काशी हिन्दू विश्वविद्यालय

BANARAS HINDU UNIVERSITY

M.VOC. DEGREE PROGRAMME

IN

FOOD PROCESSING & MANAGEMENT

REGULATION, SCHEME AND SYLLABUS

(2019-20 ADMISSION ONWARDS)

Mater of Vocation in Food Processing & Management

NSQF Level: 9

Job Role: Plant Manager

Sector: Food Processing

Occupation: Processing

Sub- Sector: Fruit and vegetable, Food Grain Milling (including Oil seeds), Dairy Products, Meat And Poultry, Fish & Sea Food, Bread And Bakery, Alcoholic Beverages, Aerated Water/Soft Drinks, Soya Food, Packaged Foods, Packing And Refrigeration .

Job Role Description: A Plant Manager is responsible for daily management and coordination of food processing unit operations including production planning, managing human resources, supply chain, production operation, maintenance, quality assurance, storage and distribution of finished products from the plant warehouse within scheduled timeline and budget. S/he is responsible for developing policies and procedures to increase productivity, assure quality, and reduce overall costs.

Personal Attributes: A Plant Manager must possess management, leadership, communication, presentation and negotiation skills. She/he must also have the ability to think systematically, plan, take decisions, evaluate, carry out team building activities, motivate, solve problems and support others.

Applicable National Occupational Standards (NOS)

1. Lead operations of a food processing unit
2. Ensure proper production and operation management
3. Manage new projects and ensure compliance to regulatory requirements**.**

1. Postgraduate Attribute

Job Roles proposed to be covered in each year (Along with NSQF level)

Semester /Year	NSQF Level
First & Second Year	**Level 9 Plant Manager** **1. Lead operations of a food processing unit** • Develop and implement operational plan for food processing unit • Provide leadership across all operation functions of food processing unit. • Manage business process in food processing unit. • Monitor progress and work quality in food processing unit. **2. Ensure proper production and operation management** • Plan production and control in a food processing unit. • Direct and control finance for operation of food processing unit. • Direct and control human resource for operation of food processing unit. • Ensure product and process quality in food processing unit **3. Manage new projects and ensure compliance to regulatory requirements.** • Manage new projects/product in food processing unit. • Ensure product and process compliance to regulatory requirements. • Implement and ensure health and safety, food safety, hygiene and sanitation requirements.

Objectives:

1. To impart knowledge and develop capacities of the students through state of the art higher education in the areas of Food Science, Food Safety and Quality, Food Industry Management.
2. To develop students to become professionals in these and related areas who can work effectively and efficiently in academics, research, food industry, training, extension and community service.
3. To develop capacities and abilities and enable them to pursue higher education and research in Food processing and management

FACULTY NAME: DDU KAUSHAL KENDRA
COURSE NAME: MASTER'S OF VOCATION IN FOOD PROCESSING AND MANAGEMENT

COURSE CONTENT

MASTERS IN VOCATIONAL COURSE (M.VOC) PROGRAMME IN

FOOD PROCESSING & MANAGEMENT

Semester-I

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:101	Food Chemistry and Analysis	4	4	70	30
2.	M.VFPM :102	Food Microbiology	4	4	70	30
3.	M.VFPM :103	Principles of Food Processing & Post Harvest Technology	6	6	70	30
4.	M.VFPM :104	Fermentation Technology & Food Packaging	4	4	70	30
5.	M.VFPM :105	Milk and Milk Product Processing	3	3	70	30
6.	M.VFPM :106	Practical of M.VFPM 101	3	3	100	-
7.	M.VFPM :107	Practical of M.VFPM 102	3	3	100	-
8.	M.VFPM :108	Practical of M.VFPM 105	3	3	100	-
		TOTAL	**30**	**30**		

Semester-II

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:201	Food Engineering	4	4	70	30
2.	M.VFPM :202	Bakery and Confectionary Technology	4	4	70	30
3.	M.VFPM :203	**Lead operation of a food processing unit**	**6**	6	70	30
4.	M.VFPM :204	Cereals, Pulses and Oilseeds Processing	4	4	70	30
5.	M.VFPM :205	Communication Skills and Technical Writing	3	3	70	30
6.	M.VFPM :206	Personality Development	3	3	70	30
7.	M.VFPM :207	Practical of M.VFPM 202	3	3	100	-
8.	M.VFPM :208	Practical of M.VFPM 204	3	3	100	-
		TOTAL	**30**	**30**		

SUMMER TRAINING (One Month)

Summer Training - Chronological Diary needs to be maintained and submitted within the first week of the reopening date of 3rd Semester. The training report along with the

company certificate should be submitted.

