SWAMI VIVEKANAND UNIVERSITY, SAGAR (M.P.)

SYLLABUS

For

Diploma of Technology

(Food Technology engineering)

Course Code : DFTE

Department of Food Technology Engineering

Faculty of Engineering

Duration of Course	:	3 Year
ExaminationMode	:	Semester
Examination System		:Grading

SwamiVivekanandUniversity,SironjaSagar (M.P.)

2017-2018

FOOD MICROBIOLOGY
DFTE-301

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DETAILED CONTENTS

Unit-I

1. Introduction – Definition, structure of cell (prokaryotic and eukaryotic),significance of food microbiology.

Unit-II

2. Bacteria - Structure size and shape; Types depending upon different requirements.Gram positive and negative bacteria; Mode of reproduction. Fungi - Yeast and moulds–structure: their growth requirements, mode of reproduction, its importance.

Unit-III

3. Microbiology of milk and milk products like cheese, curd, butter, Ice-cream, milk powder. Microbiology of meat, fish, poultry and egg products. Microbiology of fruits and vegetable products like jam, jelly, sauce, juice, pickles, Microbiology of cereal and cereal products like bread.

Unit-IV

4. Microbial spoilage of foods – food borne pathogens, food poisoning, foodinfection and intoxication.

Unit-V

5. Anti-microbial agents – physical and chemical agents – their mechanism of action.

RECOMMENDED BOOKS

1. Essentials of Microbiology by KS Bilgrami; CBS
2. Food Microbilogy by WC Frazier; Tata McGraw Hill
3. Modern Food Microbilogy by James M Jay; CBS
4. Bacteriology by Sale
5. Standard Methods for Waste Water Analysis by APHA
6. Basic Food Microbilogy: Bannett , Chapman and Hall
7. Food Microbiology by M.R. Adams
8. Hand Book of Microbiology by Bisen
9. Text Book of Fungi by Sharma

LIST OF PRACTICALS

1. Study of microscope, study of cell and microbiological quality of milk. Study of microbiology of water.
2. Estimation of total microbial bacterial plate count of food sample by directmicroscopic and SPC method
3. Estimation of total microbial count of yeast and mould
4. Estimation of total microbial count of
(a) Milk products (b) fruits and vegetableproducts (c) meat, fish and poultry products (d) water (e) surface (f) air (g)workers (h) canned foods
5. Study of the growth curve of micro-organisms
6. Demonstration of effect of different anti-microbial agent's i.e.
(a) high and lowtemperature (b) UV radiation and (c) chemical preservatives on the growth ofmicrobes

FOOD CHEMISTRY AND NUTRITION
DFTE-302

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DETAILED CONTENTS

Unit-I

1. Importance of food. Scope of food chemistry .

Unit-II

2. Water-Structure of water molecule, types and properties of water, water activity and its Importance. Carbohydrates Basic composition, classification, sources, nutritional and industrial importance,effect of processing and storage. Proteins Basic composition, classification, sources, functional, nutritional and industrialimportance, effect of processing and storage.

Unit-III

3. Lipids -Basic composition, classification, sources, nutritional and industrial importance, effect of processing and storage. Vitamins and MineralsFunction and sources of minerals-calcium, iodine, zinc, iron, floride, fat solubleand water-soluble vitamins, effect of processing and storage on vitamins,Deficiency diseases of vitamins and minerals.

Unit-IV

4. Concept of Balanced Diet. Food PigmentsImportance and classification of pigments (Chlorophyll, Anthocyanin,Carotenoids, lycopene), effect of processing and storage.

Unit-V

5. Enzymes :-Definitions, mode of action, importance sources, nomenclature and classification,effect of processing.

RECOMMENDED BOOKS

1. Essentials of Food and Nutrition by Swaminathan Vol. I and II, Health Kalyani publishers, New Delhi
2. Food Chemistry by LH Meyer, Van Nostrand Reinhold Co. New York **...**
3. Hand book of Analysis of Fruits and Vegetables by S. Ranganna, Tata Me Graw- Hill. Publishing Company, New Delhi 77
4. Biochemistry by Mohinder Singh, Sejwal Publisher. New Delhi
5. Introduction to Biochemistry by Braverman, Elsevier Scientific Publishing
6. Food Chemistry by Linhinger, CBS Publishers, Delhi ...
7. Food Chemistry by FANNEMA,
8. Hand Book of Food & Nutrition by Swaminathan, Narosa Publishing House, New Delhi
9. A Text Book of Biochemistry A.V.S.S. Rama Rao, U B S Publishers, New Delhi
10. A Text Book of Biochemistry A.K.Berry, Narosa Publishing House
11. Nutrition & Dietetics by Joshi, Tata McGraw-Hill Education, New Delhi
12. Clinical Dietetics and Nutrition by Antia& Abraham, Oxford University Press, USA
13. Chemical Changes in Food During Processing by Richardson, John W. Finley ... Avi Publishing Co Inc.
14. Fundamentals of Food & Nutrition by Sumati R. Mudambi, Published by New Age International (P) Ltd.,
15. Nutrition & Dietetics by Rose
16. Food science by Sri Laxmi, New Age International Publishers, New Delhi
17. Food chemistry (Narosa publication) by H.K. Chopra and P.S. Panesar (2010), Published By Morgan & Claypool

LIST OF PRACTICALS

1. Determination of moisture in a given food sample
2. Determination of protein in a given food sample
3. Determination of carbohydrates in a given food sample
4. Determination of ash in a given food sample
5. Determination of crude fat in a given food sample
6. Determination of pH of a given sample
7. Determination of total sugars in a food sample
8. Determination of vitamin C in given food sample
9. Identification of pigments in a given food sample
10. Visit to food industries

PRINCIPLES OF FOOD PROCESSING AND PRESERVATION
DFTE-303

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DETAILED CONTENTS

Unit-I

1. Scope and trends in food industry .Status of Indian food industry with emphasis on State of Punjab. Definition offood – food technology, food science, food preservation and food engineering –basic considerations. Importance of food processing and preservation.Classification of foods on the basis of shelf life, pH, origin; Different types of foodspoilage viz. microbiological, bio-chemical, chemical, physical and their effects onfood quality, principles of food preservation

Unit-II

2. Preservation by Additives Classification, functions and uses in foodsPrinciples of Salt and sugar preservation, Intermediate Moisture Food (IMF)

Unit-III

3. Preservation by Low Temperature Low temperature required for different foods – refrigeration, refrigeration systems;slow and fast freezing, freezing process; types of freezer; advantages andlimitations of freezing; storage and thawing of frozen food

Unit-IV

4. Preservation by High Temperature Pasteurization, Sterilization, Canning: their Definition, Method, advantages andlimitations

