

Food Processing & Quality Management

(FPM)

Syllabus for B.Voc in Food Processing & Quality Management

Programme template: B.Voc course (CBCS) in FPQM
Gauhati University

Semester	CORE COURSE (12 papers, 72 credits)	Ability Enhancement Compulsory Course(AECC) (2 papers, 8 credits)	Skill Enhancement Course (SEC) (4 papers,16 credits)	Discipline Specific Elective(DSE) (6 papers,36 credits)
I	FPM-VC-1016	ENG-AE-1014		
	FPM -VC-1026			
	FPM -VC-1036			
II	FPM -VC-2016	ENV-AE-2014		
	FPM -VC-2026			
	FPM -VC-2036			
III	FPM -VC-3016		XXX-SE-3XX4	
	FPM -VC-3026			
	FPM -VC-3036			
IV	FPM -VC-4016		XXX-SE-4XX4	
	FPM -VC-4026			
	FPM -VC-4036			
V			XXX-SE-5XX4	FPM -VE-5016
				FPM -VE-5026
				FPM -VE-5036
VI			XXX-SE-6XX4	FPM -VE-6016
				FPM -VE-6026
				FPM -VE-6036

Semester I

Qualification Pack: Jam, Jelly and ketchup Processing Technician

(NSQF level 4)

Paper: FPM-VC-1016- Basics of Food Processing

Total credit: 6

Total marks: 100

Theory:

total marks: 60

Unit 1

Introduction to food processing

Unit operations, techniques used in unit operations, general structure of wheat and rice kernels, starch microscopy, milling, size reduction, milk pasteurization, physical and chemical preservation techniques, food packaging

Unit 2

Basic industrial mathematics

Ingredient formulation, chemical concentration, normality, molarity, ppm, ppb calculation, statistical tools and various bars/curve plotting using MS-excel

Unit 3

Basics of food safety and quality control

Definition of food quality, quality attributes of food, subjective and objective indices for quality, factors affecting quality in food chain, sanitation measures, classification of foods based on perishability, effect of intrinsic and extrinsic properties on quality, mycotoxins, bacterial exotoxins, heat and cold methods of preservation, use of gamma rays, adulteration, spoilage, HACCP .

Practical:**total marks: 20**

1. Basic laboratory rules.
2. Identification of laboratory glasswares and accessories.
3. Preparation of standard solutions- normality, molarity, ppm, ppb and percent calculation.
4. Determination of moisture content of food sample in both dry basis and wet basis.
5. Determination of gluten content of wheat flour.
6. Curve plotting using MS-excel.

Internal evaluation**total marks: 20****Books and references:**

1. Manay ,N.S, Shadaksharaswamy, M., Foods-Facts and Principles , New Age International Publisher, New Delhi, 2004
2. Potter,N. N , Hotchkiss,J.H. Food Science , CBS Publisher, New Delhi, 2000
3. Srilakshmi,B, Food Science (3rd edition), New age International (p) limited Publisher , New Delhi, 2003
4. Fellows, Food process technology: Principles and Technology, CRC publications.
5. Khetarpaul, N. (2005). Food Processing and Preservation, Dya Publishing House, New Delhi.
6. Essentials of food science

Paper: FPQM-VC-1026- Industrial Food Processing

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Introduction to food processing machineries

Millers, ovens, boilers, freezers, mixers and kneaders, size reduction machineries, pasteurizer, packaging equipments, working principles and designs of the machineries`

Unit 2

Designing of a food industry

Basic production lines of different food industries: bakery, mills, milk and other dairy products, drinking water, beverages, cold storage, abattoir, fruits and vegetable products etc., Quality management system in a food industry, marketing and distribution of products, governing agencies in India and Assam, Entrepreneurship, meaning of entrepreneur and entrepreneurship, characteristics of entrepreneur, entrepreneurial competencies, motivations, entrepreneurship development programme, entrepreneurial, entrepreneurial competencies, motivations, entrepreneurship development programme, entrepreneurial process .

Practical:

total marks: 20

1. Identification of different instruments and machineries with their working principles.
2. Instrument handling procedures.
3. Construction , operation and utility of food processing laboratory equipments

Internal evaluation

total marks: 20

Books and references

1. Srilakshmi,B, Food Science (3rd edition), New age International (p) limited Publisher , New Delhi, 2003
2. Fellows, Food process technology: Principles and Technology, CRC publications.