SEMESTER – III

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:301	Meat, Poultry and fish food product Processing	4	4	70	30
2.	M.VFPM :302	Marketing of Food Products	4	4	70	30
3.	M.VFPM :303	**Production and Operation Management in Food Processing**	**6**	6	70	30
4.	M.VFPM :304	**Management Skills and Legal Regulatory Requirements in Food Processing**	**6**	6	70	30
5.	M.VFPM :305	Fruit and Vegetable Processing	4	4	70	30
6.	M.VFPM :306	Practical of M.VFPM 305	3	3	100	--
7.	M.VFPM: 307	Report & Seminar on Industrial Training	--	3	100	--
		TOTAL	27	**30**		

SEMESTER – IV

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:401	Thesis Report and Evaluation	3	**6**	100	--
2.	M.VFPM:402	Project Presentation	3	**18**	100	--
3.	M.VFPM:403	Comprehensive Viva-Voce	3	**6**	100	--
		TOTAL	--	**30**		

Semester-I

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:101	Food Chemistry and Analysis	4	4	70	30
2.	M.VFPM :102	Food Microbiology	4	4	70	30
3.	M.VFPM :103	Principles of Food Processing & Post Harvest Technology	6	6	70	30
4.	M.VFPM :104	Fermentation Technology & Food Packaging	4	4	70	30
5.	M.VFPM :105	Milk and Milk Product Processing	3	3	70	30
6.	M.VFPM :106	Practical of M.VFPM 101	3	3	100	-
7.	M.VFPM :107	Practical of M.VFPM 102	3	3	100	-
8.	M.VFPM :108	Practical of M.VFPM 105	3	3	100	-
		TOTAL	**30**	**30**		

M.VFPM 101. Food Chemistry and Analysis

UNIT-I

Food chemistry- definition and importance, Shelf life of food. Water relationships in foods: water activity and its relevance to deteriorative processes in foods (chemical, enzymic, physical and microbial changes). Food Carbohydrates: structural, analytical, physicochemical, nutritional and functional aspects of small mol. wt. carbohydrates and polysaccharides of plant and microbial origin. Lipids: classification, and use of lipids in foods, physical and chemical properties, effects of processing on functional properties and nutritive value.

UNIT-II

Protein and amino acids: physical and chemical properties, distribution, amount and functions of proteins in foods, functional properties, effect of processing.-Losses of vitamins and minerals due to processing. Pigments in food, food flavours, browning reaction in foods. Enzymes in foods, and food industry, bio-deterioration of foods, food contaminants, additives and toxicants.

UNIT-III

Food analysis techniques: Spectroscopic techniques using UV/Vis, fluorescence, IR, FTIR, NIR, NMR, atomic absorption, polarimetry, refractometry, microscopic techniques in food analysis (light microscopy, SEM, TEM, particle size analysis, image analysis etc.). Techniques for dough rheology and starch characterization, Surface tension and its significance in food analysis.

UNIT-IV

Chromatographic techniques: Adsorption, column, partition, affinity, ion exchange, size exclusion, GC, GLC, HPLC, HPTLC, GCMS, LCMS. Separation techniques: Gel filtration, dialysis, electrophoresis, sedimentation, ultrafiltration and ultracentrifugation, solid phase extraction, supercritical fluid extraction.

Suggested Readings

1. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York.
2. Meyer, L.H. 1973. Food Chemistry. East-West Press Pvt. Ltd., New Delhi. Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport.
3. Bamji MS, Rao NA & Reddy V. 2003. Textbook of Human Nutrition.Oxford& IBH.
4. Belitz HD.1999. Food Chemistry. Springer Verlag. DeMan JM. 1976. Principles of Food Chemistry. AVI.

M.VFPM 102. Food Microbiology

UNIT I

History of microbiology of food, Types of micro-organism normally associated with food-mold, yeast, and bacteria. Foods as ecological niches, Relevant microbial groups, Microbes found in raw materials and foods that are detrimental to quality, Factors that influence the development of microbes in food, newer and rapid methods for qualitative and quantitative assay demonstrating the presence and characterization of microbes, Stress, damage, adaptation, reparation, death.

UNIT II

Microbial growth in food: intrinsic, extrinsic and implicit factors, Microbial interactions, Inorganic, organic and antibiotic additives. Effects of enzymes and other proteins, Combination systems, Adaptation phenomena and stress phenomena, Effect of injury on growth or survival.

UNIT III

Microbial behaviour against the newer methods of food processing, Adoption and resistance development, Microbes as test organisms, as sensors and as tools for future applications in energy production and food and non-food industrial products. Modern methods of cell culture: synchronous and co- cell culture, continuous cell culture in liquid and solid media, Cell immobilization and applications, Pre and probiotics cultures

UNIT IV

Contaminants of foods-stuffs, vegetables, cereals, pulses, oilseeds, milk and meat during handling and processing. Biochemical changes caused by micro-organisms, deterioration of various types of food product. Food poisoning and microbial toxins, microbial food fermentation, standards for different foods. Food borne intoxicants and mycotoxins.

