

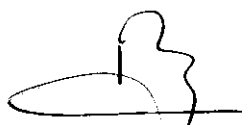
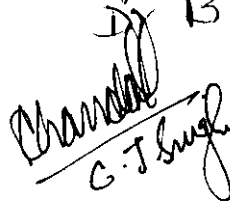
B. Sc FOOD TECHNOLOGY

Total no. of
pages - 26
including cover
page.

SYLLABUS - 2017
(Annual Pattern)

I, II AND III YEAR

Sw
2014/17.
(G. B. K. S. PRASAD)


Dr. Bharti Dubey

G. J. Singh

NEED AND SCOPE OF FOOD TECHNOLOGY

In the world, India is the second largest producer of food after china; the country has achieved the potential of being the biggest with the food and agricultural sector. Indian food industry is considered to be occupying about two third of total Indian skills and equipment have taken place in industries such as canning, dairy, food processing, specialty processing, packaging, frozen food, refrigeration and thermo processing. India's food processing industry has been growing at over 13% deposit the global slow down. And now the government is aiming to double the turnover in the next five year by setting up mega food parks to attract global capital.

At present the export from agro-sector represents about 16% of total Indian exports. The primary export commodities are cereals, fruits, vegetables and their processed products, and marine products but fast growing specialty products have also penetrated in foreign markets. Considering the contribution of these products in Indian export, it is necessary to have appropriate technology for handling and processing of agricultural produce.

Food technologist develops the manufacturing process and recipes. They work on existing and newly discovered ingredients and technologies to invent new recipes and concept. They are involved in conducting equipment and producing sample product and machinery for making products with a consistent flavor, color and texture.

- Modifying existing products and process and developing new ones (NPD).
- Checking and improving quality control procedures from raw material stage to the finished product.
- Addressing issues of safety and quality.
- Selecting raw material and other ingredients.
- Maintaining proper hygienic condition of entire food industry.
- Step undertaken to meet the requirements of with respect to hygienic and nutritional quality.

C. J. Singh

29/4

Dr Bharti Dubey

PRE-REQUISITES

Any student who has passed +2 examinations in the science stream can apply for the three year B. Sc Food Technology. It is a program offering 12 core food technology courses which are given below:


PURPOSE OF COURSE

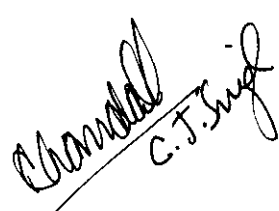
The purpose of this course is to enable graduate to acquire the scientific, technical and industry through on understanding of science underlying food technology together with deeper comprehension of food quality assurance.

The expected outcomes are that students acquire and demonstrate:

- Knowledge and competence in the principles of quality assurance and quality management system as they are applied in the food manufacture and distribution to produce safe food meeting quality and legal requirements.
- An understanding of chemical, biological and physical principle which underlie food processing, package and storage.
- An ability to apply the principles of chemical analysis, microbiology and statistical control techniques to assure the quality and safety of food.
- A capacity to undertake research and NPD in the science of food.
- Critical, presentational and interpersonal skills.

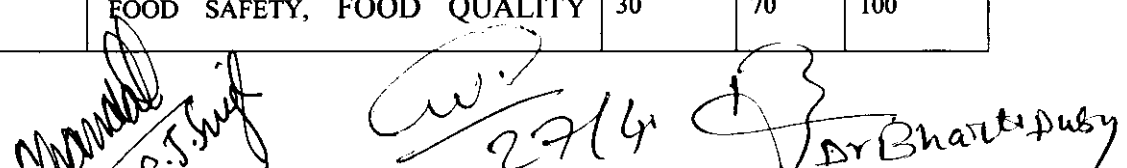
aw
29/4


Dr Bharata Dubey


C.T. Singh

Scheme

I YEAR	Code	Title of Course	Marks		
			IA	EA	Total
	FOUND-1	HINDI	30	70	100
	FOUND-2	ENGLISH LANGUAGE	30	70	100
	FOUND-3	ENVIRONMENT	30	70	100
	FT-101	FUNDAMENTALS OF NUTRITION & BIOCHEMISTRY	30	70	100
	FT-102	FUNDAMENTAL FOOD CHEMISTRY	30	70	100
	FT-103	FOOD MICROBIOLOGY	30	70	100
	FT-104	TECHNIQUES OF FOOD ANALYSIS, FOOD PROCESSING & FOOD ENGINEERING	30	70	100
	FT-105	LABORATORY-I	-	100	100
	FT-106	LABORATORY-II	-	100	100
TOTAL MARKS					900
II YEAR	Code	Title of Course	Marks		
			IA	EA	Total
	FOUND-1	HINDI	30	70	100
	FOUND-2	ENGLISH LANGUAGE	30	70	100
	FOUND-3	COMPUTERS IN BIOLOGY	30	70	100
	FT-201	PRINCIPLES OF FOOD PREPARATION (BAKERY AND CONFNCTIONERY)	30	70	100
	FT-202	TECHNOLOGY OF FRUITS AND VEGETABLES & FOOD PACKAGING TECHNOLOGY	30	70	100
	FT-203	FOOD SAFETY, FOOD QUALITY	30	70	100