Paper: FPM-VC-1036- Industrial Processing of Fruits and Vegetables

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Definition of food processing, various subsectors of food processing industry, status and scope of fruits and vegetables processing industry in India

Unit 2

Post harvest losses of fruits and vegetables and factors affecting them, post harvest changes in fruits and vegetables , maturity indices of fruits and vegetables , climacteric and non climacteric fruits ,fruit ripening and changes ,packaging of whole fruits and vegetables ,post harvest physical and chemical treatment to enhance the shelf life of fruits and vegetables , microbiological spoilage of fruits and vegetables .

Unit 3

Classification, chemical composition and nutritive value of fruits and vegetables, preparing fruits and vegetables for processing- washing, sorting, grading, peeling, Bottling and canning of fruits and vegetables

Unit 4

Job role and responsibilities of jam, jelly and ketchup processing technician, hierarchy role and organizational structure

Unit 5

Machineries for peeling, slicing/dicing, pulping, hydraulic pressing and clarification; preparation and maintenance of work area and process machineries; different materials and equipments used in the cleaning process

Unit 6

FPO specifications and preparations of Jam, Jellies, marmalade, pickles

Tomato processing- FPO standard and preparation of tomato juice, puree, paste, chutney, sauce and ketchup.

Preparation and standard of fruit juices, squashes, cordials, fruit syrup, nectar, RTS and pulp

Unit 7

Packaging of jam, jelly and ketchup; microbial spoilage; microbial; analysis of products; documentation procedure and maintenance of record of raw materials, packing materials, finished products

Internship: In food industry/processing unit.

Conduct in workplace: The students will undergo industrial internship (NSQF level 4) during the first semester. Evaluation will be done by departments based on the feedback from the industrial management on their performance during the tenure.

Report making and verbal presentation:

After completion of the internship, the student will prepare a report on his work and experience. Evaluation will be based on the quality of the report and presentation.

Practical:

total marks: 20

1. Studies on maturity indices of fruits and vegetables.
2. Estimation of total soluble solids (TSS).
3. Studies on the physiological disorders-chilling injury of banana.
4. Preparation of fruit jam
5. Preparation of fruit jelly/marmalade
6. Preparation of fruit preserve and candy.
7. Preparation of fruit juice/squash/cordial/nectar
8. Preparation of pickle/mixed pickle.
9. Preparation of tomato products- sauce, puree, ketchup.
10. Visit to fruit and vegetable processing industry.

Internal evaluation:

total marks: 20

Books and references:

1. Post harvest physiology , handling and utilization of tropical and subtropical fruits and vegetables-E.B.Pantastico, AVI Publishing company, INC
2. Post harvest technology of fruits and vegetables: handling, processing, fermentation and waste management. Vol I and Vol II Verma L R and Joshi V.K.
3. Preservation of fruits and vegetables- Girdharilal, G.S. Siddapa and G.L. Tandon.
4. Fruits and vegetables preservation principles and practices- Srivastava R.P and Sanjeev Kumar

Semester II

Qualification Pack: Plant Baker

(NSQF level 5)

Paper: FPM-VC-2016- Food Quality Regulation and Maintenance

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Objectives, functions and principles of quality control; Difference between food quality control and quality assurance, assessment of raw materials and finished products

Unit 2

Food safety and food labeling, Food laws and regulations, concepts of codex alimentarius, HACCP, ISO series, GMP, GHP, 5S, SOP, audit system, documentation etc. Food standard and safety act: salient provisions and prospects, role of various food standards in India- PFA, FPO, AGMARK and BIS .Recent development in food quality regulation, MOFPI and schemes for establishing food industries in India

Unit 3

Sensory quality evaluation - introduction, method, sensory panel; Sensory and instrumental analysis in quality control

Practical:

total marks: 20

1. Identification of food logos.
2. Study of food labeling.
3. Identification of critical control points in a product line.
4. Small scale demonstration of food processing.
5. Sensory evaluation of different food samples.

Internal evaluation:

total marks: 20

Books and references:

1. Early, R. (1995): Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.
2. Gould, W.A and Gould, R.W. (1998). Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.

Paper: FPM-VC-2026- Food Chemistry

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Water: types of water-bound water, free water. Water activity – concepts, methods for measuring; Distribution of water in various foods and moisture determination

Unit 2

Carbohydrate: classification and structure of carbohydrate .sources of carbohydrate. Basic concepts of starch, cellulose, glycogen, pectin, agar-agar; Reducing and non-reducing sugar-concept and their estimation, basic idea about gelatinization, retrogradation, caramelization, Maillard browning

Unit 3

Proteins: classification of amino acids, sources and properties of proteins, structure, protein denaturation, common food proteins.