Suggested Readings

1. Branen A.L. and Davidson, P.M. 1983. Antimicrobials in Foods. Marcel Dekker, Newyork.

2. Jay J.M. 1986. Modern Food Microbiology.3rd Edn. VNR, New York.

3. Robinson, R.K. Ed. 1983. Dairy Microbiology.Applied Science, London.

4. Banawart GJ. 1989. Basic Food Microbiology. 2nd Ed. AVI Publ.

5. Frazier J &Westhoff DC. 1988. Food Microbiology. 4th Ed. McGraw Hill

M.VFPM 103. Principles of Food processing and Post-harvest Technology

UNIT I

Scope and importance of food processing. National and international perspectives. Principles and methods of food processing and preservation (freezing, heating, dehydration, canning, additives, fermentation, irradiation, extrusion cooking, dielectric heating)

UNIT-II

Microwave and radio frequency processing: Definition, Advantages, mechanism of heat generation, application in food processing: microwave blanching, sterilization and finish drying. Hurdle technology: concept of hurdle technology and its application. High Pressure processing: Concept, equipments for HPP treatment, mechanism of microbial inactivation and its application in food processing. Ultrasonic processing: Properties of ultrasonic, application of ultrasonic as processing techniques. Newer techniques in food processing: Application of technologies of high intensity light, pulse electric field, ohmic heating, IR heating, inductive heating and, Nanotechnology: Principles and applications in foods.

UNIT-III

Principles of Post-harvest treatments, value-addition, and traceability; Post harvest technology for cereals, legumes (cleaning, grading, milling), Hydrothermal treatment & conditioning of grains, Modern paddy and wheat parboiling-systems, equipment, Advances in heat transfer and fluid flow in grain processing operations. Crop drying principles, moisture migration theories, Crop drying methods/systems and Crop dryers-selection, design and testing.

UNIT-IV

Storage of post harvest produce, Cold Storage, Food Packaging: Packaging materials & its advancement, Mass transfer in packing material, Innovation in food packing (active, passive, intelligent),Package testing, CA & MA, Kinetics of biological reactions - kinetics of reactions occurring in processed foods, reaction velocity constant, order of reaction; quality changes during storage of foods; application of Arrhenius equation to biological reactions.

Suggested Readings:

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. Potter NN & Hotchkiss 1997. Food Science.5th Ed. CBS.

M.VFPM 104. Fermentation Technology and Food Packaging

UNIT-I

Introduction to fermentation: Modern methods of cell culture: synchronous and co- cell culture, continuous cell culture in liquid and solid media, Cell immobilization and applications, Pre and probiotics cultures. Rate of microbial growth and death. Fermentation kinetics, mass transfer diffusion, membrane transport, dialysis, nutrient uptake.

UNIT-II

Fermenter design, operation, measurement and control in fermentation. Aeration and agitation in fermentation: Oxygen requirement, measurement of adsorption coefficients, bubble aeration, mechanical agitation, correlation between mass-transfer coefficient and operating variables. Types of fermentation: sub-merged and solid state. Batch and continuous fermentation, scale up in fermentation. Product recovery. Biological waste treatment and in plant sanitation.

UNIT III

Properties of materials such as tensile strength, bursting strength, tearing resistance, puncture resistance, impact strength, tear strength, their methods of testing and evaluation; Barrier properties of packaging materials: Theory of permeability, factors affecting permeability, permeability coefficient, gas transmission rate (GTR) and its measurement, water vapour transmission rate (WVTR) and its measurement, prediction of shelf life of foods, selection and design of packaging material for different foods.

UNIT IV

Food packaging systems: Different forms of packaging such as rigid, semi rigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods. Packaging equipment and machinery: Vacuum, CA and MA packaging machine; gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; bottling machines; carton making machines.

Suggested Readings

1. Stanburry P.P. and Whitaker, A. 1984. Principles of Fermentation Technology.Pergamon Press, Oxford UK.

2. Steinkraus, K.H. 1983. Handbook of Indigenous Fermented Foods. Marcel Dekker, New York.

3. Food, Fermentation, and Micro-Organisms by Charles W. Bamforth

4. .Painy, F.A. and Painy, H.Y. 1983. A Handbook of Food Packaging.Leonard Hill, Glasgow, UK.

M.VFPM 105. Milk and Milk Product Processing

UNIT I

Present status of milk & milk products in India and Abroad; market milk- Composition of milk of various species, quality evaluation and testing of milk, procurement, transportation and processing of market milk, cleaning & sanitization of dairy equipments. Special milks such as flavoured, sterilized, recombined & reconstituted toned & double toned.

UNIT II

Condensed milk- Definition, methods of manufacture, evaluation of condensed & evaporated milk; dried milk- Definition, methods of manufacture of skim & whole milk powder, instantiation, physiochemical properties, evaluation, defects in dried milk powder.

UNIT III

Cream- Definition, classification, composition, cream separation, sampling, neutralization, sterilization, pasteurization & cooling of cream, evaluation, defects in cream; Butter- Definition, composition, classification, methods of manufacture, theories of churning, evaluation, defects in butter. Ice cream- Definition, composition and standards, nutritive value, classification, methods of manufacture, evaluation, defects in ice cream, and technology aspects of softy manufacture.

