Preservation

10 Periods

Definition, Introduction to preservation, History of preservation, general principles of food preservation, Need & benefits of industrial food preservation & Methods of Preservation

Unit-2: Preservation by drying

15 Periods

Types of drying, changes during drying, effect of drying on food, advantages and disadvantages of drying

Unit-3: Preservation by High & Low temperature

15 Periods

Preservation by high temperature: Blanching, pasteurization & Canning, Effect of heat on food and micro-organisms

Preservation by low temperature: Chilling, Refrigeration & freezing Effect of low temperature on food & microorganisms

Unit-4: Preservation by irradiation & Non Thermal Methods

10 Periods

Introduction & units of irradiation, mechanism of action of radiation, radiation process, effect of radiation on food, effect of radiation on micro-organisms, Non-thermal methods

Unit-5: Preservation by other methods

10 Periods

Definition of preservative, Types of preservatives- Class I & Class II, Carbonation, Antibiotics, Fermentation & Filtration

References:

- Food Facts & Principles – N. Shakuntala Manay, M. Shadaksharswamy
- Food Science – Sumati R. Mudambi, Shalini M. Rao, M.V. Rajagopal
- Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Christian
- Food Science (Vth edition) – Norman N. Potter and Joseph H. Hotchkiss (CSB Publishers and Distributors, New Delhi, 1996)
- Food Preservation, Desorier
- Unit Operations by Brennan & Cowell Lilly

First Year

Semester I

Theory Paper No, FP-2, Food Microbiology –I

Maximum Marks: 100
Teaching Period: 4 /week

Credits: 4
Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- Learn about the morphology of different microorganisms.
- Study the spoilage caused by microorganism
- Learn about important microorganisms used in food processing industry.

Learning Outcome:

- Students will have a thorough understanding of various factors responsible for food spoilage.
- The students will know the specifications of various contamination sources and disease developed in certain processed products.

Unit-1 History & scope of Microbiology

12 Periods

Introduction to microbiology, Historical Contribution of various scientists, scope of microbiology in food, Types of cell – Prokaryotic & Eukaryotic cell, Introduction to various types of micro-organisms

Unit-2 Morphology & cytology of bacteria

13 Periods

Classification of Bacteria on the basis of Structure/Shape/Size& functions of various parts of bacterial cell

Unit-3 Microbial growth in food

10 Periods

Factors affecting growth of micro-organisms, Growth curve, Thermal Death Time, D, F, 12D and Z values

Unit-4 Food spoilage

10 Periods

Sources of contamination, causes of spoilage, Classification of food depending on ease of spoilage, Details of Spoilage of different food products such as Dairy, Animal Products fruits and Vegetables.

Unit-5: Food in relation to disease

10 Periods

Food borne illness: Bacteria causing foodborne diseases, foodborne poisoning, infections and intoxications: nonbacterial- mycotoxin, Rickettsia, sea food toxicants, Characteristics of organism & Toxin, Food sources, Symptoms and prophylaxis.

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
- Garbutt, John. Essentials of Food Microbiology, Arnold, London, 1997

Theory Paper No, FP-3, Food Science – I

Maximum Marks: 100
Teaching Period: 4 /week

Credits: 4
Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- To make students aware about various cooking methods, food groups, composition,
- To make students understand the nutritive value and effect of cooking on foods

Learning Objectives:

The student will be able to:

- To know about the basic cookery and the nutritive value of food products
- To classify the products according to composition
- To explain role of each food group products

Unit-1: Introduction to Food science

12 Periods

Scope and Opportunities in Food Industries, Definition, Functions of food, Food groups, mode of heat transfer, Cooking- objectives, Preparation & cooking methods

Unit-2: Cereals & Pulses

15 Periods

Cereals: Structure, Composition & nutritive value of Wheat, Rice & Maize, Cereal Cookery, Role of cereals in cookery, other important Cereals, Textured Vegetable Protein (TVP) Sources and Advantage

Pulses -Composition & Nutritive value, toxic constituents & its elimination, Germination and its Changes, Pulse cookery, Role of pulses in cookery

Unit-3: Nuts & Oilseeds

10 Periods

Composition & Nutritive value, important nuts & oilseeds, toxins, Role of nuts & oilseeds in cookery

Unit-4: Fruits & Vegetables

15 Periods

Fruits- Classification, Sources, Composition and Nutritive value, ripening of fruits, Browning of fruits

Vegetables -Classification, Composition and Nutritive value, Vegetable cookery, Role of vegetable in cookery

Unit -5: Spices & Aromatics

8 Periods

Classification, General functions of spices, Herbs, role of spices in cookery

References:

- Food Facts & Principles – N. Shakuntala Manay, M. Shadaksharswamy
- Food Science – Sumati R. Mudambi, Shalini M. Rao, M.V.Rajagopal
- Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Chrishtian
- Food Science (Vth edition) – Norman N. Potter and Joseph H. Hotchkiss (CSB Publishers and Distributors, New Delhi, 1996)

First Year**Semester I****Practical Paper No, FP-1.1, Principles of Food Preservation****Maximum Marks: 150****Credits: 6****Teaching Period: 2/week****Teaching Load: 24 Practicals/Sem (4 Periods each)**

1.	Study of laboratory instruments	1P
2.	Study of blanching of different fruits & vegetables	1P
3.	Preservation by using sugar (Jam/Jelly/Marmalade)	2P
4.	Preservation by using salt (Vegetable Pickle)	1P
5.	Preservation by using oil & spices (Pickles)	1P
6.	Preservation by fermentation (Idli, Dhokla, Jalebi and Sauerkraut)	2P
7.	Preservation by vinegar	1P
8.	Preservation by using chemical preservatives	2P
9.	Preservation by high temperature (canning)	2P
10.	Preservation by low temperature (Peas Preservation)	1P
11.	Preservation by drying (Fruits and Vegetable)	3P
12.	Study of Osmotic dehydration (Fruit Candy)	3P
13.	Visit to Industry	1P
14.	Preparation of report on Industrial Visit	1P
15.	Activities (Market Survey)	2P

References:

- Food Science By Potter
- Food Science 3rd edition By B. Shrilakshmi
- Fruit & Vegetable Preservation By Srivastava Kumar
- Food, Facts and Principles By Shakuntala Manay
- Food Processing and Preservation By G. Subbulakshmi, Shobha A Udipi
- Food Processing Technology 2nd edition By P. J. Fellows
- FSSAI Manual

First Year**Semester I****Practical Paper No, FP-1.2, Food Science****Maximum Marks: 150****Credits: 6****Teaching Period: 2/week****Teaching Load: 24 Practical/Semester (4 Period each)**

1.	Study of different cooking methods	1P
2.	Preparation of rice flakes	2P
3.	Preparation of soya nuts	1P
4.	Extraction of edible oil	2P
5.	Preparation of Coated masala Groundnuts	1P
6.	Study of Germination/Malting	1P
7.	Preparation of Garlic/Ginger Paste	1P
8.	Preparation of condensed milk	1P
9.	Preparation of chips & wafers	2P
10.	Preparation of Tuti fruity	2P
11.	Preparation of instant soup mix	1P

First Year

Semester II

Theory Paper No, FP-4, Nutrition Science

Maximum Marks: 100
Teaching Period: 4 /week

Credits: 4
Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- To understand nutrients and food component that supply nourishment to the body.
- To know about the functions, deficiency and toxicity of nutrients
- To understand malnutrition and its prevention

Learning Outcomes:

Students will be able to:

- Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes.
- Provide nutrition counseling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies.
- Evaluate nutrition information based on scientific reasoning for clinical, community, and food service application.