Unit 4

Fats: fatty acids – concept, classification, essential fatty acids, cis and Trans fats, properties of fats and oils, defects (rancidity) and their prevention. Acid value, peroxide value, saponification number, iodine value, Richert-meissel number; Fats estimation by solvent extraction method

Unit 5

Vitamins and minerals: sources and physiological functions of minerals and vitamins, deficiency disorder, effects of processing and storage of vitamins.

Unit 6

Enzyme : Definition, classification, function and sources

Practical:

total marks: 20

1. Determination of moisture in food sample.
2. Determination of protein in food sample.
3. Determination of ash/mineral in food sample.

4. Determination of crude fat in food sample.
5. Determination of acidity and p^H in food sample/beverages.
6. Determination of vitamin c content in food sample.
7. Determination of total sugar, reducing sugar and non reducing sugar.

Internal evaluation:

total marks: 20

Books and references:

1. Fenema's food chemistry- 4th edition, CRC press, Taylor and Francis group, New York, 2008
2. Meyer, L.H- Food chemistry, CBS publisher and distributor, New Delhi, 2002
3. Manay, N.S, Shadaksharaswamy, M., Foods-Facts and Principles, New Age International Publisher, New Delhi, 2004
4. Potter, N. N, Hotchkiss, J.H. Food Science, CBS Publisher, New Delhi, 2000
5. Srilakshmi, B, Food Science (3rd edition), New age International (p) limited Publisher, New Delhi, 2003
6. Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett publishers, Boston, London, 2003
7. Sadasivam, S, Manickam, A. Biochemical methods, 2nd edition, New age international (p) limited, New Delhi, 2001

Paper: FPM-VC-2036- Bakery Science and Technology

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Food processing and its sectors; overview on bakery and bakery products

List the various types of industries within the bakery sub sector. Scope, present status and future perspective

Unit 2

Baking process; Equipments used in bakery industry (Dough mixer, divider, rounder, proofing, molding, baking machine, Slicing machine)

Cleaning and maintenance of work area and machineries

Unit 3

Baking ingredients required for production and plan production sequence.

Testing of flour for bakery goods-laboratory testing of wheat grain quality, moisture tests, grain hardness testing, viscograph, amylograph, farino graph

Units and measurements used in bakery industry. Raw materials required for bakery products. Role of flour, water, salt, yeast, sugar, milk, fats etc

Yeast----an elementary knowledge of baker's yeast, role plays in fermentation of dough and conditions influencing its working.

Effect of over and under fermentation and under proofing of dough

Mixing methods used for baking. Calculate batch size and plan for various types of dough as per the production schedule.

Unit 4

Process of mixing and knead ingredients to make dough.

Oven and baking-knowledge and working of various types of oven

Biscuits-types of biscuit dough, developed dough, short dough, semi sweet dough , batters; importance of the consistency of dough; factors affecting the quality of biscuits/ cookies .

Cakes –ingredients-cake making ingredients—flour, sugar, shortening and egg, fats and oils, leavening agents.

Manufacturing process—cake making method, sugar batter process, flour batter process, correct temperature for baking different types of cakes.

Bread- bread manufacturing process; straight dough fermentation, bread improvers, improving physical quality

Methods of bread making---straight dough method

No time dough method

Sponge and dough method

External characteristic-----volume, symmetry of shape

Internal characteristics-----color, texture, aroma

Bread faults and remedies; Bread diseases—rope and mould.

Spoilage of bakery products and microbial analysis, packaging of bakery products

Internship:

Conduct in workplace: The students will undergo industrial internship (NSQF level 5) during the second semester. Evaluation will be done by departments based on the feedback from the industrial management on their performance during the tenure.

Report making and verbal presentation:

After completion of the internship, the student will prepare a report on his work and experience. Evaluation will be based on the quality of the report and presentation.

Practical:

total marks: 20

1. Determination of moisture content of different raw ingredients, finished goods and packaging material.

2. Determination of sedimentation value, ash, acid insoluble ash, grittiness, alcoholic acidity, germ oil index of wheat flour.
3. Determination of water insoluble matter in sugar.
4. Determination of salt content of butter.
5. Determination of yeast activity.
6. Study of different equipments used in bakery industry.
7. Preparation of different bakery products-bread, cake, biscuit/cookies, bun, pastries etc.
8. Microbial analysis of bakery products.
9. Visit to a bakery industry.