UNIT IV

Cheese: Definition, composition, classification, methods of manufacture, cheddar, Gouda, cottage and processed cheese, evaluation, defects in cheese.Indigenous milk products - Present status, method of manufacture of yoghurt, dahi, khoa, burfi, kalakand, gulabjamun, rosogolla, srikhand, chhana, paneer, ghee, lassietc; probiotic milk products.

Suggested Readings

1. Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. Technology of Indian Milk Products. Dairy India Publ.

2. Dey. S.1980. Outlines of Dairy Technology.Oxford Univ. Press. New Delhi

3. Henderson JL. 1971. Fluid Milk Industry. AVI Publ.

4. Rathore NS et al. 2008. Fundamentals of Dairy Technology - Theory & Practices.HimanshuPubl

5. Spreer E. 1993. Milk and Dairy Products. Marcel Dekker.

M.VFPM 106. Practical of M.VFPM 101

Analysis of food for: Crude fibre, Moisture, Nitrogen, Ash, Calcium, Phosphorus, Iron, Vitamin A, Vitamin C, Fat, Saponification value, Iodine number, Acid number, Estimation of total Sugar in honey, Protein by Kjeldahl Method.

M.VFPM 107. Practical of M.VFPM 102

To study morphology and structural features of various bacteria and fungi commonly associated with foods. Isolation of microorganism by Pure Culture Technique and Microbial count by Standard Plate Count Method. Microbiological analysis of water, Milk canned product, Fruit Juices and Street foods. Use of Biochemical test for identifying bacteria.

M.VFPM 108. Practical of M.VFPM 105

Platform test for milk, Determination of fat in milk, Determination of adulterants in given sample, Preparations of milk Products: Homogenized milk, Reconstituted milk, Toned Milk, Flavoured milk based product, Butter, Casein, Ghee from Cream, Khoa, Channa**.**

Semester-II

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:201	Food Engineering	4	4	70	30
2.	M.VFPM :202	Bakery and Confectionary Technology	4	4	70	30
3.	M.VFPM :203	**Lead operation of a food processing unit**	**6**	6	70	30
4.	M.VFPM :204	Cereals, Pulses and Oilseeds Processing	4	4	70	30
5.	M.VFPM :205	Communication Skills and Technical Writing	3	3	70	30
6.	M.VFPM :206	Personality Development	3	3	70	30
7.	M.VFPM :207	Practical of M.VFPM 202	3	3	100	-
8.	M.VFPM :208	Practical of M.VFPM 204	3	3	100	-
		TOTAL	**30**	**30**		

M.VFPM 201. Food Engineering

UNIT I

Introduction to food engineering & processes: principles of thermodynamics and heat transfer applied to food engineering. Engineering properties of foods (Thermal, Optical, Frictional, Aerodynamic, Rheology, Physical), their significance in equipment design, processing and handling of food and food products. Fluid flow in food processing; continuity equation, Bernoulli's equation, Flow through pipes & conduits, Flow measurement, pump types & performance evaluation.

UNIT-II

Method for thermal process evaluation - Commercial sterility, pasteurization and sterilization methods based on slowest heating region; determination of the process time based on region of greatest temperature lag; calculation of process time for fluids on stream line flow and turbulent flow heated in heat exchangers

UNIT III

Mass transfer, molecular diffusion and diffusivity, Fick's law, diffusion in solids, liquids and gases equilibrium stage process, convective mass transfer co-efficient, mass transfer with laminar and turbulent flow. Application of mass transfer in food processing.

UNIT IV

Refrigeration system; components, refrigerants types, cooling load estimation, refrigeration design and application in food processing., Food chilling and freezing – Precooling and cold storage, freezing point depression; general introduction to enthalpy change during freezing; Cryogenic freezing and IQF; design of food freezing equipment (air blast freezers, plate freezers and immersion freezers).

Suggested Reading:

1. Heldman DR & Singh RP.1995. Food Process Engineering. AVI Publ.

2. Rao.D.G,Fundamentals of food engg,PHI publications.

3. Fennema O.R. Ed. 1985, Principles of Food Science: Part-II Physical Principles of food Preservation. Marcel Dekker, New York.

4. Harper, J.C. 1975. Elements of Food Engineering. AVI, Westport.

5. Heldman, D.R. and Lund, D.B. Ed. 1992. Handbood of Food Engineering marcel Dekker, New York.

M.VFPM. 202 Bakery and confectionary Technology

UNIT I

Bakery and confectionary industry; raw materials and quality parameters; dough development; methods of dough mixing; dough chemistry; rheological testing of dough-Farinograph, Mixograph, Extensograph, Amylograph / RapidVisco Analyzer, Falling number.

UNIT II

Technology for the manufacture of bakery products-bread, biscuits, cakes and the effect of variations in formulation and process parameters on the quality of the finished product; quality consideration and parameters; Staling and losses in baking; machineries used in bakery industry.