Unit-V

5. Moisture Removal Evaporation, concentration, drying and dehydration, types of dryers, advantagesand limitations

RECOMMENDED BOOKS

1. Food Science by NN Potter, CBS publishers, New Delhi
2. Technology of Food Preservation by Desrosier, TheAvi Publishing Company, Inc.,Westport
3. Principles of Food Science Vol. – I by Fennema, Karrel, McGraw-Hill Book Company, New York
4. Preservation of Fruits and Vegetables by GirdhariLal, Sidhapa and Tandon, CBS Publishers, Delhi
5. Hand book of Analysis of Fruits and Vegetables by S Ranganna, Tata Me Graw-Hill. Publishing Company, New Delhi
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6. Fruits and Vegetable Processing by Cruss, Oxford and IBH Publishing Co., New Delhi
7. Food Science by Mudambi, New Age International Pvt Ltd Publishers, New Delhi
8. Basic Food Preparation(Manual)
9. Fruit & Vegetable Processing by Bhatt, Verma, Tata McGraw Hill Publishing Company Limited,. New Delhi
10. Commercial Vegetable Processing by Woodroof, vannostrand Reinhold, New York
11. Preservation of Fruits & Vegetables by IRRI, Oxford & IBH Publishing, New Delhi
12. Food Canning Technology by Larcousse& Brown
13. Food Composition & Preservation by BhawnaSabarwal, Commonwealth Publishers

1999, New Delhi.
14. Food Preservation by S.K. Kulshrestha, vikas publishing house Pvt. Ltd., New Delhi
15. Processing Foods by Oliverra, CRC Press, New York
16. Principles & Practices for the Safe Processing of Foods by Heinz, H J Heinz Company, UK

LIST OF PRACTICALS

1. Study of changes in fruits/vegetables during storage
2. Peeling of fruits and vegetables by using various techniques
3. Preparation of brine and syrup
4. Blanching of fruits and vegetables
5. Study of cans
6. Dehydration of fruits & vegetables
7. Preparation of fruit bars
8. Freezing of seasonal vegetables, meat and fish products
9. Preparation of Jam, Jelly & squash
10. Pickle preparation
11. Storage of frozen products
12. Preparation of sauerkraut
13. Visit to fruits and vegetable industry to see above operations

UNIT OPERATIONS IN FOOD PROCESSING
DFTE-304

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DETAILED CONTENTS

Unit-I

1. Preliminary Unit operationCleaning, sorting & Grading - aims, methods and applications.

Unit-II

2. Conveying and HandlingVarious unit operations in post-harvest handling, study of different conveyingsystems like belt conveyors, chain conveyors, screw conveyors, pneumaticconveyors, vibrating and oscillating conveyors, bucket elevators – their selection,operation and maintenance.

Unit-III

3. Size Reduction and Sieve Analysis .Theory of Comminution; Calculation of energy required during size reduction.Crushing efficiency; Size reduction equipment; Size reduction of fibrous, dry andliquid foods; effects of size reduction on sensory characteristics and nutritive valueof food.

Unit-IV

4. Mixing, Agitating, kneading, blending, homogenization and related equipment.

Unit-V

5. Separation Processes Principles of Filtration, Sedimentation, Crystallization and Distillation andequipment used. Transportation and Storage
- Preparation of fresh produce for transportation/or storage
- Different modes of transportation for fresh and processed foods
- Storage structures like cold stores, bins, silos and godowns – Operation andmaintenance

RECOMMENDED BOOKS

1. Handling, Transportation and Storage of Fruits and Vegetables by A Lloyd, Ryall Penizer (AVI Publications)
2. Proceedings of Regional Workshop on Warehouse Management of Stored Food Grains by Girish and Ashok Kumar (UNDP)
3. Modern Potato and Vegetable Storage by Volkind and Roslov (Amerind)
4. Controlled Atmospheric Storage of Fruits by MettelSkilv
5. Food Grains in Tropical and Sub Tropical Areas by Hall
6. Food Storage Part of a system by Sinha and Muir (AVI)
7. Post Harvest Technology of Fruits and Vegetables – Handling, Processing, Fermentation and Waste Management by LR Verma and VK Joshi; Indus Publishing com., New Delhi
8. Drying and Storage of Grains and Oilseeds by Brooker& Hall, CBS

LIST OF PRACTICALS

1. Sampling techniques of stored foods from different storage structures andconditions
2. Analysis of sampled foods for physical characteristics
3. Determination of critical speed of ball-mill
4. Size reduction and particle size distribution using hammer-mill
5. Steam distillation of herbs
6. Concentration by crystallization
7. Clarification of apple juice using filter press
8. Visit to a public distribution system (PDS) showing storage facilities, warehouse,cold storage, refrigeration system and slaughter house etc
9. Visit to various food industries for demonstration of various unit operations

HANDLING, TRANSPORTATION AND STORAGE OF FOODS
DFTE-305

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DETAILED CONTENTS

Unit-I

1. Introduction Scope and importance of handling, transportation and storage of food and foodproducts.

Unit-II

2. Post-Harvest Changes in Foods – Physiological, chemical, microbiological and Biochemical, Post-harvest losses.

Unit-III

3. Handling, Transportation and Storage Various unit operations of post-harvest handling, transportation, introduction todifferent conveying systems like belt conveyors, chain conveyors, screwconveyors, hydraulic conveyors, pneumatic conveyors, vibrating and oscillatingconveyors, bucket elevators – their selection, operation and maintenance.

Unit-IV

4. Grains Preparation of grains for storage, Storage requirements, mycotoxin and infestation control, handling practices, causes of spoilage and their prevention, factorsaffecting quality of grain during storage and types of storage structures andfacilities.

Unit-V

5. Fruits and Vegetables Handling, transportation and storage, spoilage and prevention. Milk Collection, pre-cooling, handling and transportation systems – their effects onquality of milk. Eggs Candling and grading, packaging, handling, pre-treatment, transportation andstorage.

RECOMMENDED BOOKS

1. Handling, Transportation and Storage of Fruits and Vegetables by A Lloyd, Ryall Penizer (AVI Publications)
2. Proceedings of Regional Workshop on Warehouse Management of Stored Food Grains by Girish and Ashok Kumar (UNDP)
3. Modern Potato and Vegetable Storage by Volkind and Roslov (Amerind)
4. Controlled Atmospheric Storage of Fruits by MettelSkilv
5. Food Grains in Tropical and Sub Tropical Areas by Hall
6. Food Storage Part of a system by Sinha and Muir (AVI)

LIST OF PRACTICALS

1. Sampling of stored food grains in godown (Silo)
2. Analysis of sampled grain for foreign matter like straw parities, rodent excretaand rodents & insects infected grains
3. Demonstration of changes during storage of fresh fruits and vegetables in (a)traditional storage (b) modified atmosphere storage system (c controlledatmosphere
4. Determination of changes in pH in storage of milk
5. Visits to storage facilities like warehouse, cold storage, refrigeration system andslaughter house etc
6. Visit to demonstration of material handling systems in various food industries

TECHNOLOGY OF CEREALS AND PULSES
DFTE-306

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DETAILED CONTENTS

Unit-I

1. IntroductionStatus, production and major growing areas of cereals and pulses in India and World.

Unit-II

2-Structure and chemical composition of cereals and pulses, anti-nutritional factors wherever applicable.