Internal evaluation;

total marks: 20

Books and references:

1. Bakery 1 student handbook and practical manual published by cbse.
2. Bread: A baker's book of techniques and recipes by Jeffrey Hamelman.
3. A professional Text to bakery and confectionary by John Kingslee
4. Samuel A. Matz, "Bakery Technology and Engineering", Chapman & Hall, 3rd Edition, 1992.
5. "Association of Operative Millers Cereal Millers Hand Book", Burgess Publishing company, USA, 1963.
6. Pomeranz Y, "Modern Cereal science and Technology" MVCH Publications, NY, 1987. 4
7. Kent N.L., Evers A.D, "Technology of Cereals" Pergamon Press, Elsevier Publishers, 1994.
8. Samuel A. Matz, "Equipment for Bakers" Pan Tech International Publication, 1988.
9. Stanley P Cauvain, Linda S Young, "Technology of Bread making", Aspen publication, 2ndEdition, 2007.

Semester III

Qualification Pack: Food Microbiologist

(NSQF level 6)

Paper: FPM-VC-3016- Food Analysis

Total credit: 6

Total marks: 100

Theory:

Total marks: 60

Unit 1

Introduction to food analysis

Proximate principles and analysis of foods, official method of analysis

Unit 2

Sampling techniques

Population and sampling, importance of sampling, types of sampling, sampling plan, preparation of samples, problems in sampling.

Unit 3

Analysis of moisture, carbohydrate and protein

Moisture assay-oven drying method, Karl Fischer titration

Carbohydrate- reducing and non-reducing sugar analysis, starch and crude fibre analysis

Protein- kjeldahl method, Biuret method, Lowry's method

Unit 4

Analysis of fats, vitamin and minerals

Fat – Soxhlet method, Garber method

Analysis of vitamin C

Estimation of minerals by ashing- dry ashing, wet ashing.

Unit 5

Food adulteration

Definition, classification-intentional and incidental, health hazard caused by various adulterants, common adulterants in food and their testing

Practical:**total marks: 20**

1. To test different food samples for adulteration.
2. Proximate analysis of food samples-determination of moisture, ash, protein, fats, crude fibre etc.
3. To find out the amount of total carbohydrate in the given food sample.
4. To estimate the amount of vitamin c in the given sample.
5. Determination of ph and acidity of the given sample.
6. Determination of acid value/peroxide value of the given sample.
7. Determination of saponification value of the given sample.
8. Determination of iodine no of the given sample.

Internal evaluation:**total marks: 20****Books and references:**

1. Kalia, M. Food analysis and quality control, Kalyani publisher, New Delhi, 2002
2. Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett publishers, Boston, London, 2003
3. Sadasivam,S, Manickam,A. Biochemical methods, 2nd edition, New age international (p) limited, New Delhi, 2001
4. Pomeranz, Y. & Mrloan (1978). Food Analysis: Theory and Practice, Westport, connectiant: AVI . Pomeranz, Y. & Mrloan (1978). Food Analysis: Theory and Practice, Westport, connectiant: AVI .

Paper: FPM-VC-3026- Food Quality Assurance

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Definition and introduction to general terms

Quality, quality control, quality assurance, total quality management in food industry.

Unit 2

Introduction to bakery and job role

Overall view of bakery industry, its process line, job description as QA-manager

Unit 3

Introduction to basic mathematics, statistical tool, computer application

Mean, median, mode, ANOVA (one way), working procedure and use of MS-office- word, excel, power point, email writing to communicate with peers and seniors.

Unit 4

Introduction to organization standard

Maintenance and leading of team, profession and personal attribute as QA-manager, organization's policies, statutory and regulatory norms, HACCP, ISO, FSSAI, 4M, 5S, AIB, six sigma, GMP, PCI.

Unit 5

Introduction to different raw material, packaging material, machinery and tools used in bakery industry and their maintenance

Function of materials, testing and maintenance of quality parameter, their storage norms, FIFO, FEFO, sampling-procedure, importance, precaution to be taken, stock maintenance, bin card,

inventory management, different tools and techniques and machinery like mixing, oven, cooling system, packaging machines, instrument handling and their working procedure of laboratory.

Unit 6

Standard Operating Procedures

Preparing scope, quality policy and quality objectives of food processing company, Defining Standard operating procedure – purpose- Format - developing and implementing, effective writing. SOP for purchasing raw materials, receiving raw materials, storage, cleaning, holding, cooling, freezing, personal hygiene, facility and equipments. Systems in laboratory accreditation, GRN making, Invoice making and maintenance

Unit 7

Quality Management Tools

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, Q-score, CQI- score, VQIP (Vendor Quality Index Performance Report)

Unit 8

Pre-requisite program

Good Manufacturing Practices - Personal hygiene – occupational health and safety specification, Food Plant Sanitation Management - Plant facilities construction and maintenance - exterior of the building- interior of the building- equipments. Storage, transportation, traceability, recalling procedures, training, emergency preparedness. PCI activities