UNIT III

Chocolate Processing Technology, Compound Coatings & Candy Bars, Tempering technology, Chocolate hollow figures, Chocolate shells, Enrobing technology, Manufacture of candy bars, Presentation and application of vegetable fats. Production of chocolate mass Sugar Confectionery manufacture, General technical aspects of industrial sugar confectionery manufacture, Manufacture of high boiled sweets– Ingredients, Methods of manufacture– Types–Center–filled, lollipops, coextruded products. Manufacture of gums and jellies–Quality aspects.

UNIT IV

Quality characteristics of confectionery ingredients; technology for manufacture of flour, fruit, milk, sugar, chocolate, and special confectionary products; colour, flavour and texture of confectionary; standards and regulations; machineries used in confectionery industry. Manufacture of Miscellaneous Products, Caramel, Toffee and fudge– Liquorices paste and aerated confectionery, Lozenges, sugar panning and Chewing gum, Count Lines Quality aspects, fruit confections.

Suggested Readings

1. Dubey SC. 2002. Basic Baking.The Society of Indian Bakers, New Delhi.

2. Francis FJ. 2000. Wiley Encyclopedia of Food Science & Technology. John Wiley& Sons.

3. Manley D. 2000.Technology of Biscuits, Crackers & Cookies.2nd Ed. CRC Press.

4. Pyler EJ. Bakery Science & Technology.3rd Ed. Vols.I, II.Sosland Publ.

5. Qarooni J. 1996. Flat Bread Technology. Chapman & Hall.

M.VFPM. 203. Lead Operations of a Food Processing Unit

Aim of the Course: To Understand the leading operations of food processing unit by developing operational plan, providing leadership to all operation functions, managing business process and monitoring progress and work quality in food processing unit.

Course Overview and Context

- Develop and implement operational plan for food processing unit
- Provide leadership across all operation functions of food processing unit.
- Manage business process in food processing unit.
- Monitor progress and work quality in food processing unit

UNIT I

Principles and processes involved in business and organizational planning, Code of business conduct, Leadership and management techniques , Production and operation management, Manpower modelling and handling, Information management.

UNIT II

Management and leadership methods and techniques, Methods to improve business processes, Operational planning methods, Principles and models of effective process management, Risk analysis and risk management.

UNIT III

Contingency planning and management, Resource utilization methods, setting smart (specific, measurable, achievable, realistic and time-bound) objectives, Methods to monitor and control operational plans to achieve objectives, Methods to identify and address difficulties and challenges.

UNIT IV

Managing changes, and techniques to manage expectations during change, Types of difficulties and challenges that may arise, including conflict, diversity and inclusion issues, within the area, and ways of identifying and overcoming them, National and international, regulatory requirements like quality management system, environmental management system, health and safety, FSSAI, FDA regulations related to food processing unit and products produced.

Suggested Readings

1. Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.

2. Krammer A & Twigg BA.1973. Quality Control in Food Industry. Vol. I,II. AVI Publ. Westport.

3. Jellinek G. 1985. Sensory Evaluation of Food - Theory and Practice. EllisHorwoood.

M.VFPM.204 Cereals, Pulses and Oilseeds Processing

UNIT I

Structure and composition of common cereals, pulses and oilseeds. Wheat: Types and physicochemical characteristics; wheat milling - products and byproducts; factors affecting quality parameters; physical, chemical and rheological tests on wheat flour; additives used in bakery products; flour improvers and bleaching agents; manufacture of bakery products, pasta products and various processed cereal-based foods; manufacture of whole wheat atta, blended flour and fortified flour.

UNIT II

Rice: Classification, physicochemical characteristics; cooking quality; rice milling technology; by- products of rice milling and their utilization; Parboiling of rice- technology and effect on quality characteristics; aging of rice - quality changes; processed products based on rice. Corn: Types and nutritive value; dry and wet milling.

UNIT III

Legumes and oilseeds: composition, anti-nutritional factors, processing and storage; processing for production of edible oil, meal, flour, protein concentrates and isolates; extrusion cooking technology; snack foods; development of low cost protein foods.

UNIT-IV

Basic processing of fats and oils - oil extraction, degumming, refining, bleaching, hydrogenation, fractional crystalization, interesterification, glycerolysis, molecular distillation, plasticizing and tempering. Shortening introduction, manufacturing and uses of

shortening, types of shortening. Mayonnaise and salad dressings. Confectionery coatings. Packing and storage of fats and oils, cocoa butter, fat substitutes.

Suggested Readings

1. Blanshard J.M.V., Frazier, P.J. and Galliard, T. Ed. 1986.Chemistry and Physics of Baking.Royal Society of Chemistry, London.

2. Chakraverty, A. 1988. Post harvest Technology of Cereals, Pulses and oilseeds. Oxfordand IBH, New Delhi.

3. Durbey, S.C. 1979. Basic Baking: Science and Craft. Gujarat Agricultural University, Anand (Gujrat).

M.VFPM.205. Communication Skills and Technical Writing

UNIT-1

Introduction to communication: Meaning, nature, objectives, and process of communication; Types of Communication; types of communication; principle of Effective Communication.