Unit-III

3. Cereals and millets-I:
3.1 Wheat: types of wheat, conditioning and tempering, types of wheat milling technology, pasta and extruded products
3.2 Rice: Varieties of rice, classification of rice based on various physical parameters, parboiling, milling of rice, and factors affecting quality of rice products

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4. Cereals and millets-II:
4.1 Maize: Classification of maize, dry and wet milling of corn, preparation of corn flakes
4.2 Barley and Sorghum: Grain characteristics, technology of malt production, milling, malting and popping of sorghum

Unit-V

5.Pulses Classification of Pulses, Pre-treatment of pulses for milling, milling of major pulses.By-product utilization of different milling industries.

RECOMMENDED BOOKS

1. Cereal Technology by Kent, CBS
2. Wheat Chemistry and Technology by Y Pomeranz, AACC
3. Post Harvest Technology of Cereals pulses and oilseeds by Chakraborty AC, IBH
4. Rice Chemistry and Technology by Julian, AACC
5. Chemistry of Technology of Cereals as Food and Feed by Matz

LIST OF PRACTICALS

1. Determination of physical characteristics of (a) rice (b) wheat (c) pulses (d) maize (e) barley and sorghum
2. Milling of wheat to study its effect on various physico-chemical properties
3. Estimation of flour quality: Gluten, Ash, Water Absorption Power (WAP) Sedimentation Test, Maltose Value, Pelshenke Value
4. Parboiling and milling of rice
5. Pre-treatment and milling of pulses
6. Preparation of Pasta products – Noodles, Macroni, Vermicelli (Sevian)
7. Preparation of ready-to-eat (RTE) food products by extrusion cooking technology
8. Visits to flour mill, Rice Mill/Rice Sheller, Dhal Mill, Malting and Brewing Units

TECHNOLOGY OF MILK AND MILK PRODUCTS
DFTE-401

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DETAILED CONTENTS

Unit-I

1. Introduction – Status and scope of dairy industry in India.

Unit-II

2. Milk Definition of milk, composition, nutritive value of milk, factors affecting composition of milk, types of milk,Physico-chemical properties of milk: Colour, flavour, taste, specific gravity, &density,boiling and freezing point, refractive index, percentage acidity and pH, viscosity,surface tension, thermal conductivity. Basis for pricing of milk.

Unit-III

3. Milk Processing Receiving, Filtration and clarification, straining, standardization Homogenization andits effects, Pasteurization: and various systems of Pasteurization; LTLT, HTST, UHTmethods, Packaging of fluid milk. Coagulated Milk Products Chhanna, paneer, classification and manufacturing of processed cheese.

Unit-IV

4. Cream/Butter/Ghee – Manufacture and storage of butter and ghee .

Unit-V

5. Condensed Milk Types and factors affecting the quality of condensed milk, storage of condensed milk . Milk Powder Methods of drying milk (Drum and Spray drying), factors affecting the quality of milkpowder. packaging of milk powder. Utilization of by products of milk processing industry: skim milk, butter milk,
whey, casein.

RECOMMENDED BOOKS

1. Milk and Milk Products by Eckles and Eckles, Tata *McGraw-Hill Education* Pvt. *Limited*;
2. Outlines of Dairy Technology by Sukmar De, Oxford University Press, India
3. Dairy Plant System and Layout by TufailAshmed, McGraw-Hill Education (India) Pvt Ltd
4. Principles of Dairy Technology by Woarner, Oxford University Press, India
5. Dairy Engineering by Forvall
6. Milk & Milk Products by CBSE, Oxford and IBH *Publishing* Co., New Delhi
7. Chemistry & Testing of Dairy Products by Atherton Newlander, John Alvin *Newlander*

LIST OF PRACTICALS

1. Sampling of milk and conduct platform test of milk
2. Testing efficacy of pasteurized milk
3. Determination of moisture & fat content of milk powder
4. Study of various parts and working of cream separator
5. Preparation of Khoa
6. Detection of adulterants in milk like water, urea, neutralizers, preservatives, sucrose starch
7. Preparation of chhanna and paneer
8. Preparation of ice cream
9. Visits to different dairy plants
10. Determination of fat by Gerber method

TECHNOLOGY OF FRUITS AND VEGETABLE PROCESSING
DFTE-402

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DETAILED CONTENTS

Unit-I

1. Introduction Status and scope of fruits and vegetables industry in India, Introduction to ripening offruits; classification, composition and nutritive value of fruits and vegetables.

Unit-II

2. Preparatory Operations and Related Equipments Cleaning, sorting, grading, peeling and blanching methods.

Unit-III

3. a) Ingredients and processes for the manufacture of:
i) jam, jellies, marmalade, preserves, (ii) pickles and chutneys
b) Defects and factors affecting the quality of above. Tomato Products
Ingredients and their role, process for the manufacture of tomato ketchup, sauce, puree and paste.

Unit-IV

4. Thermal Processing of Fruits and Vegetables
History, definition, various techniques of thermal processing and their effects on the quality of fruits and vegetable products, types of containers and their selection, spoilage of canned foods. a) Dehydration of fruits; equipment and process for dehydration of plums, apricot, apple, fig, grapes peach etc
b) Dehydration of Vegetables: equipment and process for dehydration of peas, cauliflower, potato, methi, mushroom, tomato etc

Unit-V

5. Freezing Freezing process of selected fruits and vegetables: peas, beans, cauliflower, apricot, mushroom – changes during freezing and spoilage of frozen foods. Food Laws and standards for fruits and vegetable products.

RECOMMENDED BOOKS

1. Fruits and Vegetable Preservation by GirdhariLal and Sidappa; ICAR (New Delhi)
2. Preservation of Fruits and Vegetable by Srivastava; IBD Co., Lucknow95
3. Preservation of Fruits and Vegetable by VijayaKhader; Kalyani Publication
4. Post Harvest Technology of Fruits and Vegetables – Handling, Processing, Fermentation and Waste Management y LR Verma and VK Joshi
5. Processing Fruits: Science & Technology vol 1-2 by Somogyi
6. Processing Vegetables: Science & Technology vol 1-2 by Somogyi
7. The Technology of Food Preservation by Desrosier
8. Food Science by Potter
9. Food Science by Mudambi
10. Basic Food Preparation(Manual)
11. Fruit & Vegetable Processing by Bhatt, Verma
12. Commercial Vegetable Processing by Woodroof
13. Preservation of Fruits & Vegetables by IRRI
14. Food Canning Technology by Larcousse& Brown
15. Food Composition & Preservation by BhawnaSabarwal
16. Food Preservation by S.K. Kulshrestha

LIST OF PRACTICALS

1. Orientation to different processing equipments, their functions and uses
2. Preparation of jam, jelly and preserve
3. Preparation of pickle by various methods
4. Preparation of chutney
5. Preparation of tomato sauce/ketchup
6. Preparation of tomato puree/paste
7. Extraction of juice by various methods
8. Bottling and processing of fruit juice
9. Preparation of syrup and brine solutions
10. Dehydration of peas, potatoes
11. Dehydration of grapes and apples
12. Freezing of peas
13. Preparation of tomato powder
14. Visits to different fruit and vegetable processing industries

TECHNOLOGY OF MEAT, FISH AND POULTRY PRODUCTS
DFTE-403

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DETAILED CONTENTS

Unit-I

1. Introduction to Indian meat, fish and poultry industry . Preparatory operations of meat and meant productsComposition of muscle, Different types of slaughtering methods, Different types ofmeat, Anti-mortem and post-mortem inspection of animal/and slaughtered animal,Abattoir – Definition and construction; basic preparatory procedures (culmination,emulsification, pre-blending) Cured and smoked meats, sausage products –classification, processing steps, and canned meat, meat pickles.