Unit 9

Maintenance of work area in a bakery industry

Cleaning, sanitation, different cleaning procedure and precautions, CIP, COP, maintenance and importance of Non routine activity format, waste disposal

Unit 10

HACCP principle

Conduct a hazard analysis, CCP identification, establish critical limits for each CCP, establish CCP monitoring procedures, establish corrective actions procedures, and establish procedures for HACCP verification and validation, documenting the HACCP Program, Implementation of HACCP

Unit 11

Audit Check List

Preparation of HACCP based SOP checklist - personal hygiene, food preparation, mixing, food storage and dry storage, production, training for effectiveness, cleaning and sanitizing, utensils and equipments, large equipments, garbage storage and disposal and pest control

Unit 12

Conducting audit

HACCP for bakery industries, Quality audit, Internal audit, conducting open meeting and close meeting in auditing, preparation of audit reports for different department- audit exercise

Unit 13

Handling customer and complains

Definition- customer, consumer, food chain, types of complains, handling customer, evaluation and solution of problem, report making, CAPA,

Unit 14

General principles for food safety and hygiene

Principles of food safety and quality, food safety system, quality attributes, Good Hygienic Practices, Good Manufacturing Practices, risk analysis, risk management, risk assessment, risk communication, Traceability and authentication, product recall

PRACTICAL:

total marks: 20

1. 5S practice
2. Lab Safety and Quality evaluation of foods
3. Use of Excel- format making
4. Sampling
5. Traceability and product recalling hands on practice.
6. Product development and maintenance of report.

Internal evaluation;

total marks: 20

Books and references

1. Early, R. (1995): Guide to Quality Management Systems for the Food Industry, Blackie, Academic and professional, London.
2. Gould, W.A and Gould, R.W. (1998). Total Quality Assurance for the Food Industries, CTI Publications Inc. Baltimore.
3. Bryan, F.L. (1992): Hazard Analysis Critical Control Point Evaluations A Guide to Identifying Hazards and Assessing Risks Associated with Food Preparation and Storage. World Health Organization, Geneva.
4. Krammer, A. and Twigg, B.A. (1970). Quality Control for the Food Industry. 3rd Edn. AVI, Westport. 5
5. Rekha, S. Singhal, Pushpa R. Kulkarni, Dananesh V. Rege, (1997). Hand Book of Indices of food Quality and Authenticity, wood head Publishing Ltd

Paper: FPM-VC-3036- Food Microbiology

Total credit: 6
Total marks: 100

Theory:

Total marks: 60

Unit 1

Introduction and scope of microbiology

Definition and history of microbiology, contribution of Antony van Leeuwenhoek, Louis Pasteur, Robert Koch, importance and scope of microbiology.

Unit 2

Study of Microscope

Construction and working principles of different types of microscope

Staining techniques

Basic principle of simple and gram staining, simple and gram staining process, mordant and its action, acidic and basic dyes.

Unit 3

Characteristics of microorganisms in food

Types of microorganisms- classification, morphology, structure and their importance in food (bacteria, fungi, virus, yeast etc) Significance of spores

Unit 4

Microbial growth in food

Microbial growth characteristics- bacterial growth curve, Factors affecting the growth of microorganisms in foods

Unit 5

Culture media

Classification and preparation of bacteria, yeast and mold growth medium, serial dilution technique, pure culture, mixed culture, slant culture, broth culture, pour plate, spread plate

and streak plate method of isolation. Thermal inactivation of microbes, Concept, determination and importance of TDT, lethal rate, F, Z and D values

Unit 6

Microbial food spoilage

Sources of microorganisms in foods, some important food spoilage bacteria, spoilage of specific food groups-milk and dairy products, meat, fish and poultry, fruits and vegetables and canned products, cereal and cereal products

Practical:

total marks: 20

1. Construction, operation and uses of laboratory equipments

- a) Autoclave
- b) Hot air oven
- c) Incubator
- d) p^H meter
- e) Centrifuge
- f) Spectrophotometer
- g) Laminar air flow

2. Study of compound microscope.

3. Cleaning and sterilization of glasswares.

4. Preparation of nutrient broth, potato dextrose, nutrient agar media.

5. Pure culture technique. (Pour plate, spread plate and streak plate)

6. Gram staining technique.

7. Microbial examination of different food products.

8. Safety measures in microbiology laboratory.

Internal evaluation:

total marks: 20

Books and references:

1. Frazier, W.C. Food microbiology, 4th edition, McGraw Hill, 2008
2. Khetarpaul, N. Food microbiology, Daya Publishing House, New Delhi, 2009
3. Pelzar, H.J and Rober, D. Microbiology, 5TH edition, McGraw Hill, 2009
4. Prescott,L.M; Harley,J.P and Klein, D.A. Microbiology, 4th edition, 1999
5. James M. Jay (2000). Modern Food Microbiology, 5th Edition, CBS Publishers.
6. Banwart, G.J. (1997). Basic Food Microbiology, CBS Publishers.
7. Adam, M.R. & Moss, M.O. (1995). Food Microbiology, New Age International Pvt. Ltd Publishers.