Unit-1 Basics of Nutrition

12 Periods

Introduction to nutrition science, relationship between health and nutrition, role of public nutritionist in health care, interrelationship between nutrition and quality of life

Unit-2 Food Constituents

12 Periods

Food Constituents- Definition, Occurrence, Properties, Functions, Deficiency and metabolisms of Protein, Carbohydrates, lipids, Vitamins and Minerals

Unit-3 Basics for Diet planning

12 Periods

Role of nutrients, Balance diet, Food exchange list and Principle of Meal Planning, Energy Balance- BMR, Recommended dietary allowances, Balanced diet for different age groups (infant to old age)

Unit-4 Diet for different groups

12 Periods

Nutrition for Fitness and Sports, Therapeutic diets and effective nutritional counseling, Diet during Energy Imbalance and Diet for different diseases

Unit-5 Problems associated with Nutrition

12 Period

Malnutrition Causes, types, symptoms and presentation of Assessment of Nutrition status of the community, Nutritional assessment, planning and Policies

References:

- Bamji MS, Krishnaswamy K, Brahmam GNV (2009). *Textbook of Human Nutrition*, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd.
- Wardlaw MG, Paul M Insel Mosby (1996). *Perspectives in Nutrition*, Third Edition.
- B. Srilakshmi (2007) *Dietetics*, Revised Fifth Edition, New Age International Publishers
- B. Srilakshmi (2011) *Nutrition Science*, Third Edition, New Age International Publishers

- Dr. M. Swaminathan (2006) Advanced Text book on Food and Nutrition, Volume 1, 2 and 3, Second Edition, BAPPCO Publication.
- Jim Mann and A. Stewart Truswell (2010) Essentials of Human Nutrition, Third Edition, Oxford Publication.
- Michael J. Gibney, Hester H. Vorster and Frans J. Kok (2002) Introduction to Human Nutrition, First Indian Reprint, Blackwell Publishing.
- Introduction to Biochemistry of Foods, Z. Berk

First Year

Semester II

Theory Paper No, FP-5, Food Microbiology – II

Maximum Marks: 100
Teaching Period: 4 /week

Credits: 4
Teaching Load: 60 Theory Period/Semester

Learning Objectives:

To enable the students to:

- Understand the various types of poisoning and infection caused by microorganism.
- Study various techniques used to study microorganisms.

Learning Outcomes:

Students should be able to:

- Explain the interactions between microorganisms and the food environment, and factors influencing their growth and survival.
- Explain the effects of fermentation in food production and how it influences the microbiological quality and status of the food product.
- Describe the characteristics of foodborne, waterborne and spoilage microorganisms, and methods for their isolation, detection and identification.

Unit-2: Culture media and Pure culture Techniques

12 Periods

Culture Media & its Composition, Types of culture media depending upon composition, function & applications and agar concentrations, Methods for isolation of pure culture- Streak plate, Pour plate and Spread plate.

Unit-3: Microscopy and Staining Procedures

12 Periods

Introduction & types of microscope, Definition of dye & stains, classification of stains- Acidic, Basic and Neutral, principles, procedure, mechanism & applications of staining procedures: simple staining, negative staining, differential staining- gram staining & acid fast staining.

Unit 4: Control of microorganisms

16Periods

Quality of food, control at source- training, facilities and operations, equipment, cleaning and disinfection, Physical and chemical control methods.

Unit-5: Microbial spoilage of different foods& Recent trends

10 Periods

Microbial spoilage of meat, poultry fish; fruits & vegetables; cereal & cereal products and milk & milk products, SCO, Prebiotic and Probiotic.

Unit-5Beneficial micro-organisms

15 Periods

Introduction & types, general principle of culture preparation & maintenance, fermented foods – Yogurt, Wine, Idli, Soya sauce & Sauerkraut, Mushroom,SCP, Production of amino acids, enzymes, antibiotics & other substances added to food

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)
- Industrial Microbiology by A. H. Patel
- 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
- Garbutt, John. Essentials of Food Microbiology, Arnold, London, 1997
- Pelczar MJ, Chan E.C.S and Krieg, Noel R. Microbiology, 5th Ed., TMH, New Delhi, 1993

First Year

Semester II

Theory Paper No, FP-6, Food Science – II

Maximum Marks: 100
Teaching Period: 4 /week

Credits: 4
Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- To make students aware about various cooking methods, food groups, composition, nutritive value and effect of cooking on foods

Learning Objectives:

The student will be able to:

- To know about the basic cookery and the nutritive value of food products
- To classify the products according to properties
- To explain role of each food group products

Unit-1 Milk & Milk Products

10 Periods

White revolution, Sources, Composition & Nutritive value, Physical properties, Milk cookery, Milk substitute, Role of milk & milk products in cookery.

Unit-2 Sugar & Related Products

10 Periods

Sources, Types, Nutritive value, Characteristics & uses of sugar, Properties, sugar cookery & role of sugar in cookery, Sugar related products, Artificial sweeteners.

Unit -3 Fats & Oils

10 Periods

Sources, Composition & Nutritive value, Specific fats & Oils, Effect of heating, role of fat or oil in cookery.

Unit 4 Egg and Flesh foods

15 Periods

Egg: Structure of egg, composition & nutritive value, Egg cookery, role of egg in cookery.
Flesh Foods: Composition, nutritive value and cookery of meat, poultry & fish.

Unit 5 Beverages & appetizers

15 Periods

Classification - Coffee, Tea, Cocoa and its processing, introduction to other beverages.

References:

- Outline of dairy technology by Sukumar De, Oxford University Press, New Delhi
- Food Facts & Principles – N. Shakuntala Manay, M. Shadaksharswamy
- Food Science – Sumati R. Mudambi, Shalini M. Rao, M.V. Rajagopal
- Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Christian
- Food Science (Vth edition) – Norman N. Potter and Joseph H. Hotchkiss (CSB Publishers and Distributors, New Delhi, 1996)

First Year

Semester II

Practical Paper No, FP-2.2, Food Microbiology-II

Maximum Marks: 150

Credits: 6

Teaching Period: 2/week

Teaching Load: 24 Practical/Semester (4 Period each)

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|---|----|
| 1. Introduction to the Basic Microbiology Laboratory Instruments. | 2P |
| 2. Introduction to the Basic Microbiology Laboratory materials | 1P |
| 3. Functioning and use of compound microscope | 1P |
| 4. Study of Aseptic Techniques | 3P |
| 5. Preparation, Cleaning and sterilization of glassware and Media | 2P |
| 6. Preparation of slant, stab and plates using nutrient agar/ MacConkeys Agar/ Potato Dextrose agar | 2P |
| 7. Cultivation of microbes | 2P |
| 8. Standard Plate Count Method | 2P |
| 9. Monochrome staining | 1P |
| 10. Gram's staining | 1P |
| 11. Negative staining | 1P |
| 12. MPN method for Coliform in food samples as well as water sample. | 3P |
| 13. Visit to microbiology laboratory | 1P |
| 14. Preparation of report on visit | 1P |
| 15. Activities: a) Spoiled Product Study
b) Swab Test | |

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

Practical Paper No, FP-2.3, Soft Skill Development

Maximum Marks: 150
Teaching Period: 2/week

Credits: 6
Teaching Load: 24 Practical/Semester (4 Period each)

Unit 1 Fluency in Grammar Usage	4P
1) Tenses	
2) Verbs	
3) Active & Passive Voice	
4) Reported Speech	
5) Prepositions	
6) Conjunctions	
7) Effective Sentence-Construction	
8) Vocabulary	
Unit 2 Fundamentals	5P
1) Greeting and taking leave	
2) Introducing yourself	
3) Introducing people to one another	
4) Making requests and asking for directions	
5) Congratulating, expressing sympathy and offering condolence	
6) Making suggestions and offering advice	
7) Making and accepting an apology	
Unit 3 Situational dialogues	2P
Unit 4 Personality development	3P
Unit 5 Interview and Group discussion	3P
Unit 6 Writing and comprehension skills	5P
1) Letter (Formal) and Email	
2) Report	
3) Summarizing reports, articles, editorials	
4) Making an abstract	
5) Review writing	
6) Writing resume	
7) Research Paper Writing	
8) Review paper Writing	
Output Activity: a) Preparation of Food Blogs	2P
b) Preparation of Poster/Pamphlet related to food	

M.Voc (Food Processing Technology)

SYLLABUS

First Year

Semester I

Theory Paper, FPT-1: Advances in Food Microbiology

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning objectives:

- To describe the applications of microbes in industry, the design of bioreactors for different applications, design media, growth conditions and techniques for producing and recovering different types of products of commercial value

Learning Outcomes:

After learning this subject Students will be able to

- Get equipped with a theoretical practical understanding of industrial microbiology
- Understand the beneficial role of microorganisms in fermented foods and food processing.
- Appreciate how microbiology is applied in manufacture of industrial products
- Know how to source for microorganisms of industrial importance from the environment
- Know about design of bioreactors, factors affecting growth and production, heat transfer and oxygen transfer
- Appreciate the different types of fermentation processes and biochemistry of various fermentations
- Understand the techniques and underlying principles in downstream processing