Unit-II

2. Handling and Dressing of Poultry Inspection of poultry birds, dressing and preparation of ready to cook poultry, factorsaffecting the quality.

Unit-III

3. Egg and Egg Products Structure, chemical composition and nutritive value, spoilage of eggs and preservationof whole egg and egg products, preparation of egg powder. Fish and Fish Products Types of fish, composition and nutritive value, judging the freshness of fish, fishgrading and cooking of fish, smoking, pickling, salting and dehydration, preservation offish and processed fish products.

Unit-IV

4. Traditional Meat Products–Tikkas and Kabab (seekh, boti, glauti, pathar)

Unit-V

5. Frozen Storage of fresh and processed meat, poultry and fish.

RECOMMENDED BOOKS

1. Meat Science by Lawrie, Heinemann Educational *Books* Ltd., London
2. Egg Science and Technology by Mountney, AVI *Publish* co.,. Westport
3. Egg Science and Technology by PC Pande, Vikas*Publishing* House (P) Ltd, New Delhi
4. Fish Processing and Preservation by CL Cutting (Agro Botanical Publisher)
5. Poultry, Meat and Egg Products by Parkursht and Mountney (CBS Publishers)
6. Fish and Fish Products by AL Winton, Hill *Book* Company U.K.
7. The Canning of Fish and Meat by RJ Footill and AS Lewis (Blackie Publishers)
8. Processed Meat by Pearson and Glite (CBS Publishers)
9. Fermented Meat by Campbell Platt and PE Cook (Blackie Publishers)
10. Fish Processing Technology by GM Hall (Blackie Publishers)
11. Introduction to Fish Technology by JM Regenstein and CE Regusten (CBS Publishers)

LIST OF PRACTICALS

1. Preparation of different types of meat products and their quality evaluation
2. Cutting of meat
3. Preparation of sausages
4. Calculation of shape and size index of egg
5. Preparation of ready to cook poultry
6. Retail cuts of dressed chicken
7. Calculation of Haugh unit of egg
8. Measurement of air cell of egg
9. Determination of effect of temperature on coagulation of egg protein
10. Determination of moisture and solid content of different egg constituents
11. Determination of specific gravity of eggs
12. Preparation of egg powder
13. Preparation of fish, meat and egg pickle
14. Candling and grading of eggs
15. Preservation of whole egg
16. Visit to slaughter houses and abattoir
17. Demonstration of filleting &steaking of fish

COMPUTER APPLICATIONS IN FOOD TECHNOLOGY
DFTE-404

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DETAILED CONTENTS

Unit-I

1. Introduction-
1.1. Introduction to computer and related hardware used in food industry(Touch Screens, Hand Held Devices, Palm Tops, Barcode Printers andScanners, RFID Tags, etc.)
1.2. Introduction to various softwares for their application in food technology
(like SAP, justFoodERP, FoodWorks, SERVE, etc.) with relevant casestudies.

Unit-II

2. Application of MS Excel (latest version) to solve the problems of Food Technology
2.1. MS Excel Basics
2.1.1. Introduction to different menus and commands commonly used in solving problems
2.1.2. Use of Add-In Tools like MegaStat, etc. for statistical data analysis.

Unit-III

3. Application of MS Excel to solve the problems of Food Technology
3.1 Chemical kinetics in food processing
3.1.1. Determining rate constant of zero order reaction
3.1.2. First order rate constant and half-life of reactions
3.2 Microbial destruction in thermal processing of foods
3.2.1 Determining decimal reduction time from microbial survival data
3.3 Statistical quality control in food processing
3.3.1 Control Charts
3.4 Sensory evaluation of foods
3.4.1 Statistical descriptors of a population estimated from sensory data obtained for a sample
3.5 Mechanical transport of liquid foods
3.5.1 Measuring viscosity of liquid foods using a capillary tube viscometer
3.6 Steady state heat transfer in food processing
3.6.1 Reducing heat transfer through a wall using insulation
3.7 Transient heat transfer in food processing
3.7.1 Predicting temperature in a liquid food heated in a steam-jacketed kettle
3.8 Refrigeration, freezing and cold chain
3.8.1 Pressure-temperature relations for ammonia used as a refrigerant in a vapor compression refrigeration system
3.8.2 Loss of quality in the cold chain

Unit-IV

4 Familiarization with the application of computer in some common food industries, (like milk plant, bakery, fruit and vegetable processing, etc.) starting from the receiving of raw material up to the storage and dispatch of finished product with relevant case studies.

Unit-V

5 Basic Introduction to CAD (Computer Aided Designing), CAM (Computer Aided Manufacturing), CIM (Computer Integrated Manufacturing) and CAE (Computer Aided/ Assisted Engineering) and application of different softwares (like AutoCAD, Pro-E, Google Sketchup, etc.) in the same.

RECOMMENDED BOOKS

1. Computer Applications in Food Technology: Use of Spreadsheets in Graphical, Statistical and Process Analysis by R. Paul Singh, AP.
2. Computer Applications in Food Technology by VedpalYadav, i-proclaim.com.
3. Statistical Quality Control for the Food Industry by Merton R. Hubbard (Kluwer Academic)
4. MS Excel Video Tutorials on http://www.youtube.com (Recommended channel is ExcelIsFun).
5. MS Excel for Dummies.
6. Manuals of MS office

PRINCIPLES OF FOOD ENGINEERING
DFTE-405

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DETAILED CONTENTS

Unit-I

1. Introduction
Units of measurement and their conversion, Physical properties like colour, size, shape, density, specific gravity, thousand grain, weight/bulk density, porosity, Rheological properties of food materials and their importance, Thermal conductivity, specific heat, thermal diffusivity and other physical properties of foods

Unit-II

2. Materials and energy Balance Basic principles, total mass & component mass balance, system boundaries, materialbalance calculations, principle of energy balance, Heat, Enthalpy, calculations of specificheat.

Unit-III

3. Heat and Mass Transfer during food processing – Modes of heat transfer i.e. conduction, convection and radiation. Different heat exchangers. Principle of mass transfer, diffusion.

Unit-IV

4. Thermal Processing of Foods Selection, operation and periodical maintenance of equipmentsused in food industry viz.pasteurizer, autoclave, heat exchangers, evaporators, driers, boilers etc.