Semester IV

Qualification Pack: Food Microbiologist

(NSQF level 6)

Paper: FPM-VC-4016- Modern Methods in Food Processing

Total credit: 6

Total marks: 100

Theory:

total marks: 60

Unit 1

Modern processing techniques and products

Fluidized bed drying, freeze drying, ohmic heating, cold sterilization, aseptic packaging, tetra pack, HTST pasteurization, microencapsulation, vacuum processing, edible coatings and films, nanotechnology in food, modern packaging traits, and modern waste management systems in food industries

Unit 2

Modern analytical tools

Food color, Food texture analysis, viscosity of flour and starch paste, food crystallinity, antioxidants in foods, HPLC and other modern chromatographic techniques, calorimetry, electron microscopy, microbiological plating, colony counting, ELISA.

Practical:

total marks: 20

1. Study of fluidized bed dryer.
2. Study of freeze dryer.
3. Study of hunter color I, a, b.
4. Study of texture analyzer.
5. Study of HPLC.
6. Study of Gas chromatography

Internal evaluation:

total marks: 20

Books and references:

1. Pomeranz, Y. & Mrloan (1978). Food Analysis: Theory and Practice, Westport, connectiant: AVI . Pomeranz, Y. & Mrloan (1978). Food Analysis: Theory and Practice, Westport, connectiant: AVI .

Paper: FPM-VC-4026- Basics of Food Engineering

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Material & Energy Balance: - Properties of wet, dry saturated & superheated steam, use of steam tables & Mollier diagram, Numerical problems on material and energy Balance related of food processing.

Thermal Processing: - Microbial inactivation, concept of F, Z & D value, evaluation Of thermal process time for batch sterilization by graphical & formula method, Calculation of process time, continuous flow system, factor affecting rate of heat Penetration, effect of can size on sterility requirement, different types of sterilizers (Batch and continuous type).

Evaporation: - Boiling point elevation. Basic principles of evaporators. Construction And operation. Different types of evaporators used in food industry. Basic concept of multiple effect evaporator.

Unit 2

Drying and Dehydration: Introduction to principles of drying, Equilibrium moisture content, bound and unbound moisture, rate of drying, constant, & falling rate periods, Engg. aspects of different types of driers used in food processing including tray drier, drum drier, fluidized bed drier, spray and freeze drier etc.

Freezing: - Depression of Freezing point, Planks equation and other modified equations for prediction of freezing time, freezing time calculation for a product having uniform temperature (negligible internal resistance), Different types of Freezers like air blast freezer, plate freezer and cryogenic freezer.

Liquid transport system- pipelines and pumps for food processing plants-positive displacement pumps, air-lift pumps, propeller pumps, centrifugal pumps and jet pumps.

Heat exchangers- different types.

PRACTICAL:

total marks: 20

1. Determine the evaporation capacity of an evaporator by material balance.
2. Calculate the specific heat of the given sample.
3. Find the thermal conductivity of the given sample.
4. Determine the viscosity of the given sample.

Internal evaluation;

total marks: 20

Books and references

1. Singh, R.P and and Heldman, D.R. Introduction to food engineering, academic press.
2. Earle, R.L. Unit operations in food processing. 2nd edition.

Paper: FPM-VC-4036- Fermentation Technology

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

History of fermentation, introduction to fermentation process, media formulation and process optimization

Unit 2

Microorganisms used in food fermentation, types of culture, starter culture –maintenance, propagation and cultivation of culture.

Unit 3

Types of fermentation-submerged/solid state fermentation, batch/ continuous fermentation, fermenter design and operation.

Unit 4

Fermented foods – types, methods of manufacture for sauerkraut, tempeh, miso, soya sauce and traditional Indian foods

Practical:

total marks: 20

1. Study of fermenter- design, construction and working principle.
2. Study of different types of fermenter.
3. Preparation of various fermented foods.
4. Preparation of wine.
5. Preparation of sauerkraut.
6. Lactic acid fermentation of milk and vegetables.