Unit I: Overview of Industrial Microbiology

10 Periods

Introduction to industrial fermentations, Range of fermentation processes, Chronological development Compartmental part of fermentation processes

Unit II: Industrially Important Microorganisms and Their Growth

12 Periods

Criteria for Selection of Industrially Important Microorganisms Overview of strain improvement of Industrially Important Microorganisms Preservation of industrially important microorganisms, Microbial Growth Curve, Synchronous growth

Unit III: Fermentation Media

12 Periods

Media selection Medium Formulation Medium for industrial fermentation, Batch Fermentations, Continuous Fermentation, Fed Batch Fermentation, Production of Citric acid and Lactic acid

Unit IV: Bioreactor

15 Periods

Design: Basic functions, Parts of stirred tank fermenter: Aeration and agitation; agitator, Impeller, sparger systems, baffles and other accessories Types of reactor; Problems related to scale up of Process

Unit V: Upstream and Down Stream Processes:

11 Periods

Upstream processes Overview of Downstream Processing Methods of cell destruction Methods of purification of enzyme/product Concentration and Packaging

References

1. Food Microbiology – M.R.Adams&M.O.Moss, New Age International (P) Limited, New Delhi
2. Food Microbiology – William C.Frazier, Tata McGraw Hill publishing Company limited, New Delhi. 4
3. General Microbiology – Power &Daginawala, Himalaya Publishing House, Mumbai. (vol-II)
4. Basic Food Microbiology – G. Banwart, CBS Publishing & Distributors.
5. Modern Food Microbiology – Jay, James, Aspen publishers.

First Year

Semester I

Theory Paper, FPT – 2:Advances in 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 learn about working and principles of analytical instruments

Learning Outcomes:

After learning this subject Students will be able to

- Understand the properties of food components
- Develop an understanding of the principles of interactions of food molecules.
- 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 and carbohydrates

10 Periods

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

Unit II: Carbohydrates and proteins

15 Periods

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

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

15 Periods

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 flavoring agents – importance, types and sources changes during processing and storage

Unit IV: Basics in food analysis

10 Periods

Introduction, sample preparations, sampling methods, importance of analysis in industry

Basic Electrophoresis techniques used in food analysis

Chromatographic techniques – classification, Paper, TLC, HPLC, Column, Affinity, Ion exchange

Unit V: Determinative Techniques**10 Periods**

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

References:

1. Fennema, O.R. Ed. 1976. Principles of Food Science
2. Meyer, L.H. 1973. Food Chemistry. East-West Press Pvt. Ltd., New Delhi.
3. Belitz HD.1999. Food Chemistry. Springer Verlag.
4. DeMan JM. 1976. Principles of Food Chemistry. AVI.
5. Fennema OR.1996. Food Chemistry. Marcel Dekker.
6. Meyer LH. 1987. Food Chemistry. CBS Publication
7. Methods in Food Analysis. Joslyn, M.A. Ed. 1970.Academic Press, New York.

First Year

Semester I

Theory Paper, FPT-3: Advances in Food Processing

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning objectives:

To impart the basic knowledge of:

- Cold preservation and freezers, Dehydration, Irradiation, Food Packaging&Thermal Processing

Learning Outcomes:After learning this subject Students will be able to

1. Understand major food preservation principles and techniques.
2. Determine suitable methods of processing techniques for a chosen food
3. Understand Novel food processing methods like thermal processing, cold preservation etc.

Unit I:Cold Preservation

10 Periods

Freezing: requirements of refrigerated storage-controlled low temperature, air circulation and humidity, changes in food during refrigerated storage, progressive freezing, changes during freezing-concentration effect and ice crystal damage, freezer burn. Refrigeration load, factors determining freezing rate-food composition and non compositional influences.

Unit II:Food Irradiation and Microwave Heating

10 Periods

Ionizing radiation and sources, unit of radiations, direct and indirect radiation effects, safety and wholesomeness of irradiated food. Microwave heating and applications.

Unit III:Thermal Processing

10 Periods

Introduction, classification of Thermal Processes, Principles of thermal processing, Thermal resistance of microorganisms, Thermal death time, Lethality concept, Characterization of heat penetration data, Thermal process Calculations.

Unit- IV 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

Unit-V

Dielectric and Ohmic heating of Foods, ISM frequencies, Microwave and Radio Frequency Processing: Definition, Advantages, Mechanism of Heat Generation, Applications in Food Processing, Limitations. High Pressure processing: Concept, equipments for HPP treatment, mechanism of microbial inactivation and its application in food processing. Ultrasonic processing: Properties of Ultrasonics, Application of Ultrasonics as Processing Techniques.

References:

1. Arsdel WB, Copley MJ & Morgan AI. 1973. Food Dehydration. 2nd Ed. Vols.I, II.AVI Publ.
2. Desrosier NW & James N.1977. Technology of Food Preservation.4th Ed. AVI.Publ.
3. Fellows PJ. 2005. Food Processing Technology: Principle and Practice. 2nd Ed. CRC
4. Painy, F.A. and Painy, H.Y. 1983. A Handbook of Food Packaging. Leonard Hill, Glasgow,
5. Scicharow, S. and Griffin, R.C. 1970. Food Packaging. AVI, Westport.

First Year

Semester I

Theory Paper, FPT-4: Total Quality Management

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning objectives:

1. To build fundamental knowledge on total quality management
2. To build fundamental knowledge and realize the significance of TQM in food industry
3. To build capability of preparing Quality management documents to get certifications
4. To minimize all resource wastages and support growth of company
5. To build ecofriendly culture in current generation

Learning Outcomes: After completing this course Students will be able to

1. Implement customized quality management systems in different food industries and improve the productivity of plant
2. Identify current public health problems nationally and globally.
3. Analyse issues (Case study and health issues, Food safety, water safety exercise and obesity, exposure to toxins)
4. Compare public health infrastructures in developed and developing countries.

UNIT I INTRODUCTION

12 Periods

Introduction to quality management - Definition, Scope, Significance and Objectives of Quality management; Dimensions of quality in foods, Food quality evaluation techniques, Quality control Vs Quality assurance.

UNIT II ADULTERATION AND QUALITY CONTROL IN PROCESS 12 Periods

Adulteration - Types of adulterants, Adulterant identification techniques, Quality assurance for raw materials, work in process and finished goods, Safe handling of food product, equipments and machineries; personal hygiene- MPL for adulterants

UNIT III QUALITY MANAGEMENT TOOLS

12 Periods

Seven old and new Quality management tools, Statistical process control – Mean & range chart, P chart and C chart, Seven deadly wastages, PDCA cycle, Quality circle, Quality audit, Internal audit, Continuous improvement of productivity- proficiency testing for product quality- Six Sigma Concept.

UNIT - IV QUALITY MANAGEMENT CERTIFICATIONS AND REGULATIONS FOR FOOD INDUSTRY

12

Periods

Implementation procedure for HACCP (ISO 22000), QMS, ISO 9000, BIS, APEDA and Six sigma certifications; AGMARK and Codex Alimentary Commission regulations; Packaging and labeling regulations for food products; Regulations for food products export and imports.

UNIT V ENVIRONMENTAL QUALITY MANAGEMENT SYSTEM

12 Periods

Environmental quality management system (ISO14000), Effluent treatment plant location and maintenance- Eco friendly food processing system, green plant, packaging methods, Challenges in quality management and green processing system implementation.