Unit-V

5. Psychrometry Principle of psychrometry and its application.

RECOMMENDED BOOKS

1. Post Harvest Technology of Cereal, Pulse and Oil Seeds by Chakraborty, AC, CBS *Publishers*, Delhi.
2. Unit Operations in Agriculture Processing by Singh and Sahay, Vikas*Publishing* House (P) Ltd, New Delhi
3. Fundamentals of Food Engineering by Brennen, AVI *Publishing* Co., Westport
4. Fundamentals of Food Processing Engineering by Romeo T Toledo, AVI *Publishing* Co., Westport,
5. Agricultural Process Engineering by Henderson and Perry, John Wiley and Sons, Inc., New York
6. Transfer Processes and Unit Operation by CJ GeanKoplis, McGraw-Hill *Book* Co., New York.
7. Physical Properties of Plants and Animal Materials by NK Mohsenin, Gordon and Breach Science *Publishers*, New York, USA
8. Principles of Food Engineering by TE Charm, McGraw-Hill *Book* Co., New York.
9. Introduction to Food Engineering by Singh RP and DR Heldmann, McGraw Hill *Book* Co., New York.
10. Unit Observation in Chemical Engineering by McCabe, Smith and others, McMillan *publishing*compony, Newyork

BAKERY AND CONFECTIONERY TECHNOLOGY
DFTE-406

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DETAILED CONTENTS

Unit-I

1. Introduction – Status of Bakery industry in India.

Unit-II

2. Raw Materials for Bakery Products Flour, sugar, shortening, yeast, salt etc as raw material for bakery products, their role andPFA specifications of these raw materials

Unit-III

3. Manufacturing of Bakery Products Different types of bread and preparation of bread using different methods, qualityevaluation of bread, staling of bread.Different types of biscuits and preparation of biscuits using different methods, qualityevaluation of biscuits
Different types of cakes and pastries, preparation of cakes and pastries using different methods, quality evaluation of cakes, different types of toppingsPreparation of other bakery products: rusks, crackers, buns, puffs, muffins and pizzaTypes of Additives used in bakery products

Unit-IV

4. Confectionery Products Introduction, classification of confectionery products, confectionery ingredients likestarch, fats, colours, flavours additives. Brief account of sweeteners like Gur, refinedsugar, beet sugar, white sugar and liquid sweeteners like Molasses, corn syrup, high fructose syrup, maple syrup. Reaction of sugar like caramelization, hydrolysis sand crystallization, sugar boiled, chocolate and Indian compectionary

Unit-V

5. Layout out, setting up of units and hygienic conditions required in bakery plant, operation and maintenance of bakery equipment.

RECOMMENDED BOOKS

1. Bakery Engineering and Technology, Vol. I and II by Matz; CBS
2. Bakery Products Published by SIRI
3. Cereal Technology by Kent; CBS
4. Wheat Chemistry and Technology by Y Pomeranz
5. Basic Baking by SC Dubey
6. Practical Baking by William Sultan Vol. I and II
7. Practical Handbook of Bakery by US Wheat Associates

LIST OF PRACTICALS

1. Quality analysis of raw materials used in bakery and confectionery industry according to PFA standards
2. Preparation and evaluation of bakery and confectionery products:
a) Bread
b) Cakes
c) Biscuits
d) Buns
e) Doughnuts
f) Puffs
g) Kulchas
h) Pizza base
i) Ginger candy
3. Study and analysis of the production charts used for different products by bakery industries
4. Visits to bakery and confectionery industry

TECHNOLOGY OF BEVERAGES
DFTE-501

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DETAILED CONTENTS

Unit-I

1. Introduction Status and scope of beverage industry in India, Classification of beverages andtheir nutritional significance.

Unit-II

2. Bottled Water Water treatment before its utilization in beverages, Mineral water, bottled water,Quality standards of water.

Unit-III

3. Technology of Carbonated and Non-Alcoholic Beverages Definition of soft drinks, different ingredients for soft drinks and their functions,methods of preparation, related equipments and machinery.

Unit-IV

4. Tea and Coffee Processing Types, nutritional significance, methods and processing of tea and coffee, relatedequipment and machinery.

Unit-V

5. Alcoholic Beverages Ingredients and their role in beer and wine preparation, methods of manufacturingof Wine, Beer, Scotch, Whiskey, Brandy, Rum, Vodka and Gin; related Equipment.

RECOMMENDED BOOKS:

1. Potter and Hotchkisn Food Science CBI publication
2. Ashurst Chemistry and Technology of Sheffield Academic Press
3. Soft Drinks and Fruit Juices
4. Varnam and Sutherland Beverages- Technology, Chemistry ASPEN
5. and Microbiology

LIST OF PRACTICALS

1. Determination of Important Potable Water Quality Parameters
2. Preparation of carbonated beverages and their evaluation
3. Preparation of Tea and coffee decoction
4. Determination of quality of Tea based on chemical indices (TF/TR ratio)
5. Preparation of Ready To Serve beverages (RTS beverages) including cold coffee and iced tea
6. Determination of CO_2 level in carbonated beverages
7. Preparation of different Wines
8. Preparation of flavoured milk, lassi, butter-milk, soya milk and kanji etc.
9. Visit to carbonated and non-carbonated beverage/brewery/winery/distillery industry

SPICES, HERBS, CONDIMENTS AND FOOD FLAVOURS
DFTE-502

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3 1 2

DETAILED CONTENTS

Unit-I

1. Importance and role of spices, herbs and plantation products in food processing and food products.

Unit-II

2. Classification and properties of spices, herbs and plantation products – their products, including health benefits and medicinal properties.

Unit-III

3. Cleaning, grading, milling, blending, formulating and packaging of spices and spice mixes.

Unit-IV

4. Uses of spices and herbs-
Processing of major spices: ginger, pepper, turmeric, galangal
Minor spices: clove, nutmeg cardamom
Leafy spices: bay oregano, basil (tulsi), mint, thyme and curry leaves
Seed spices: fenugreek, mustard, sesame (til), garlic, dill
Common aromatic herbs and their uses: basil (tulsi), mint, turmeric, curry leaves, lemon grass, stevia etc.

Unit-V

5. Food Flavours: Natural, Nature identical and Synthetic flovours; Browning Reactions.

RECOMMENDED BOOKS

1. Medicinal Plants by NS Chauhan
2. Spices and Condiments by JS Pruthy
3. Food and Beverage Service by Dennis & Lilly Crap
4. Other relevant sources of information on Internet

LIST OF PRACTICALS

1. Demonstration of process of essential oil extraction and oleoresin of different spices
2. Study of detection of adulteration in spices
3. Study of constituents and sensory characteristics of essential oils and oleoresins
4. Demonstration of actual processing of different spices, herbs and plantation products
5. Practicals related to: cleaning, grading, milling, blending, formulating and preparing of spices and spice mixes.
6. Visit to relevant industries

INSTRUMENTATION AND PROCESS CONTROL
DFTE-503

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3 1 2

DETAILED CONTENTS

Unit-I

1. Introduction Importance of instruments in process industries. Classification of instruments, static and dynamic characteristics of instrument.