UNIT -2

Developing English language skills: Essentials of Grammar; Applied grammar and Usage; Common Errors and Misappropriations; jumbled sentences; Building Advanced vocabulary.

UNIT-3

Listening and Speaking Skills: Developing effective skills, Non- verbal communication, Dynamics of professional presentations, Group Discussions, Job Interviews, conversations, Dialogues and Debates.

UNIT-4

Technical writing: formal and informal writings; formal writings/report, hand books, manuals, letter, Memos, Circular, Notice, Resume, Agenda and Email writings.

Suggested Readings:

1. ‘Communication Skills’, Sanjay kumar & Pushp Lata, Oxford University press India.

2. ‘Technical Communication’: Priciples and practice, Meenakshi Raman & Sangeeta Sharma, Oxford University press India.

M.VFPM 206. Personality Development

UNIT- 1

Personality: Meaning & Concept, Personality Patterns, Symbols of Self, Moulding the Personality Pattern, Personality & Personal Effectiveness. Personality Determinants: An overview of Personality determinants. Evaluation of Personality: Sick Personalities and Healthy Personalities.

UNIT - 2

Introduction to Interpersonal Relations, Analysis of Relations of different ego states, Analysis of Strokes, Analysis of Life position. Introduction to Motivation, Relevance and types of Motivation, Motivating others

UNIT- 3

Stress Management: Introduction to Stress Causes of Stress, Impact of Stress, Managing Stress. Conflict Management: Introduction to Conflict Causes of Conflict, Managing Conflict.

UNIT- 4

Time Management: Time as a Resource, Identify Important Time Management Wasters, Individual Time Management Styles, Techniques for better Time Management

Suggested Readings:

1. Lall and Sharma, Personal Growth Trainning and Development, Excel Books.
2. Janakiraman, Trainning and Development, Biztantra.
3. Hurlock and Elizabeth, B. Personality Development, Tata McGraw Hill, 1st Ed.
4. Sahu, R.K., Training for Development, Excel Books, 1st Ed.
5. Singh, A. and Ubha, D.S., Personality Development and Soft Skills.
6. Petri, H.L. and Govern, J.M., 2013, Motivation: Theory, Research, and Applications, Wadsworth Cengage Learning: Belmont CA, 6th Ed.
7. Robbins, S., Organisational Behaviour.
8. Keith and Davis, Organisational Behaviour.

M.VFPM 207. Practical of M.VFPM 202

Preparation of Cookies, Nan-Khatai, Bread, Cake, Candy, Chocolate. Determination of protein content in dough, TPA analysis of biscuits. Quality test for wheat flour use3d in baked products.

M.VFPM 208. Practical of M.VFPM 204

Physico-chemical and rheological examination of wheat and its products test weight, Kernel hardness, moisture content of wheat-flour, alpha amylase activity, fat acidity, starch damage, ash content in wheat flour. Determination of amylose and amylopectin, gelatinization temperature. Detection of adulteration Sesame oil, saponification value, iodine value, acid value of fats and oil, Rancidity test of fats and oils.

SEMESTER – III

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:301	Meat, Poultry and fish food product Processing	4	4	70	30
2.	M.VFPM :302	Marketing of Food Products	4	4	70	30
3.	M.VFPM :303	**Production and Operation Management in Food Processing**	**6**	6	70	30
4.	M.VFPM :304	**Management Skills and Legal Regulatory Requirements in Food Processing**	**6**	6	70	30
5.	M.VFPM :305	Fruit and Vegetable Processing	4	4	70	30
6.	M.VFPM :306	Practical of M.VFPM 305	3	3	100	--
7.	M.VFPM: 307	Report & Seminar on Industrial Training	--	3	100	--
		TOTAL	27	**30**		

M.VFPM.301 Meat, Poultry and fish food product Processing

UNIT – 1

Meat Processing: nutritional quality of meat and poultry, structure of muscles-factor affecting quality of fresh meat. Slaughtering technique- post-mortem changes – rigor mortis.

UNIT -2

Meat Preservation: method of preservation- low temperature, chilling and freezing-thermal processing-dehydration-curing and smoking- preservation using antibiotics- preservation by irradiation**.**

UNIT- 3

Egg Processing: Structure and composition of egg, processing of eggs, storage and transportation of egg products

UNIT- 4

Fish Processing and preservation: Fish structure and composition, handling, storage and transportation of fish. Low temperature, chilling and freezing, Thermal processing, dehydration, curing and smoking, preservation using antibiotics, preservation by irradiation.

TEXT BOOKS

1. Mead,"Processing of poultry" 1989.
2. Richardson and Mead,"Poultry meat science" 1999.
3. B. D Sharma, "Outline of meat science and technology" JAYPEE BROTHERS MEDICAL PUBLISHER.
4. Dr. K Gopa kumar, "Fishery Technology" INDIAN COUNCIL OF AGRICULTURE RESEARCH.