References

1. Poornimacharantimath, Total quality management, Dorling Kindersley, Publishers South Asia Ltd., 2009.
2. Sohrab, 2001 Integrated ISO 9001 HACCP for food processing industries, allied publishers ltd, Mumbai
3. Krammer, A. and Twigg, B.A. 2006. Quality control for the food industry, Volume 2 Applications. The AVI Publishing Company. Inc., Westport, Connecticut.
4. Ranganna, S. 1994. Hand book of analysis and Quality control for fruits and vegetable products. Tata McGraw hill. New Delhi

First Year

Semester I

Practical Paper, FPT-1.1: Advances in Food Microbiology

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practical /Sem (4 Periods each)

1. To study the bacterial growth curve in batch culture 1P
2. To study the thermal death characteristics of known bacterial culture 1P
3. Isolation and preservation of pure culture 2P
4. Isolation and screening of amylolytic microorganisms 2P
5. Isolation and screening of protease producing microorganisms 2P
6. Isolation and screening of antibiotic producing microorganisms 3P
7. To carry out quantitative estimation of protease 2P
8. To carry out quantitative estimation of amylase 2P
9. To measurement C.O.D. of effluent 1P
10. To demonstrate the fermenter operations 1P
11. To carry out the ethanol fermentation by *S. cerevisiae* 3P
12. To produce citric acid by *A. niger* 3P
13. Visit to Industry 3P

**First Year
I**

Semester

Practical Paper, FPT –1.2, Advances in Food Chemistry & Analysis

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practicals/Sem (4 Periods each)

1. Working principle of instruments used in food analysis 1P
2. Estimation of moisture by oven method 1P
3. Estimation of ash by muffle furnace 1P
4. Estimation of fat by Soxhlet method 1P
5. Estimation of protein by 3P
 - a) Kjeldahls'
 - b) Biuret method
6. Estimation of iron in food sample 1P

7. Determination of pigments in food sample 1P
8. Determination of Vitamin C in food sample 2P
9. Determination of acidity of beverages and juices 1P
10. Determination of reducing and non – reducing sugars 2P
11. Analysis of oil: 5P
 - a) Saponification value
 - b) Acid value
 - c) Iodine Number
 - d) peroxide value
12. Determination of essential amino acids 2P

13. Quality analysis of food products

1P

14. Analysis of water

2P

First Year

Semester I

Practical Paper, FPT-1.3: Advances in Food processing

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practicals/Sem (4 Periods each)

1. Comparison of conventional and microwave processing of food 1P
2. Low Temperature processing 2P
 - Experiment on storage of leafy vegetables, fruits, perishable produce at refrigerated temperature, cold storage, and chilling temperature.
 - By using appropriate pre-processing and various packaging materials.
3. Frozen food processing 2P
 - Experiments on processing of Fruit pulp ,fruits, vegetables, eatables by using appropriate packaging and freezing
 - Quality evaluation and storage studies
4. Drying of food using tray dryer/ other dryers 1P
5. Preservation of food by using canning (Fruit/Vegetable) 2P
6. Osmotic dehydration 2P
7. To study the performance the Reverse Osmosis Appratus 1P
8. To study and compare RO and Municipal Water 1P
9. To study and Compare the properties of RO water, tap water and distilled water 1P

First Year

Semester II

Theory Paper, FPT- 5: Post harvest Management & Supply Chain

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning Objective:

- To know the post-harvest management techniques of Fresh fruits, vegetables and plantation crops.
- To get aware about post-harvest loss and their control measures
- To recognize marketing channel and possible losses.

Learning outcomes

- Understand the post harvest technology of spices, fruits and vegetables
- Understand cold chain management
- Processing of horticulture crops with industrial importance
- Understand latest technologies in harvest technology

Unit I: Introduction to post harvest management

10 Periods

Introduction and terminologies, Importance, advancements in post harvest technologies, post harvest losses, causes and types, marketing channels, post harvest chain, climacteric and non climacteric fruits, physiological and biochemical changes in fruits and vegetables, cold chain management

Unit II: Concepts in post harvest management

15 Periods

Post harvest procedures for different vegetables, harvesting, maturity indices, curing, cleaning, washing, sorting and quality grading, transportation, storage, respiration rate, perishable rate, zero energy, ripening process, pre harvest factor affecting quality on post harvest life, Factors responsible for deterioration, methods of storage, CA and MA storage

Unit III: Plantation crops I

10 Periods

Tea – introduction, types, characteristics, processing, storage and packaging
Coffee- introduction, types, processing, curing, characteristics, products
Cocoa- introduction and processing

Unit IV: Plantation crops II

15 Periods

Spice processing technologies of pepper, cardamom, cove, cinnamon, clove, nutmeg, turmeric, garlic, coriander, fennel, fenugreek, vanilla, herbal spices, ginger and tamarind, value addition

Unit VI:

10 Periods

Logistics and supply chain management - Scope, Significance and Drivers; Basic Model - Primary and Secondary Activities; Role and Challenges of Logistics and supply chain management in food industry.

References:

1. Kadar AA.1992. Post-harvest Technology of Horticultural Crops.2nd Ed. University of California.
2. Lal G, Siddapa GS &Tandon GL.1986. Preservation of Fruits and Vegetables.ICAR

3. Pantastico B. 1975. Post Harvest Physiology, Handling and Utilization of Tropical and Subtropical Fruits and Vegetables. AVI Publ.
4. Salunkhe DK, Bolia HR & Reddy NR. 1991. Storage, Processing and Nutritional Quality of Fruits and Vegetables. Vol. I. Fruits and Vegetables. CRC
5. Thompson AK. 1995. Post Harvest Technology of Fruits and Vegetables. Blackwell Sci.
6. Verma LR. & Joshi VK. 2000. Post Harvest Technology of Fruits and Vegetables. Indus Publ

First Year

Semester II

Theory Paper, FPT- 6: Novel Food Packaging Technology

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning Objective:

- To know the Novel Food Technology, function of packaging, types of packaging.
- To get aware about the packaging materials
- To understand properties of packaging materials their methods of testing and evaluation

Learning outcomes

- Students will be able to understand operations involved in packaging material manufacturing
- Students will be able to understand major packaging material and methods used in food packaging

Unit I: Novel Food Packaging Technology

12 Periods

Introduction to principles of Food Packaging, Functions of packaging , Types of Package. Packaging materials, Desirable properties of Packaging Materials, Selection of packaging material for different foods.

Unit II: Methods of packaging and packaging equipments

12 Periods

Different forms of packaging such as Rigid, Semi rigid, Flexible forms. Properties of packaging materials their methods of testing and evaluation; Barrier properties of packaging materials: Permeability, Gas transmission rate (GTR), Water vapour transmission rate (WVTR) and their measurement.

Unit-III Glass

12 Periods

Glass: composition, properties, types of closures, methods of bottle making; Metals: Tinsplate containers, tinning process, components of tinsplate, tin free steel (TFS), types of cans, Aluminum containers, lacquers.

Unit-IV Plastics

12 Periods

Plastics: types of plastic films, laminated plastic materials, coextrusion, edible films, biodegradable plastics. Active and Intelligent packaging techniques: Concept, techniques and uses in Food Industry, Current use of novel packaging techniques, Consumers and novel packaging.

Unit-V Scavengers

12

Periods

Oxygen, ethylene Carbon dioxide and other scavengers: Scavenging technology, and its applications. Different packaging system for different foods, Prediction of Shelf Life of foods.

References:

1. Kadoya T. (Ed). 1990. Food Packaging. Academic Press.
2. Mahadeviah M & Gowramma RV. 1996. Food Packaging Materials. Tata McGraw Hill.
3. Palling SJ. (Ed). 1980. Developments in Food Packaging. App. Sci. Publications
4. Painy FA. 1992. A Handbook of Food Packaging. Blackie Academic.
5. Sacharow S & Griffin RC. 1980. Principles of Food Packaging. AVI Publications

First Year

Semester II

Theory Paper, FPT-7: Beverages and Snack Food Technology

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning objectives:

- To develop the skills for processing of different types of alcoholic and non-alcoholic beverages with a brief knowledge of packaged drinking water manufacturing industry and Indian snack food markets.

Learning Outcomes:

After learning this subject

1. Students will be able to know different types of beverages found in Indian as well as international market.
2. Students will have better ideas regarding alcoholic and non-alcoholic beverages with water industry.
3. Students will have thorough knowledge of different types of cereal based snacks food items available in market.
4. Students will get brief knowledge of fruits and vegetables based snacks

Unit I: Introduction to Beverages

10 Periods

History, importance of beverages and status of beverage industry, Types of Beverages, packaged drinking water Processing

Unit II: Processing of beverages

12 Periods

Juice based beverages processing, Synthetic, still, carbonated, low-calorie and dry beverages, isotonic and sports drinks, dairy based, alcoholic beverages fruit beverages, speciality beverages, tea, coffee, cocoa, spices, plant extracts, etc.