Unit-II

2. Instruments for Temperature Measurement Thermometer, thermocouple, thermister and pyrometer, application and working.

Unit-III

3. Instruments for pressure Measurement Use of Manometers, Bourdon gauge, measurement of vacuum and pressure.Liquid level measurement-Direct and differential method.

Unit-IV

4. Flow Measurements and calibration with orifice, venturi meter, rotameter, pitot tube

Unit-V

5. Instruments for Miscellaneous Measurements Measurement of viscosity, conductivity, humidity and pH value, TSS, industrialweighing systems.

RECOMMENDED BOOKS

1. Process Control by Harriott and Peter Process system Analysis and Control of Coughanour; McGraw Hill
2. Industrial Instrumentation by Eckman; Wiley Eastern

LIST OF PRACTICALS

1. Measurement of temperature using mercury in glass thermometer
2. Calibration and measurement of temperature using different kinds of Thermocouple
3. Measurement of viscosity of a fluid using viscometer
4. Measurement of the vacuum using pressure gauge
5. Measurement of the pressure using manometer
6. Measurement of static & dynamic characteristics of Bourdon gauge.
7. Measurement of the liquid level using the direct and differential method.
8. Measurement of TSS
9. Measurement of physical parameters of food
10. Visit to industrial unit

TECHNOLOGY OF OILS & FATS
DFTE-504

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3 - 2

DETAILED CONTENTS

Unit-I

1. Introduction Oils and Fats, sources, composition, physico-chemical properties and their functions (Tenderness,Texture, Flavor and Emulsion).

Unit-II

2. Nutritional importance of oils and fats . Extraction and refining of oils and fats Pretreatment, rendering, extraction methods, refining, bleaching, hydrogenation, fractionation, deodorizing, plasticizing, packaging.

Unit-III

3. Production and processing of animal fats
- Butter and ghee
- Margarine
- Lard
- Fish oil

Unit-IV

4. Production and processing of vegetable oils
- Soya bean oil
- Mustard oil
- Groundnut oil
- Sunflower oil
- Olive Balm and coconut oil

Unit-V

5. Blending and fortification of oils

RECOMMENDED BOOKS

1. Food Science: Norman. N. Potter CBS Publication, *CBS* Publishers and distributors Pvt. Ltd, New Delhi
2. Food Oils & Fats: Lawson Harry-CBS Publication, *CBS* Publishers and distributors Pvt. Ltd, New Delhi
3. Food Oils & Fats: Bailey Publication, Oxford & IBH *Publishing* Co., New Delhi
4. Bailey's Industrial Oil and Fat Products by Daniel Swern, Interscience*Publishers,* New York
5. The Chemical Analysis of Food and Food Products by Jacobs, Morris B *Jacobs Publisher*: New York,
6. A First Course in Food Analysis by A.K. Sathe, New Age Publications, New Delhi
7. Standards for Fats & Oils by Lawson, AVI *Publishing* Company, Westport.

LIST OF PRACTICALS

1. To determine the smoke point, flash point and fire point of given sample
2. To determine the acid value of given sample
3. To determine the iodine value of given sample
4. To determine the saponification value of given sample
5. Determination of rancidity of given sample
6. To determine the melting point of given sample
7. To determine the fat content of a given sample
8. Detection of adulteration in fats/oils
9. Visit to oil processing industry

GENERIC SKILLS AND ENTREPRENEURSHIP DEVELOPMENT
DFTE-505

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DETAILED CONTENTS

Unit-I

1. Introduction to Generic Skills
1.1 Importance of Generic Skill Development (GSD)
1.2 Global and Local Scenario of GSD
1.3 Life Long Learning (LLL) and associated importance of GSD.

Unit-II

2. Managing Self
2.1 Knowing Self for Self Development: Self-concept, personality, traits, multiple intelligence such as language intelligence, numerical intelligence, psychological intelligence etc.
2.2 Managing Self – Physical: Personal grooming, Health, Hygiene, Time Management
2.3 Managing Self – Intellectual development, Information Search: Sources of information, Listening: Effective Listening, Speaking: Effective Oral Communication, Reading: Purpose of reading, different styles of reading, techniques of systematic reading; Note Taking: Importance and techniques of note taking
Writing: Correspondence - personal and business
2.4 Managing Self – Psychological: Stress, Emotions, Anxiety-concepts and significance (Exercises related to stress management), Techniques to manage the above

Unit-III

3. Managing in Team
3.1 Team - definition, hierarchy, team dynamics
3.2 Team related skills- sympathy, empathy, co-operation, and concern, lead and negotiate, work well with people from culturally diverse background
3.3 Communication in group - conversation and listening skills

Unit-IV

4. Problem Solving
4.1 Prerequisites of problem solving- meaningful learning, ability to apply knowledge in problem solving
4.2 Different approaches for problem solving.
4.3 Steps followed in problem solving.
4.4 Exercises/case studies on problem solving.

Unit-V

5. Entrepreneurship
5.1 Introduction: Concept/Meaning and its need, Competencies/qualities of an entrepreneur, Entrepreneurial Support System e.g., District Industry Centres (DICs), Commercial Banks, State Financial Corporations, Small Industries Service Institute (SISIs), Small Industries Development Bank of India (SIDBI), National Bank of Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State/National level.
5.2 Market Survey and Opportunity Identification (Business Planning)

How to start a small scale industry, Procedures for registration of small-scale industry, List of items reserved for exclusive manufacture in small-scaleindustry, Assessment of demand and supply in potential areas of growth, Understanding business opportunity, Considerations in product selection, Data collection for setting up small ventures.
5.3 Project Report Preparation: Preliminary Project Report, Techno-Economic Feasibility Report, and Exercises on Preparation of Project Report in a group of students

RECOMMENDED BOOKS

1. Soft Skills for Interpersonal Communication by S.Balasubramaniam; Published by Orient BlackSwan, New Delhi
2. Generic skill Development Manual, MSBTE, Mumbai.
3. Lifelong learning, Policy Brief (www.oecd.orf)
4. Lifelong learning in Global Knowledge Economy, Challenge for Developing Countries – World Bank Publication
5. towards Knowledge Society, UNESCO Paris Publication
6. Your Personal Pinnacle of Success by DD Sharma, Sultan Chand and Sons, New Delhi
7. Human Learning, Ormrod
8. A Handbook of Entrepreneurship, Edited by BSRathore and Dr JS Saini; AapgaPublications, Panchkula (Haryana)
9. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
10. Handbook of Small Scale Industry by PM Bhandari

MINOR PROJECT
DFTE-506

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DETAILED CONTENTS OF PRACTICAL