M.VFPM 302. Marketing of Food products.

UNIT I

Concept and functions of marketing of food products; Concepts and elements of marketing mix. Concept of market structure, micro and macro environments; Consumer behaviour; Marketing opportunities- Analysis, marketing research and marketing information systems. Market measurement- present and future demand; Market forecasting; market segmentation, targeting and positioning, Allocation and marketing resources, Marketing Planning Process.

UNIT II

Product policy and planning: Product-mix; product line; product life cycle, New product development process. Product brand, packaging, services decisions. Marketing channel decisions, Retailing, wholesaling and distribution, Pricing Decisions, Price

determination and pricing policy of milk products in organized and unorganized sectors of dairy industry, Promotion-mix decisions.

UNIT III

Advertising; Deciding advertising objectives, advertising budget and advertising message, Media Planning, Personal Selling, Publicity; Sales Promotion, Food and Dairy Products Marketing. International Marketing and International Trade, Salient features of International Marketing, Composition & direction of Indian exports.

UNIT IV

International marketing environment; Deciding which & how to enter international market; Exports- Direct exports, indirect exports, Licensing, Joint Ventures, Direct investment & internationalization process, Deciding marketing Programme; Product, Promotion, Price, Distribution Channels. Deciding the Market Organization; World Trade Organization (WTO).

Suggested Readings

1. Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
2. Krammer A & Twigg BA.1973. Quality Control in Food Industry. Vol. I,II. AVI Publ. Westport.
3. Macrae R, Roloson R & Sadlu MJ. 1994. Encyclopedia of Food Science &Technology & Nutrition. Vol. XVI. Academic Press.
4. Export/Import policy by Govt. of India.

M.VFPM.303 Production and Operation Management in Food Processing

Aim of the Course: To Understand the about managing production and operations of food processing unit through production planning and control, directing and controlling finance, human resources, and ensuring product and process quality.

Course Overview and Context

- Plan production and control in a food processing unit.
- Direct and control finance for operation of food processing unit.
- Direct and control human resource for operation of food processing unit.
- Ensure product and process quality in food processing unit

UNIT I

Organisation policies and goals, Production and operation management, Quality management, Human resource management, Budget management, Food regulatory policies and procedures related to products produced in the organisation, Quality mark accreditations of the organisations, Audit procedures, Code of business conduct, Manpower modelling and handling.

UNIT II

Current developments, tools and techniques in operation management, legal and regulatory requirements related to the organisation, Production and operational management, Inventory and supply chain management. Methods of storage and distribution, and logistics management, Risk analysis and risk management, Contingency planning and management, Methods of delegation and resource utilization.

UNIT III

Financial responsibilities, organisational guidelines and procedures for the Preparation and approval of budgets , Budgetary systems, methods to monitor, control and evaluate performance against budgets , Methods to calculate human resource requirement, and, methods to hire and train human resource for organisation requirements, Appraisal system followed in the organisation, and methods to review performance of employees.

UNIT IV

Methods to monitor and control operational plans to achieve objectives , Types of difficulties and challenges that may arise, including conflict, diversity and inclusion issues within the area, and ways of identifying and overcoming them , Methods to investigate reason for non-conformance related to processes and product quality and decide on appropriate corrective actions , National and international regulatory requirements like quality management System (ISO, HACCP, etc.), environmental management system, health and Safety, FSSAI, FDA, CODEX alimentarius regulations, etc. related to food processing unit and products produced.

Suggested Readings

1 Production and Operation Management Paperback – 2015 by K.ASWATHAPPA (Author, Contributor), K. Shridhara Bhat. Hiimalya Publishing House Pvt Ltd,

2 Principles of Food Production operation by Yogesh Singh, I K International Publishing Pvt Ltd.

M.VFPM.304 Management Skills and Regulatory Requirements in Food Processing

Aim of the Course: To Understand the about managing new projects, ensuring compliance to regulatory requirement, and health and safety systems.

Course Overview and Context

- Manage new projects/product in food processing unit
- Ensure product and process compliance to regulatory requirements
- Implement and ensure health and safety, food safety, hygiene and sanitation requirements.

UNIT I

Organisation policies and goals, Project management, Quality management system, Environmental management system, Quality mark accreditations of the organisations, Food regulatory policies and procedures related to process and products produced in the organisation, Documentation and records management system, Health and safety policy, Food safety system like FSSAI.

UNIT II

Project management tools and techniques, leadership, motivation, negotiation, planning, delegation, communication, setting objectives, consulting, systematic thinking, decision making and problem solving, influencing and persuading, presenting information, information management, contingency planning, evaluation, monitoring, analysing and reviewing, , involving others, valuing and supporting others.

UNIT III

Risk analysis and risk management. Regulations, guidelines and codes of practice related to health and safety, food safety, hygiene and sanitation (as per fssai), Environmental standards for food processing units. Methods to implement health and safety system in food processing unit.