Unit III: Quality of Beverages

14 Periods

FSSAI specifications for beverages, Ingredients, manufacturing and packaging processes and equipment for different beverages; Water treatment and quality of process water Sweeteners, colorants, acidulants, clouding and clarifying and flavouring agents for beverages Carbon dioxide and carbonation Quality tests and control in beverages; Miscellaneous beverages Coconut water, sweet toddy, sugar cane juice, coconut milk, flavoured syrups

Unit IV: Grain Based Snacks

12 Periods

Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes Coated grains-salted, spiced and sweetened Flour based snack– batter and dough based products; savoury and farsans; formulated chips and wafers, papads.

Unit V: Other Snack Foods

12 Periods

Technology for fruit and vegetable based snacks: chips, wafers, papads etc. Technology for coated nuts – salted, spiced and sweetened products- chikkis, Sing bhujia, Technology for RTE puffed snack- sand puffing, hot air puffing, explosion puffing, gun puffing etc

References

1. Edmund WL. Snack Foods Processing. AVI Publ.
2. Frame ND .1994.The Technology of Extrusion Cooking. Blackie Academic.
3. Gordon BR.1997 Snack Food.AVI Publ
4. Dubey SC. 2002. Basic Baking.The Society of Indian Bakers, New Delhi.
5. . Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology. John Wiley& Sons.
6. Manley D. 2000.Technology of Biscuits, Crackers & Cookies.2nd Ed. CRC Press.
7. Pylar EJ. Bakery Science & Technology.3rd Ed. Vols.I, II.Sosland Publ.

First Year

Semester-II

Theory Paper, FPT – 8:Statistical and Research Methodology

Maximum Marks: 100

Credits: 4

Teaching Period: 4 /week

Teaching Load: 60 Theory Period/Semester

Learning Objectives:

- The purpose of the course is to impart knowledge on different advanced statistical methods for its applications in Food & Nutrition related disciplines.
- To understand some basic concept of Research and its Methodology
- The emphasis will be more on solving practical problems with basic understanding of the theoretical concepts.

Learning Outcomes:At the end of the course, the students should able to understand,

1. Analysis of data to draw valid inferences.
2. To understand the working of statistical methods and its applications to several situations.
3. To develop statistical models and to study the several characteristics of data structures.

Unit I: Introduction to statistics

Definition concepts for understanding statistical measures, popular concepts and misuse of statistics ,Normal distribution and its property's ,Normal distribution Binomial distribution Probability, use of normal probability tables, area under normal distribution ,,Data management planning of data analysis-coding of response, preparation of code book ,Coding of data ,Use of statistical programmes -Ms-excel,SPSS

Unit II:Data analysis

Quantitative analysis - descriptive statistics, descriptive statistics, inferential statistics, uses and limitations, summation sign and its properties proportions,percentage ,ratios

Measures of central tendency –mean, median, mode-arithmetic mean and its uses, mid – range geometric mean, weighted mean Measures of dispersion /variation ,kurtosis,skewness Grouped data –frequency distribution, histogram, frequency polygons, percentiles, quartiles ,tertiles, ogiveLarge and small samples tests and interpretation,Z–test for single proportions and difference between proportions, large sample test for single mean and difference between means ‘Small sample

Unit III: Chi square test and its interpretation

General features ,goodness of fit, independence of attributes, Correlation and Regression and its interpretation - Basic concepts, Linear regression and correlation coefficient, regression and prediction, Rank correlation, product –moment method, Analysis of variance and its interpretation - one factor analysis of variance, two-factor analysis of variance

Unit IV: Presentation of data

Tabulation and Organization of data frequency distributions, cumulative frequency distribution, tables Graphical presentation of data –histograms, frequency polygon ,ogive ,stem and leaf plot,box and whiskers plot , Graphs for nominal and ordinal data –pie

diagram, bar graphs of different types, graphs for relation between two variables, lines diagrams. Use of illustrations, Caution in visual display of data

Unit V: The Research Report

Basic components of a research report –prefatory material, introduction and review of related literature, methodology, results, discussion, conclusion, summary, abstract, Bibliography and appendices.

References:

1. Fundamentals of biostatistics- Veer Bala Rastogi, Ane books publication
2. Biostatistics- P Rama Krishanan, Saras publication
3. An introduction to biostatistics- N. Gurumani, MJP publication.

First Year

Semester II

Practical Paper, FPT-2.1: Post Harvest Management & Supply Chain

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practicals/Sem (4 Periods each)

1. Morphological features of some selected fruits and vegetables 1P
2. Determination of angularity of banana and its correlation with maturity 1P
3. Preservation of foods by sugar 3P
 - a) Jam
 - b) Jelly
 - c) Marmalade
4. Fruit Preserves 2P
 - a) Tuti Fruity (Papaya)
 - b) Ginger Murabba (Ginger).
5. Preservation of foods by salt and acid 1P
6. Tomato ketchup 1P
7. Lemon pickle 1P
8. Study on inactivation of enzyme by blanching 1P
9. Determination of total soluble solids of fruits 1P
10. Determination of juice content of fruits 1P
11. Determination of Titrable acidity of fruit and its correlation with ripening 1P
12. Studies on starch content and its correlation ripening of fruit 1P
13. Determination of fruit firmness and its correlation with ripening 1P
14. Wax coating of selected fruits 1P
15. Ripening of banana using ether 2P
16. Studies on effect of different storage temperatures on quality of fruits 1P
17. Effect of storage transpiration rate of fruit 2P
18. Packaging of fruits and vegetables 1P
19. Effect of blanching of polyphenol oxidase activity 1P

First Year

Semester II

Practical Paper, FPT-2.2: Novel Food Packaging Technology

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practicals/Sem (4 Periods each)

- | | |
|--|----|
| 1. Identification and testing of packaging materials | 1P |
| 2. Determination of tensile strength of given packaging material | 1P |
| 3. Cut out analysis of canned food | 1P |
| 4. Determining water absorption capacity of packaging material | 1P |
| 5. Determining bursting strength of packaging material | 1P |
| 6. Determining tearing strength of packaging material | 1P |
| 7. To perform vacuum packaging of food sample and carry out its storage study | 1P |
| 8. Testing of lacquered tin plate sheets | 1P |
| 9. Determination of water vapour transmission rate of package films | 1P |
| 10. Pre-packaging practices followed for packaging fruits and vegetables | 1P |
| 11. Packaging and labelling of the product-packaging design, graphics, labelling | 1P |
| 12. Visit to packaging industry. | 3P |

First Year

Semester II

Practical Paper, FPT-2.3: Beverages and Snack Food Technology

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practicals/Sem (4 Periods each)

1. Quality analysis of water from different sources and treatments 1P
2. Determination of aqueous extraction of tea/coffee 1P
3. Detection of sodium benzoate in beverage 1P
4. Measurement of pH and acidity of beverage 1P
5. Detection of E. coli in beverage 1P
6. Measurement of CO₂ content of carbonated beverage 1P
7. Determination of caffeine in beverages 1P
8. Determination of tannins in wine 1P
9. Preparation of Instant Tea/coffee 1P
10. Preparation of carbonated beverage 1P
11. Specifications for different fruit beverages and preparation of fruits squash 1P
12. Preparation of artificial lemon juice 1P
13. Preparation of beverage using artificial sweetener 1P
14. Preparation of cereals based fried snack foods 1P
15. Preparation of legume based fried snack foods 1P
16. Preparation of cereal grain based puffed products 1P
17. To study the effect of frying time and temperature on potato chips 1P
18. Preparation of cereal and legume based roasted snack 1P
19. Determination of shelf-life and packaging requirements of snack food products 2P
20. Visit to carbonation unit 1P
21. Visit to mineral water plant 1P
22. Visit to industriesManufacturing snack foods. 2P

Second Year**Semester III****Practical Paper, FPT-3.1 Experiential Learning Programme****Maximum Marks: 300****Credits: 12****Teaching Period: 3/week****Teaching Load: 24 Practicals/Sem (4 Periods each)**

a) Concept The word ‘experiential’ essentially means that learning and development are achieved through personally determined experience and involvement, rather than on received teaching or training, typically in group, by observation, study of theory or hypothesis, and bring in innovation or some other transfer of skills or knowledge. Experiential learning is a business curriculum-related endeavour which is interactive. EL is for building (or reinforcing) skills in project development and execution, decisionmaking, individual and team coordination, approach to problem solving, accounting, marketing. The programme has end to end approach. Carefully calibrated activities move participants to explore and discover their own potential. Both activities and facilitation play a critical role in enhancing team performance.

b) Objectives EL provides the students an excellent opportunity to develop analytical and entrepreneurial skills, and knowledge through meaningful hands on experience, confidence in their ability to design and execute project work. The main objectives of EL are:

- To promote professional skills and knowledge through meaningful hands on experience.
- To build confidence and to work in project mode.
- To acquire enterprise management capabilities

Second Year**Semester III****Practical Paper, FPT-3.1 Experiential Learning Programme****Maximum Marks: 300****Credits: 18****Teaching Period: 3/week****Teaching Load: 24 Practicals/Sem (4 Periods each)**

PURPOSE: To undertake research in an area related to the program of study

INSTRUCTIONAL OBJECTIVE: The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

M.Tech projects should be socially relevant and research oriented ones. Each student is expected to do an individual project/Group Project. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce/Presentation examination on the project.