Towards the end of second year, after completion of course work, the students should be sent to food processing and preservation industries for project oriented professional training. The purpose of this training is:
1. To develop understanding of various field activities in which students are going to play a role as food technologists after completing diploma programme
2. To develop understanding of subject based knowledge given in the class room in the context of its application at work places
3. To gain first-hand experience and confidence amongst the students to enable them to use and apply knowledge and skills to solve practical problems in the field
4. Development of special skills and abilities like interpersonal skills communication skills, attitudes and values For the fulfillment of above objectives, polytechnic(s) offering diploma course in food technology may establish close linkages with 8 – 10 food processing and preservation industries/organizations. The industries/organizations may be contacted by the teachers and students for project oriented and professional training of students during third year.
The practical industrial training has to be well planned, structured and supervised by polytechnic teachers clearly specifying complete schedule of the students on day to day basis for whole of their training period. Proformamay be prepared by polytechnics related to the concerned industries to access daily, weekly and monthly progress of the students and the students must be asked to fill these proformas regularly duly signed by them and countersigned by personnel from industry and concerned teacher attached to a particular student. Each teacher is supposed to supervise and guide 4 to 6 students.
Following schedule, as a sample, is proposed for the training

Familiarization and Training about Various Food Processing Operations
Students should be familiarized with various materials, principles and operations involved in processing of different types of food used for different purposes

Specific Task
Students should be given specific task related to following:
- Complete flow chart and plant layout for food-processing unit
- Preparation and preservation of food products, including raw material identification, testing and processing
- Hygiene and sanitation for a food processing and preservation unit
- Fault diagnosis and rectification

RECOMMENDED BOOKS
1. Food Preservation by SK Kulshrestta, Vikas Publishing House, New Delhi
2. Fundamentals of Food and Nutrition by Sumati R. Mudambi& MV Rajagolap, New Age International Pvt. Ltd. New Delhi
3. Food Processing and Preservation by Bibliography Sivasankar, Prentice Hall of India Pvt. Ltd., New Delhi
4. Managing Food Processing Industries in India by U.K. Srivastva
5. Hand Book of Entrepreneurship by B.S. Rathore, Oxford & IBH *Publishing* Co., New Delhi

6. Microbiological Safety of Processed Foods by Crowther, Vikas*Publishing* House, New Delhi.
7. Food Poisoning & Food Hygiene by Hobbs
8. Drying & Storage of Grains & Oilseeds by Brodoker
9. Fundamentals of Food Process Engg. By Toledo, AVI *Publishing* Co., Westport
10. Chocolate, Cocoa & Confectionery by Minifie, AVI *Publishing* Co., Westport
11. Safe Food Handling by M. Jacob, Hemisphere *Publishing* Corporation, New York
12. Food & Beverage Service by Andrews, Heinemann Educational *Books* Ltd., London.
13. The Science of Cookie & Cracker Production by Faridi, CBS *Publishers* & Distributors, New Delhi
14. Snack Foodby Booth, *Publishers* ISBN, New Delhi
15. Food Additives by Mahindru, .A.P.H. *Publishers, New Delhi*
16. Dough Rheology & Baked Product Texture by Faridi, CBS *Publishers* &Distributor, New Delhi

FOOD PACKAGING TECHNOLOGY
DFTE-601

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DETAILED CONTENTS

Unit-I

1. Introduction,Definition, importance and scope of packaging of foods.

Unit-II

2. Packaging Materials Origin of packaging materials, types, properties, advantages & limitations ofpackaging materials.

Unit-III

3. Brief Introduction to WVTR, GTR, bursting strength, tensile strength, tearing strength, drop test,puncture test, impact test etc.

Unit-IV

4. Packaging Requirements and their selection for raw and processed foods
4.1 Meat, fish, poultry, eggs
4.2 Milk and dairy products
4.3 Fruits and vegetables
4.4 Cereal grains and baked food products
4.5 Beverages
4.6 Snacks

Unit-V

5. Packaging Machinery Bottling, can former, form fill and seal machines, bags – their manufacturing andclosing, vacuum packs unit, shrink pack unit, tetra pack unit and retort pouchingunit. Package labeling – functions and regulations.

RECOMMENDED BOOKS

1. Handbook of Packaging by Paine and Paine; Morgan-Grampian *Publishing* Co., New York (1976).
2. Manual of Analyzing for Fruits and Vegetables Products by S Ranganna; CBS *Publishers* &Disttributor, New Delhi.

LIST OF PRACTICALS

1. Identification of different types of packaging and packaging materials
2. Determination of tensile strength of given material
3. To perform different destructive tests for glass containers
4. To perform non-destructive tests for glass containers such as physical examination
5. Determination of wax weight
6. Determination of tearing strength of paper
7. Measurement of thickness of packaging materials
8. To perform grease-resistance test in plastic pouches
9. Determination of bursting strength of packaging material
10. Determination of water-vapour transmission rate for paper
11. Testing of chemical resistance of packaging materials
12. Determination of drop test of food package
13. Visit to relevant industries

FOOD ANALYSIS, SAFETY AND QUALITY CONTROL
DFTE-602

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DETAILED CONTENTS

Unit-I

1. Introduction
1.1. Principle behind different methods of proximate analysis of:
1.1.1. Moisture
1.1.2. Ash
1.1.3. Crude Fat
1.1.4. Crude Protein
1.1.5. Crude Fibre
1.1.6. Total Carbohydrates
1.2. Concept, objectives and need of
1.2.1. Quality,
1.2.2. Quality control and
1.2.3. Quality assurance
1.2.4. TQM (Total Quality Management) and
1.2.5. TQC (Total Quality Control),
1.2.6. Plan and methods of quality control

Unit-II

2. Sampling
2.1. Definition of sampling,
2.2. Purpose,
2.3. Sampling techniques requirements

Unit-III

3. Physicochemical and mechanical properties
3.1. Colour,
3.2. Gloss,
3.3. Flavour,
3.4. Consistency,
3.5. Viscosity,
3.6. Texture and their relationship with food quality

Unit-IV

4. Sensory quality control
4.1. Definition,
4.2. Objectives,
4.3. Panel selection and their training,
4.4. Subjective and objective methods,
4.5. Interpretation of sensory results in statistical quality control,
4.6. Consumer preferences and acceptance

Unit-V

5. Food Laws and Regulations in India
5.1. Objectives,
5.2. Requirements and
5.3. Benefits of food grades and
5.4. Agencies and standards
5.4.1. BIS (Bureau of Indian Standards),
5.4.2. AGMARK (Agricultural Marketing Board),
5.4.3. PFA (Prevention of Food Adulteration Act),
5.4.4. FSSA (Food Safety and Standards Act),
5.4.5. FPO (Fruit Products Order),
5.4.6. MFPO (Meat Food Product Order)
5.4.7. MoFPI (Ministry of Food Processing Industries)
5.4.8. ISO (International Organisation for Standardization)
5.4.9. CAC (Codex Alimantarious Commission)