Internal evaluation:

total marks: 20

Books and references:

1. Robert W Hutkins. 2006. Microbiology and technology of fermented foods. Wiley-Blackwell
2. Y. H. Hui and E. Ozgul Evranuz. 2012 .Handbook of plant based fermented foods and beverage technology. CRC press

Semester v

Qualification Pack: Production Manager

(NSQF level 7)

Paper: FPM-VE-5016- Industrial Processing of Grains, Pulses and Oilseeds

Total credit: 6

Total marks: 100

Theory:

total marks: 60

Unit 1

Food grain processing

Food grains of worldwide importance, general structures of food grains, principles of milling, products and by products of grain milling, grain based food products, chemistry of different grains affecting product quality, by-product utilization, nutritional factors and anti-nutritional factors in grains, traditional Assamese grain based products, storages and preservation.

Unit 2

Pulse and oilseeds processing

Composition, nutritive value and anti-nutritional factors in pulses and oilseeds, pulse germination and changes, processing of mustard oil seed, protein isolates, soyabean chunks, by-product utilization in oil industry, controlling rancidity in oil, storage and preservation.

Practical:

total marks: 20

1. Physical characteristics of rice- bulk density, true density, porosity, 1000kernel weight
2. Physical characteristics of wheat.
3. Cooking quality of rice- minimum cooking time, elongation ratio, water uptake ratio

Internal evaluation:

total marks: 20

Books and references:

1. Essentials of food science
2. David Dendy A.V. Cereals and cereal products: technology and chemistry- 2000
3. "Association of Operative Millers Cereal Millers Hand Book", Burgess Publishing company, USA, 1963.
4. Pomeranz Y, "Modern Cereal science and Technology" MVCH Publications, NY, 1987. 4

Paper: FPM-VE-5026- Industrial Processing of Animal Products

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Structure, composition and nutritive value of meat, meat types, meat products, abattoir, slaughter methods, rigor mortis and other biochemical changes in carcass meat processing, traditional and modern preservation techniques, meat curing, meat storage.

Unit 2

Marine and fresh water fish, popular fishes, primary processing, minced fish, fish protein isolate, fish liver oil, natural causes of rapid spoilage, fish glazing, other preservation techniques, fermented and non-fermented fish products, fish drying and dried fish products of Assam, storage.

Unit 3

Structure and composition of egg, egg quality evaluation, primary processing, egg white and egg yolk, egg-based products, egg as natural emulsifier, storage.

Unit 4

Co-operative dairy schemes, milk composition and properties, milk micro-flora, detection techniques, collection of milk, homogenization, pasteurization techniques, aseptic packaging, toned and double-toned milk, recombined and reconstituted milk, lactose intolerance.

Unit5

Reconstituted / recombined milks, flavored milks, dahi and yoghurt, paneer, chana, butter, ghee, lassi, toffee, milk powder, ice cream- processing and quality, microbiology and storage, recent developments in dairy industry.

Unit 6

Methods of cleaning and sanitization: Cleaning of production area, equipment, and tools used
Equipment, detergents and sanitizers used in the cleaning and maintenance of the work area,
Properties of the cleaning agents used, CIP method of cleaning,

State the different types of maintenance procedures, Periodic maintenance of all production machineries

Method of managing and disposing waste material • Personal hygiene and sanitation guidelines

Food safety hygiene and quality standards to follow in a work environment, HACCP principles to eliminate food safety hazards in the process and products • Method of documenting and recording the details of raw material to final finished products

Unit 7

Organizational policies and goals, production team, various expertise to achieve production goals, effective communication with the employee , leadership , monthly/weekly/daily production plan, plan details, development of production schedule as per market demands, co-ordination with maintenance and quality.

The Production Function: Objectives of Production Management, Operation Concept, Concepts, Objectives and functions of Production Planning and Control (PPC)

Planning and organization of work: organization standards, process standards and procedures followed in the organization, types of products produced by the organization, Code of business conduct, Dress code.

Personnel Management: Personnel and leadership qualities

Labour: Types of labour, criteria for selection and employees training. Labour laws and legal aspects- health & safety of employees, welfare policies.

Practical:

total marks: 20

1. Estimation of moisture content of meat.
2. Estimation of protein content of meat.
3. Preservation of meat
4. Analysis of microbial spoilage in meat and meat products.
5. Milk reception operation.
6. To perform different platform tests in milk
7. Straining, filtration and clarification of milk.
8. Chilling and storage of milk
9. Standardization of milk.
10. To estimate milk fat by Gerber method.
11. Study of cream separator.
12. Study of can washer.
13. Study of batch pasteurizer and HTST pasteurizer.
14. Preparation of khoa, chana and paneer.