UNIT IV

Industry standards such as GMP, HACCP and product recall process. Types of hazards such as physical, chemical and biological hazards and methods to measure, control and prevent them. Methods to establish systems for monitoring, measuring and reporting on health and safety. Procedures to ensure food safety, hygiene and sanitation in the organization

Suggested Readings

1. Early R.1995.Guide to Quality Management Systems for Food Industries. Blackie Academic.
2. Krammer A &Twigg BA.1973. Quality Control in Food Industry. Vol. I,II. AVI Publ. Westport.
3. Macrae R, Roloson R &Sadlu MJ. 1994. Encyclopedia of Food Science &Technology & Nutrition. Vol. XVI. Academic Press.

M.VFPM 305 Fruit and Vegetable Processing

UNIT I: Introduction

Composition and nutritive value of fruits and vegetable. Factors effecting composition and quality of fruits and vegetables. Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching

UNIT II: Spoilage of fruits and vegetables

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. 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 III: Processing of fruits and vegetables

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; applications to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables. Fruit powders using spray drying. Technology of extraction of juices from different types of fruits

UNIT IV: Manufacture of Fruit and vegetable products

Manufacturing process of juice, soup, puree, and paste.Jams, Jellies and marmalades: selection, preparation, production. Difference between jam and jelly. Theory of jell formation, failure and remedies in jam and jelly making. General principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits, sauce, ketchup, vegetable juices and concentrated products

Reference Books

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.

M.VFPM 306. Practical of M.VFPM 305

1. **Handling and operating of food processing equipment and Instruments**
    - Pulper
    - Juice extracting machines
    - Autoclaves
    - Corking machines
    - Refractometer
    - Salinometer
    - Hydrometers
    - Jelmeter
    - Vacuum gauge, pressure gauge, seam checking gauge
    - Electronic weighing balance

2. **Quality analysis**
    - Quality evaluation of fruits and vegetables.
    - Quantitative analysis of cut fruits and vegetable yield.
    - Effects of pre-treatment on quality of cut fruits and vegetables.
    - Refrigeration storage of fruits and vegetables
    - Determination of Maturity indices of fruits & vegetables.

3. **Quality Testing**
    - Determination of Degree Brix (TSS), pH and % acidity in fruits and vegetable products.
    - Estimation of benzoic acid, sulphur dioxide and KMS in terms of ppm present in fruits and vegetable products.
    - Estimation of reducing and non- reducing sugars in fruit and vegetable products

4. **Preservation techniques**
    - Extraction of juice by different methods.
    - Preservation of fruits juices with addition of preservative.
    - Preparation of fruit and synthetic beverages.
    - Preparation of carbonated beverages.

5. **Product Preparation**
    - Preparation of tomato juices, puree, sauces, ketchups, soup, paste.
    - Comparison of juice/pulp extraction methods on quality and yield of tomato pulp.
    - Preparation of jam, jelly and marmalades.
    - End point determination in preparation of high sugar product.
    - Preparation of preserves, candies, crystallized and glazed fruits and fruit bars.
    - Effects of pre- treatment and process variables on quality of preserve and candied fruits.
    - Preparation of chutney, sauerkraut, gherkins, cauliflower, lime, mango and Mixed pickles.

M.VFPM 307 Report & Seminar on Industrial Training

The Industrial Training will be undertaken by each student during the summer recess after the completion of the 2nd semester examination and prior to commencement of the 3rd semester. A report on the training which is required to be submitted shall consist of:

1. A general overview of the plant.

2. The products & raw material sources of the plant.

3. Detail description of different processing and other equipment.

4. Scheduling of plant operations.

5. Conclusion.

6. A viva will be conducted after submission of the report and presentation of a seminar.

SEMESTER – IV

Sl. No.	COURSE CODE	COURSE TITLE	L	C	External Marks	Internal Marks
1.	M.VFPM:401	Thesis Report and Evaluation	3	**6**	100	--
2.	M.VFPM:402	Project Presentation	3	**18**	100	--
3.	M.VFPM:403	Comprehensive Viva-Voce	3	**6**	100	--
		TOTAL	**--**	**30**		

M.VFPM.401. THESIS REPORT AND EVALUATION

Academic/ Industrial Project on development of new food product or machinery for food processing, Implementation of HACCP, Food Patents etc.

Experiment in Planning and optimizing the process or ingredient for products, further analysis of the product developed to be done on chemical, physical and microbiological basis. Evaluation to be done on the basis of exhibits made by students, which have to be assessed by a panel of Internal and external examiners. Students should be able to submit his/her project report in last week of month of April.

The effectiveness of Project work would be evaluated by

(1) Thesis will be sent to controller of Examination after completing his/her project/thesis

(2) Presentation of project report in department and defending the viva.

(3) A satisfactory certificate from the industry/academy where project would be done.

M.VFPM. 402 PROJECT REPORT PRESENTATIONS

Presentation of project report in department and defending the viva.

M.VFPM. 403. COMPREHENSIVE VIVA-VOCE

Comprehensive viva voce will be conducted in front of external examiner on the basis of the complete syllabus.