Second Year

Semester IV

Practical Paper, FPT-4.1 Industrial Tour

Maximum Marks: 150

Credits: 6

Teaching Period: 3/week

Teaching Load: 24 Practicals/Sem (4 Periods each)

Industrial Tour of Two-Three weeks to various industries within and outside the state of the university and submission of report on industrial tour

Objectives:

The objective of an industrial visit is to provide

1. An insight regarding internal working of companies.
2. To understand that theoretical knowledge is not enough for a successful professional career. With an aim to go beyond academics, industrial visit provides students a practical perspective of the work place.
3. An opportunity to learn practically through interaction, working methods and employment practices.
4. To an exposure to current work practices as opposed to possibly theoretical knowledge being taught at college.
5. An excellent opportunity to interact with industries and know more about industrial environment. Industrial visits are arranged by colleges for us with an objective of providing us an opportunity to explore different sectors like IT, Manufacturing, services, finance and marketing. Industrial visit helps to combine theoretical knowledge with practical knowledge. Industrial realities are opened to the students through industrial visits.

Second Year

Semester IV

FPT-4.2 Internship/ In-plant Training

Maximum Marks: 600

Credits: 24

Teaching Period: 3/week

Teaching Load:

Students should undergo Internship/In-plant training, during Semester VI. The Department in consultation with the food industries arranges the programme. The purpose of the programme is to get hands-on experience on various aspects of food industries that form the strong foundation for the young food technologists. Student should report for the programme on the stipulated date. On completion, each student should prepare a report duly certified by the supervisor in the industry. Consequently, a seminar should be conducted in the department to present the finding of the report. The external examiner will evaluate the bonafide project report attested by the head of the department and a viva voce will be conducted.

M.Voc. Proposal
Application under the UGC Scheme for providing Skill Based Education
under National Skill Qualification Framework

1. Details of the College:

1.	Name of the College (as given in list u/s 12(B) of UGC Act)	TuljaramChaturchand College of Arts, Science and Commerce, Baramati
2.	Full Postal Address:	Box No. 51, A/P. Tal. Baramati Dist. Pune Pin: 413102
3.	Name of the Affiliating University	SavitribaiPhule Pune University, Pune
4.	Whether covered under Section 2 (f) and 12 (B) of the UGC Act, 1956	Yes
5.	Whether Autonomous	Yes
6.	Whether recognized as college with Potential for Excellence/University with Potential for Excellence	Yes
7.	NAAC/NBA Accreditation details. (Date, Grade, CGPA, Validity)	NAAC- Accredited "A ⁺ " (CGPA-3.55) Grade, 2017 and ISO Certified 9001-2008
8.	Whether the institution is aided and receiving General Development Assistance from UGC or Self Financing?	Yes aided, UGC-GDA
9.	Name, designation and contact details(Telephone/fax/mobile/email) of Head of the Institution.	Dr. Chandrashekhar V. Murumkar Tel: (02112)-222728, Fax: (02112)-222728, Mobile: 9850640140 Email: principal.tccollege@gmail.com
10.	Website URL of the College /University	www.tccollege.org
11.	Any other relevant information (Maximum 100 words) College / University may like to provide	TuljaramChaturchand College of Arts, Science and Commerce, Baramati was established in 1962 and is affiliated to SavitribaiPhule Pune University, Pune. The College has Jain Religious minority status from Government of Maharashtra. The college has: <ul style="list-style-type: none"> ➤ NAAC Re-accredited with "A⁺" grade (CGPA-3.55) ➤ UGC-CPE status ➤ DBT-Star College Scheme ➤ DST FIST '0' Level ➤ UGC-COC ➤ Best College Award- SSPU 2017 ➤ Best Principal Award-SPPU 2017 ➤ UG (25) and PG (18) courses in Arts, Commerce and Science faculty ➤ Post Graduate Research Centre (03) ➤ The research projects are funded by DST, UGC, BCUD (University of Pune).

2. Details of the Proposed Programmes

(a) PG Program

S. No	Name of the Trade or Sector	Name of the Programme (s) (PG Diploma & M.Voc. Degree)	Duration		No. of credits	Job Roles and Levels proposed (*)	Partners Industry	Proposed intake of students (Annually)
			No. of Hours	No. of Semester				
1.	Food Processing Technology	PG Diploma Programme	450	I	30	Level-8	Imsofer India Pvt. Ltd, ScheriberDynamix Dairies, Bauli India Pvt. Ltd. VRS Foods, Mapro, &Malas Wai, Patanjali Group, Ahmed Nagar	24
			450	II	30	Level-8		
2.	Food Processing Technology	M. Voc. Degree	450	III	30	Level-9		
			450	IV	30	Level-9		

3. Basis for choosing the course specialisation(s):

- Skills Gap requirements.
- College has expertise in the specialisation; and
- College has committed industry partner(s) for design, delivery, internship and placement.

3.1. Skill Gaps Identified:

S. No.	Trade (S)	Skill Gaps Identified (Quantitative, Qualitative, Source...)
1.	M. Voc. in Food Processing Technology	<ul style="list-style-type: none"> ➤ There is strong demand for uplifting agriculture base through Technological & Managerial Support. ➤ There is potential for producers of processed food at regional, national and international level. ➤ Food processing technology will be nurturing farmer's economics and will help in his economic upliftment. ➤ Availability of Fruits, vegetable, milk, meat and poultry in the entire western Maharashtra but Food Processing industry are very limited. ➤ There is scope for emerging entrepreneurs ➤ Skilled manpower is not available in existing food processing industry in this region.
		(i) Western Maharashtra is predominant area of milk and

		<p>milk produce and a large number of dairy and milk processing units are running/coming up. Also the area is potential milk supplier to Delhi, Mumbai, Pune and export also. So, the setting up of a new department of Dairy Technology at TC College, Baramati, is the need of hour.</p> <p>(ii) There is need of preservation dairy and dairy products.</p> <p>(iii) Value addition to dairy products, by-products and residues</p> <p>(iv) To develop diet milk, fortified milk and other such niche categories which are expected to grow.</p> <p>(v) Packaging and handling of traditional and other new products will be developed by adopting latest technologies and processes</p>
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3.2. Existing expertise / core competence of the College in the proposed trade(s):

S. No.	Specialisation	Existing Expertise (Which can be leveraged by the institution)
1.	M. Voc. in Food Processing Technology	Dr. Wazid Ali Khan, M. Tech. (Food Engineering) and Ph. D (Post Harvest Engg. & Technology)
		Miss S.S. Nair, M.Sc. Food Science & Technology Miss. A.A. Zambare, Food Science & Technology Mrs. A.S. Phule, M.Tech. Food Technology Miss Pooja D. Jirobe, B.Tech. (Food Technology) & M.Sc. (Food and Nutrition)
	English Communication Skills	We have highly experienced & qualified staff in English Dept.
	Group Discussion	Separate team for conducting soft skill programme
	On job training	Project work undertaken in collaboration with agricultural and Food Processing industries
	Institution Expertise	Institute has COC Programme, College has post-graduation Programme (Botany, Chemistry & Microbiology) and Separate Management College.
	Industrial Support	Real Dairy, Nandan Dairy, Dynamix Dairy, Baramati Fresho Ice-cream, Imsopher India Pvt. Ltd. Taj frozen food, United Sprits, Bauli, Baramati Agro, VRS Foods, Sonai Dairy, rj foods, Modi Foods, Personna Foods, Gits, Morde, ITC, Varna dairy, Gokul Dairy and Govind etc.