Internal evaluation:

total marks: 20

Books and references:

- 1.** R.A. Lawrie, 1988 Meat Science, Pergamon Press.
- 2.** G.J. Mountney.1995. Poultry Products Technology by Taylor & Francis
- 3.** Parkhurst& Mountney.2012. Poultry Meat and Egg Production.Springer London, Limited, 05-Jul- 2012
- 4.** Food Facts & Principles by Shakuntla Manay N & Shadoksharaswamy N, 1996, New Age world publisher, CA.
- 5.** Egg Science & Technology by Stadelman WJ, & Cotterill OJ, 2002, CBS Publisher, New Delhi.
- 6.** Fish Processing & preservations by Charles L, Cutting
- 7.** Sukumar de; Outlines of dairy technology -oxford university press.
- 8.** Indian dairy products, K.T.Acharya publication
- 9.** Milk hygiene in milk production processing and distribution, FAO Publication.
- 10.** Fluid milk industry, J.S Handerson, A.V.I Publishing Company, USA
- 11.** Milk Hygiene in milk production processing and distribution, F.A.O Publication.

Paper: FPM-VE-5036- Project/ Internship

Total credit: 6
Total marks: 100

Conduct in workplace: A student will undergo either a project supervised by any teacher or industrial internship in the field of their specialization during this semester of the academic year. Evaluation will be done by the department based on the outcome of the project or on feedback received from the industrial management on the student's performance during the tenure.

Report making and verbal presentation:

After completion of the project, the student will prepare a report on his work and experience. Evaluation will be based on the quality of the report and presentation.

Project report + presentation+ viva

100 marks

Semester VI

Qualification Pack: Production Manager

(NSQF level 7)

Paper: FPM-VE-6016- Industrial Processing of Tea, Coffee and Spices

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

General introduction to the plant, types of tea, green tea, black tea, white tea, oolong tea, yellow tea, instant tea, flavored tea, industrial processing techniques, tea fermentation and compounds, quality of tea, health effects, Assam tea, flavor stability, tea bags, storage of tea, innovative tea-based products, tea-wine, *kombucha* etc.

Unit 2

Introduction to coffee, different types, processing, quality analysis.

Unit 3

Introduction, classification, composition and functions. Major international quality specifications of spices. Spice processing, Value added spice products: Spice volatile oils, spice oleoresins

Practical:

total marks: 20

1. Processing of tea leaves.
2. Quality analysis of different spices.
3. Field visit

Internal evaluation:

total marks: 20

Paper: FPM-VE-6026- Food Packaging

Total credit: 6
Total marks: 100

Theory:

total marks: 60

Unit 1

Introduction to food packaging

Definition, functions and requirements for effective packaging, packaging criteria, classification of packaging-primary, secondary and tertiary packaging, Flexible and rigid packaging, Importance of packaging

Unit 2

Materials for food packaging

Paper, glass, tin, aluminium-polymer coated, tin free steel cans, cellophane, plastics-different types of plastics.

Unit 3

Different forms of food containers

Boxes, jar, cans, bottle; Interaction of package with foods; Packaging requirements for various products-fruits and vegetables, meat, fish, milk and dairy products, canned foods, dehydrated foods.

Unit 4

Modern concepts of packaging technology

Aseptic packaging, form-fill seal packaging, edible films, retort pouch packaging, Gas flushing, tetra pack, vacuum packaging, MAP & CAP, active packaging, intelligent packaging.

Unit 5

Food packaging laws and specifications

Quality testing of packaging materials-

Paper and paper board-thickness, bursting strength, tensile strength, puncture resistance

Flexible packaging materials (plastics)-density, tensile strength, WVTR, GTR, seal strength

Practical:**total marks: 20**

1. Study of different packaging materials
2. Determination of water vapor transmission rate of various packaging materials.
3. Demonstration of measurement of carton's dimension as per organizational standard.
4. To determine the thickness of paper and paper board.

Internal evaluation**total marks: 20****Books and references:**

1. Coles,r; dowel, d.m; kirwan,j. food packaging technology. Black well publishing ltd
2. Niir board; food packaging technol;ogy handbook national institute of industrial research , New Delhi
3. PirengerO.G.andA.L.Baver: Plastic Packaging Materials for Food Wiley VCH, GmbH, Germany

Paper: FPM-VE-6036- Project/ Internship

Total credit: 6
Total marks: 100

Conduct in workplace: A student will undergo either a project supervised by any teacher or industrial internship in the field of their specialization during this semester of the academic year. Evaluation will be done by the department based on the outcome of the project or on feedback received from the industrial management on the student's performance during the tenure.

Report making and verbal presentation:

After completion of the project, the student will prepare a report on his work and experience. Evaluation will be based on the quality of the report and presentation.

Project report + presentation+ viva

100 marks

The end