RECOMMENDED BOOKS

1. Food Analysis by Suzzane Nielsen
2. ISI Handbook of Food Analysis- (18 Volumes in 5 parts)- BIS
3. AOAC- 18th Edition- (CD ROM Edition)
4. Hand Book of Analysis of Fruits and Vegetables by S Ranganna (THM)
5. Food Analysis Theory and Practices by Pomeranz and Meloan (AVI)
6. Quality Control for the Food Industry (Vol. I and II) by Kramer and Twigg (AVI)
7. Laboratory Methods of Sensory Evaluation by Larmond
8. Sensory Analysis by Piggot
9. Hand Book of Food Analysis by S.N. Mahindru

LIST OF PRACTICALS

1. Proximate analysis of marketed food products
1.1. Moisture
1.2. Ash
1.3. Crude Fat
1.4. Crude Protein
1.5. Crude Fibre
1.6. Total Carbohydrates
2. Detection of adulterants/non-permitted food additives in food products viz.
2.1. Milk,
2.2. Ghee,
2.3. Honey,
2.4. Spices,
2.5. Pulses,
2.6. Oils,
2.7. Sweets, etc.
3. Test of sensory evaluation
3.1. Hedonic scale
3.2. Duo-trio test
3.3. Ranking difference
3.4. Triangle test
4. Detection of basic tastes and their threshold values
5. Consumer acceptability trial
6. Statistical analysis of sensory data
7. Visits to the quality control laboratories of the food industry, educationalinstitutions and testing centres

WASTE MANAGEMENT IN FOOD INDUSTRY
DFTE-603

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DETAILED CONTENTS

Unit-I

1. Introduction .Types of waste and magnitude of waste generation in different food processingindustries; concept scope and maintenance of waste management and effluent treatment

Unit-II

2. Waste Characterization Temperature, pH, Oxygen demands (BOD, COD, TOD), fat, oil and greasecontent, metal content, forms of phosphorous and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicides residues

Unit-III

3. Environmental protection act and specifications for effluent of different food Industries.

Unit-IV

4. By-products and Waste utilization

Unit-V

5. Effluent Treatment.
5.1 Pre-treatment of waste: sedimentation, coagulation, flocculation and floatation
5.2 Secondary treatments: Biological oxidation – trickling filters, oxidation ditches, activated sludge process, rotating biological contractors, lagoons
5.3 Tertiary treatments: Advanced waste water treatment process-sand, coal and activated carbon filters, phosphorous, sulphur, nitrogen and heavy metals removal.

RECOMMENDED BOOKS

1. Food Processing Work Management by Green and Krammer; CBS Publication
2. Principles of Food Sanitation by Mariett NG; CBS Publication

LIST OF PRACTICALS

1. Waste characterization: (a) temperature (b) pH (c) solids content (d) turbidity (e) BOD (f) COD
2. Visit to effluent treatment plant attached with food industry and city
3. To estimate residual chlorine
4. Evaluation effect of lime treatment on waste water in respects of BOD, COD, solids content, phosphate content
5. Visits to various industries using waste and food by-products
6. Visit to Biogas plant and vermin-culture centre

BASICS OF MANAGEMENT
DFTE-604

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DETAILED CONTENTS

Unit-I

1. Principles of Management
1.1. Introduction, definition and importance of management.
1.2. Functions of Management
Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling
1.3. Concept and Structure of an organization
Types of industrial organization
a) Line organization
b) Functional organization
c) Line and Functional organization
1.4. Hierarchical Management Structure
Top, middle and lower level management
1.5. Departmentalization
Introduction and its advantages.

Unit-II

2. Work Culture
2.1. Introduction and importance of Healthy Work Culture in organization
2.2. Components of Culture
2.3. Importance of attitude, values and behaviour
Behavioural Science – Individual and group behaviour
139
2.4. Professional ethics – Concept and need of Professional Ethics

Unit-III

3. Leadership and Motivation
3.1. Leadership
a) Definition and Need of Leadership
b) Qualities of a good leader
c) Manager vs. leader
3.2. Motivation
a) Definition and characteristics of motivation
b) Factors affecting motivation
c) Maslow's Need Hierarchy Theory of Motivation
3.3. Job Satisfaction

Unit-IV

4. Legal Aspects of Business: Introduction and need
4.1. Labour Welfare Schemes
a) Wage payment Definition and types
b) Incentives: Definition, need and types
4.2. Factory Act 1948
4.3. Minimum Wages Act 1948

Unit-V

5. Management Scope in different Areas
5.1. Human Resource Development
a) Introduction and objective
b) Manpower Planning, recruitment and selection
c) Performance appraisal methods
5.2. Material and Store Management
a) Introduction, functions and objectives of material management
b) Purchasing: definition and procedure
c) Just in time (JIT)
5.3. Marketing and Sales
a) Introduction, importance and its functions
b) Difference between marketing and selling
c) Advertisement- print media and electronic media
d) Market-Survey and Sales promotion.
5.4. Financial Management – Introduction
a) Concept of NPV, IRR, Cost-benefit analysis
b) Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund
5.5 Maintenance Management
a) Concept
b) Preventive Maintenance

RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by ShyamalBannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited ,Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. :Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, MarutiUdyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed &Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

PROJECT WORK
DFTE-605

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Towards the end of third year, after completion of course work, the students should be sent to food processing and preservation industries for project work. The objectives of the project work are:

1. To develop understanding of various field activities in which students are going to play a role as food technologists after completing diploma programme
2. To develop understanding of subject based knowledge given in the class room in the context of its application at work places
3. To gain first-hand experience and confidence amongst the students to enable them to use and apply knowledge and skills to solve practical problems in the field
4. Development of special skills and abilities like interpersonal skills communication skills, attitudes and values

For the fulfillment of above objectives, polytechnic(s) offering diploma course in food technology may establish close linkages with 8 – 10 food processing and preservation industries/organizations. The industries/organizations may be contacted by the teachers and students for project oriented and professional training of students during third year.

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Following schedule, as a sample, is proposed for the training

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- Fault diagnosis and rectification

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2. Fundamentals of Food and Nutrition by Sumati R. Mudambi& MV Rajagolap, New Age International Pvt. Ltd. New Delhi
3. Food Processing and Preservation by Bibliography Sivasankar, Prentice Hall ofIndia Pvt. Ltd., New Delhi145
4. Managing Food Processing Industries in India by U.K. Srivastva

5. Hand Book of Entrepreneurship by B.S. Rathore
6. Microbiological Safety of Processed Foods by Crowther
7. Food Poisoning & Food Hygiene by Hobbs
8. Drying & Storage of Grains & Oilseeds by Brodoker
9. Fundamentals of Food Process Engg. By Toledo
10. Chocolate, Cocoa & Confectionery by Minifie
11. Safe Food Handling by M. Jacob
12. Food & Beverage Service by Andrews
13. The Science of Cookie & Cracker Production by Faridi
14. Snack Foodby Booth
15. Food Additives by Mahindru
16. Dough Rheology & Baked Product Texture by Faridi

Seminar/Industrial Visit
DFTE-606

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DETAILED CONTENTS OF PRACTICAL

1- Visit to food preservation, Agro processing, Bakery and Confectionary Unit. Students have to submitthe report of the working and manufacturing process of companies/industries/units with a seminar.