4. Curriculum Design

4.1. Has the Curriculum for each programme been developed in consultation with the:

- a) Sector Skill Council? YES / NO: No
- b) Industry partner? YES / NO: Yes

4.2. Please provide details of Industry/Sector Skills Council (SSC) Representatives (Name/Designation/Address) involved in design and preparation of curriculum for each of the proposed programme (s):

S. No	Name of the Programme	Details of the Industry & SSC Representative (S)		
		Name	Name of Organization & Address	Contact Details (Mobile, email, website)
1.	M. Voc. Food Processing Technology	Support Services	NIASM, Malegaon	Dr. N.P. Singh, Director,NIASM, Baramati 413 115, Pune Maharashtra, Phone : (02112) 254057/58/59www.niam.res.in
		Support Service	NRC on Pomegranate, Solapur	Dr. NileshGaikward, Sr. Scientist, NRC on Pomegranate, Solapur, Maharashtra 7756935301
		Curriculum design, Academic Partners	Agricultural Development Trust	Dr. Syed Shakir Ali, Incharge, KVK, Baramati 8380090282kvkbmt@yahoo.com, www.kvkbaramati.com
		Academic Support	PDKV Akola	Prof. P.A. Borkar, Head Processing & Post-Harvest Tech.Mobile: 09822716481
		Support Service	Technical Director Ceres Organics Pvt.Ltd.	Mr. PrashantRaut, Baramati Email:prashantraut.1@gmail.com
		Curriculum Design	ICAR	Dr. R.P. Kachru, Ex- ADG Process Engg. and Advisor, PHT Scheme, Govt. of India,
		Academic Support	BARC, Mumbai	“Padamshree”Dr. S.P. Kale Ex-Associate Director, BSG BARCTrombay, Mumbai 400085
		Academic Support	SNDT College, Pune	Dr. S. M. Naikare, Pashan, Pune 9823360944
		Support Service	Nichrome India Ltd. Pune	Mr. C. V. Joshi, Chairman, Nichrome India Ltd. Pune
		Support Service	Imsofer, Baramati	Mr.ChetanShinde, Production Manager, Imsofer, Baramati
		Academic Service	Dr. B. K. Sakhale	Dept. of Food Technology, Dr. BAMU, Aurangabad
		Academic Support	Dr. Rahul Ranveer	Dr. BSKKV, Dapoli 9967309295
Academic Support	Dr. P.K. Srivastava	EX Dean, CAE&PHT, Ranipool, Gangtok		

4.3. Alignment with National Occupational Standard of the Sector Skills Council and National Skill Qualification Framework:

S. No.	Name of the Sector/Programme	Semester	Job role (s) Covered	NSQ F	Remarks
1.	Food Processing Technology				
	Post Graduate Programme in Food Processing Technology	I&II	<ul style="list-style-type: none"> ➤ Quality control Executive ➤ Supply Chain and Logistics Professionals ➤ Supervisor and Others ➤ Technical Officer ➤ Food Consultant 	Level -8	Post Graduate Diploma in FPT
	M. Voc. Degree Food Processing Technology	III & IV	<ul style="list-style-type: none"> ➤ Production Manager and Process Engineer ➤ Research & Development Specialists ➤ Regulatory & Legal Experts ➤ Academic Professionals ➤ Sensory Evaluator 	Level -9	M. Voc. Degree

4.4 Whether the curriculum has been vetted by respective Sector Skill Council (s):No

5. Proposed subjects / papers in each of the semester of proposed programmes to be offered in Centre separately for the General Education & Skill component.

5.1 Food Processing Technology (M. Voc. Programme)

First year: Semester I

Sr. No.	Subject Name	No. of Credits	Marks
Theory (General Education Component)			
FPT-1	Advances in Food Microbiology	3	75
FPT-2	Advances in Food Chemistry & Analysis	3	75
FPT-3	Advances in Food Processing	3	75
FPT-4	Total Quality Management	3	75
Practicals (Skill Component)			
FPT- 1.1	Advances in Food Microbiology	6	150
FPT- 1.2	Advances in Food Chemistry & Analysis	6	150
FPT- 1.3	Advances in Food Processing	6	150

Semester II

Sr. No.	Subject Name	No. of Credits	Marks
Theory (General Education Component)			
FPT- 5	Post Harvest Management& Supply Chain	3	75
FPT- 6	Novel Food Packaging Technology	3	75
FPT- 7	Beverage and Snack Food Technology	3	75
FPT- 8	Statistical & Research Methodology	3	75
Practicals (Skill Component)			
FPT- 2.1	Post Harvest Management& Supply Chain	6	150
FPT- 2.2	Packaging Technology	6	150
FPT- 2.3	Beverage and Snack Food Technology	6	150

Second year: Semester III

Sr. No.	Subject Name	No. of Credits	Marks
Skill Component			
FPT 3.1	Experiential Learning Programme	12	300
FPT-3.2	Research Project	18	450

Second Year: Four Semester IV

S. No.	Subject Name	No. of Credits	Marks
FPT 4.1	Industrial Tour- Ten Days	06	150
FPT 4.2	Internship/In-Plant Training	24	600

Note:

- One compulsory visit to field/industry/institute for practical papers in all semesters
- Report Submission and PPT presentation of visit is mandatory
- Seminar Report preparation and PPT presentation mandatory for each theory papers.
- Group discussion/case study based on local/regional/national social economic aspects.

5.2 Detailed Syllabus: Please Refer Annexure-I

6. Details of Existing Faculty/Departments:(We are running two B.Voc. courses under Food and Dairy Technology namely 1. Food Processing and Post-Harvest Technology and 2. Dairy Technology

S. No.	Faculty/Departments	Sanctioned Faculty Strength	Existing Faculty Members	Total number of Students
1.	B. Voc. Food Processing and Post-Harvest Technology	01	04	150
2.	B.Voc. Dairy Technology	01	02	50

7. Existing Industrial Linkages:

Name of the Industry/Industry Associations	Nature of Existing Collaboration
For Food Processing Technology	
➤ NRC on Pomegranate, Solapur (MS)	Training, Research and Development
➤ Real Dairy, Baramati	In-plant Training and Placement
➤ CAU, Gangtok Sikkim	Research and Development
➤ Sunder Sikkim, Gangtok	In Plant Training and Research,
➤ BFIT, Dehradun	Academic Support
➤ Modi Foods, Baramati	In Plant Training and Placement
➤ YISD, Pune	Academic Support
For Dairy Technology	
➤ Real Dairy, Baramati	In-plant Training and Placement

8. Proposed Industry Partners/NSDC Training Partners for Skill Training for Proposed Programmes:

Name of the Industry Partner	Nature of work, specialization and Size of Operations
Food Processing Technology (M. Voc. Programme)	

➤ VRS Foods, Ahmednagar	Training and Placement
➤ Agriculture Development Trust, Baramati	Academic and Research
➤ Dr. BSK Agriculture University, Dapoli	Curriculum Design
➤ United Sprit, Pimpri	In-plant Training and Placement
➤ ARTI, Phaltan	In-plant Training and Placement
➤ Ceres Organics Pvt. Ltd. Mumbai	In-plant Training and Placement
➤ Nichrome India Ltd. Pune	In-Plant Training and Placement
➤ Gits Food Private Limited, Pune	In-plant Training and Placement
➤ SNDT, Pune	Academic development
➤ Modi Foods, Baramati	Training and Placement
➤ SchriberDynamix Dairy	Academic Support, Training & Placement
➤ VRS Foods, Ahmad Nagar	Academic Support, Training & Placement
➤ Pantajali Foods, Ahmad Nagar	Academic Support, Training & Placement
➤ Real Dairy Baramati	Training and Placement
➤ Nandan Dairy Baramati	Training and Placement
➤ Bauli India Pvt. Ltd.	Academic support, Training & Placement
➤ Imsofer India Pvt. Ltd	Training and Placement
Name and Details of NSDC Skills Training Partners (if any): Nil	
To be contacted	

9. Details of B.Voc. /Community College: (Applicable only if the Institution is approved under UGC Community Colleges/B.Voc./DDU KAUSHAL during XII Plan)

Programmes	Key Achievements (Enrolment, Industry Collaboration, Placements etc...)
B. Voc. (UGC reference No. D.O. No. F. 2-2/2014 (B.Voc) dated 05 th May, 2014 and grants approved-185.00 Lakhs)	
Food Processing and Post-Harvest Technology	Enrolment-44 Students in 2014-15 Enrolment 50 Students in 2015-16 Enrolment 50 Students in 2016-17 Enrolment 50 Students in 2017-18 Enrolment 50 Students in 2018-19 Industry Collaboration -6 MoU Signed 80% placed in industries 20% self employed and higher education
Community College	Nil
DDU Kaushal	Nil

10. Availability of Faculty

S. No.	Name of the Programme	Name of the Faculty				Name of the Industry Partner Providing guest faculty
		Required	Available with Host Institution	Guest Faculty to be hired	Guest Faculty to be provided by industry Partners	
1.	Post Graduate Diploma & M.Voc. Degree in Food Processing Technology	07	--	--	02	Real Dairy, Paras Dairy & Schrieber Dynamix Dairy Baramati, Ceres Organics Pvt. Ltd. Mumbai, NRCon Pomegranate Solapur, Ferrero India Pvt. Ltd.

11. Training needs of Faculty

S. No.	Name of the Programme (s)	Details of Training & required duration	Training Provider (s) (NSDC/Industry)
Food Processing Technology			
1.	Quality Systems in food industry	02 days to 06 days	NIST Institute Private Limited, Pune and Mumbai
2.	Testing & quality evaluation of packaging materials	2 days to 6 days	IIP, Mumbai
3.	Food Processing Technology	07 to 15 days	NAFARI, Pune
4.	Instrumentation in food processing	15 days	IICPT, Tamil Nadu
5.	Flavour & Fermentation Tech.	15 days	FFDC Kannauj, UP
6.	Vegetable oil processing, value added products & analysis	05 days	CFTRI, Mysore
7.	Thermal processing of foods principles, packaging and practices	03 days	CFTRI, Mysore
8.	Functional food product / ingredient development from fruits and vegetables	05 days	CFTRI, Mysore
9.	Advance knowledge with new technology development	Two week per year	Rahuri Krushi Vidyapeeth, Rahuri
10.	Practical training on different method of food processing	Tow week per year	Agricultural College, Malegaon, Baramati
11.	PHT on Fruits & Vegetables	07 days to 15 days	NIPHT, Talegaon, Pune
12.	Food Safety & Standard	1, 2 & 3 Days	FoSTAC, Mumbai & Pune
13.	Cheese Technology		NDDB, Hisar

12. Details of infrastructure available with university/college for KAUSHAL

Particulars	Details
Administrative/faculty office	06 No. (14'.3"X11'.9")
Classrooms	09 No. (29.0"X24'.3")
Labs/Workshops	06 No. (29'X49'.3")

Note: Separate building for the B.Voc. Programme is Available

13. Please provide plan for meeting the requirements of physical infrastructure for programmes to be offered:

S. No.	Name of the Programme	Availability of Physical infrastructure		
		Infrastructure	Available in Host College/University	To be provided by industry Partner/NSDC Training Partners
1.	Food Processing Technology	Classroom	03 No. (29.0’’X24’.3’’)	
		Laboratory	02 No. (29’X49’.3’’)	
		Workshop	Yes (Central facility)	
		Library*	Yes 01 (16’X18.3)	
		ICT Facility*	Yes 01 (29’X25’)	
		Others	Yes	Research Activity & Inplant Training by Real Dairy- Baramati, Mapro- Wai, Nichrome Industry, Pune, NRC on Pomegranate- Solapur

Note: Separate building will be made available after sanctioning of the M.Voc. Programme.

*Central library and central ICT facility are also available

14. Placement Plan:

14.1 Please provide details of plans, for enabling placement of students of the Centre in partner industries:

S. No.	Name of the Programme	Details of Proposed Placement of learners	
		Industry Partners name (s)	Expected Placement Numbers by the partner industry at the end of the programme
1.	Food Processing Technology	ITC, Bauli, Gits, Imsofer, VRS Foods, Patanjali Foods, Real Dairy, Nandan Dairy, ITC, Sonai Dairy etc. Schrieber Dynamix Dairy Baramati, Goverdhan Dairy etc.	24 Students

Note: Partnership in process

14.2 How would the Centre set up an effective mechanism for placement of students?

TC College Baramati would play a critical role in addressing the issues of talent gaps in various industries by way of continuing education and training programmes. College will coordinate between the Industry, Academia and Government to create the required ecosystem for skill development. The institute will forge broad based partnership and be a primary driver in matching the talent requirement of the Industry. It will focus on the skill deficit in industry by planning and delivering innovative training solution. The college will conduct training programmes under placement cell through:

1. Executive Development Programmes
2. Entrepreneurship Development Programme
3. Skill Development Programmes

Procedure for placement Activity in the Campus

1. In-Plant Industrial Training:

2. Pre-placement talk:

Pre-placement preparation regarding the written test, group discussion and presentations from the students will be mandatory. We will provide information to the students about company business, work culture, organizational structure, and career and growth opportunities of the industries. Finally 20 minute presentations with 10 minute Q&A Session will be form the students.

3. On Campus Requirement:

We will approach to food processing industry and industry may plan to visit TC college campus for conducting placement interviews and making job offers to students. Separate training and placement facilities will be provided for all students.

**15. Roadmap for implementation of the Scheme:
For Food Processing Technology:**

Work to be done	2019-20	2020-21	2021-22	2022-23
1. To establish the department with state-of-the-art laboratories namely				
Dairy Technology Laboratory (Partially)	✓			
Food Quality and Research Laboratory	✓			
Food Engineering Laboratory		✓		
2. To establish smart class rooms.	✓			
3. Adoption of villages for entrepreneurship development with the collaboration of food processing industry and research institution.			✓	
5. Assistance for Creation of Infrastructural Facilities under the Scheme for Human Resource Development sponsored by Ministry of Food Processing Industries Govt. of India, New Delhi total cost of the project - Rs. 100/- Lakhs. Objective of the Proposal: To cater to the growing need of the food processing industries for trained manpower (including entrepreneurs, managers, technologists, skilled workers) and also keep abreast with latest technology & diversification and new ways of managing and marketing to face global competition.		✓		
6. To setting up of regional level food testing laboratory		✓	✓	✓

<p>sponsored by Ministry of Food Processing Industries Govt. of India, New Delhi (up to Rs. 5 Crore investment)</p> <p>This laboratory would benefit all stake holders including domestic industry (Domestic and exports), entrepreneurs, small and medium enterprises, food standards setting bodies and Government. The objectives of the laboratory:</p> <ul style="list-style-type: none"> ➤ To analyse the samples received from food processing industries and others stake holders. ➤ To reduce the time of analysis of samples by reducing transportation time of samples. ➤ To ensure compliance of standards in case of exports as well as imports. <p>To establish a surveillance system for monitoring the quality and composition of food</p>				
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16. Budget Requirements for XII plan period:

S. No.	Particulars	Amount Required
1.	Start-up Assistance	02.50 Crore
2.	Staff	02 Crore, One Professor, Two Associate Professor, Four Assistant Professor and One Technical Assistant and One Multitasking Staff (As per UGC norms)
3.	Operative Cost	01Crore

17. Year wise Key Milestones/Plans:For Food Processing Technology (M.Voc.)

S. No.	Key Plans/Milestones	Person Responsible	Expected Completion Date
1.	Publicity	Mr.J.P. Rane/Mr. R.V. Pandit	31 st July, 2019
2.	Admission Process	Mr. S.D. Deokar/Mr.A.M.Solankar	31 st August, 2019
3.	Teaching	Dr. Wazid Ali Khan & Miss A.A. Zambre	As per University norms
4.	Organization of Guest Lecture of Industry expert	Dr. Wazid Ali Khan, Miss A.A. Zambre	Throughout the year
5.	Internal evaluation	Dr. Wazid Ali Khan &Miss A.A. Zambre	Continuous Assessment Process
6.	Online training	Dr. Wazid Ali Khan, Miss A.A. Zambre	Continuous Training Process
7.	Examination (Theory & Practical)	Dr. Wazid Ali Khan & Miss A.A. Zambre	15 th May of Every Year
8.	Declaration of Results	Mr. S. H. Gawade- Controller of Examination	Within 40 days after completion of examination

18. Any other information which the University/College May like to provide.

Dr. Wazid Ali Khan
Head, Department of Food and Dairy Technology