 Dr. J. Singh 27/4 Dr. Bharti Duby

		TESTING, EVALUATION AND FOOD LAWS			
	FT-204	PRINCIPLES OF FOOD PRESERVATION	30	70	100
	FT-205	LABORATORY-I	-	100	100
	FT-206	LABORATORY-II	-	100	100
TOTAL MARKS					900
III YEAR	Code	Title of Course	Marks		
			IA	EA	Total
	FOUND-1	HINDI	30	70	100
	FOUND-2	ENGLISH LANGUAGE	30	70	100
	FOUND-3	ENTREPRENEURSHIP IN FOOD TECHNOLOGY	30	70	100
	FT-301	PROCESSING OF CEREAL, PULSES & OIL SEEDS	30	70	100
	FT-302	PROCESSING OF MILK AND MILK PRODUCTS	30	70	100
	FT-303	PROCESSING OF MEAT, POULTRY AND SEA FOODS	30	70	100
	FT-304	ADVANCES IN FOOD TECHNOLOGY & ENTREPRENEURSHIP DEVELOPMENT	30	70	100
	FT-305	LABORATORY-I	-	100	100
	FT-306	LABORATORY-II	-	100	100
	FTT-307	MAJOR PROJECT	-	200	200
TOTAL MARKS					1100

GRAND TOTAL: 2900

IA: Internal assessment

EA: External assessment

Chandra
C. J. Singh

2974
Dr. Bharat Dusey

FIRST YEAR

FT 101 FUNDAMENTALS OF NUTRITION & BIOCHEMISTRY

OBJECTIVES OF THE PAPER

- To acquire an overall concept about food and nutrition
- to enable students to apply of food and nutrition in different area
- To understand the basic and applied aspects of biochemistry
- Enable the students to understand the biochemical pathways and how they are relevant to their lives

Unit I: (20 lectures)

Introduction to Food nutrients

Water

Introduction, functions, water, daily intake of water, daily loss of water, body water, water balance, deficiency of water, retention of water, daily requirements, fat.

Carbohydrates: classification , monosaccharaides, oligosaccharides, polysaccharides, structure and configuration of aldose, ketoses, triose, tetrose, pentose, hexose, starch, inulin, glycogen, cellulose, cell and biomolecules, prokaryotic and eukaryotic cells, nucleus, mitochondria, endoplasmic reticulum, Golgi apparatus, lysosomes, peroxisomes, digestion, functions, dietary sources food and its functions, digestion, absorption and metabolism of food

Metabolism of carbohydrates: glycolysis and tricarboxylic acid (TCA) cycle, HMP shunt

Unit II (20 lectures)

Lipids: classification of lipids, fatty acids, essential fatty acids, triglycerols, phospholipids, glycolipids, lipoprotein, sterols, amphipathic lipids, digestion, absorption, transportation and utilization, functions source and requirement , effect of deficiency

Proteins and amino acid: amino acid, classification, properties, essential amino acid, structure of proteins- primary, secondary, tertiary, quaternary structure of proteins; protein denaturation, digestion, functions, dietary sources food and its functions, digestion, absorption and metabolism of food.

Metabolism of proteins: - Transamination, deamination, decarboxylation, urea cycle.

Unit III (20 lectures)

Enzymes: Nomenclature and classification , kinetics of enzymic reactions, types of enzymes, enzyme inhibition, reversible inhibition, irreversible inhibition, conditions affecting enzymatic reactions, co-enzymes,

Vitamins: classification, functions, requirement and deficiency conditions, Sources and RDA of vitamin A, D, E, K, Ascorbic acid, Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, Pantothenic acid

[Handwritten signatures and notes]

[Signature]

[Signature]

[Signature]

27/4/20 Dr. Bharti Dubey

Basic concept of Minerals

Major or macro minerals- General functions of minerals, deficiency, sources and RDA

Unit IV INTRODUCTION TO FOOD AND NUTRITION & ENERGY METABOLISM (20 lectures)

Basic terms used in study of food and nutrition definition, optimum nutrition, nutritional status, good nutritional status, poor nutritional status, malnutrition, under nutrition, signs of good nutritional status, signs of poor nutritional status, definition and functions of nutrients

Energy metabolism: Introduction, unit of measurement, energy value of food-calorimetry or bi proximate composition; energy needs of the body- reference man and reference woman; basal metabolic rate, factors affecting the BMR

Unit V

(10 lectures)

CONCEPTS OF MEAL and COOKING PLANNING : Factors affecting meal planning, understanding specific considerations for planning meal for different groups of people. Dry, moist, frying and microwave cooking, Advantages, disadvantages and the effect of various methods of cooking on foods.

REFERENCES:

- Berg, J. M., Tymoczko, J. L, Biochemistry, Sixth edition, W H Freeman and Company, New York, 2007
- Das, D. Biochemistry, Seventh Edition, Academic publishers, calcutta, 1992
- Jain, J. L., Fundamentals of Biochemistry, Fifth Edition, S. Chand and Company Ltd, 2001

Handwritten signature
 27/11
Handwritten signature
 Dr Bharti Dubey

Handwritten signature
 S.T.G.

FT 102 FUNDAMENTALS FOOD CHEMISTRY

Objectives of the paper:

- To understand the chemistry of foods - composition of food, role of each component and their interaction.
- To understand the functional aspects of food components and to study their role in food processing

UNIT 1 Introduction to Food Chemistry

(10 lectures)

Definition, scope, need off learning of basic food chemistry and Composition of food
 Water: Definition of water in food, Structure of water and ice , Types of water, Sorption phenomenon, Water activity and packaging , Water activity and shelf-life

UNIT 2 Lipids

(20 lectures)

Classification of lipids , Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties-reichert meissel value, polenske value, iodine , value, peroxide value, saponification value, Effect of frying on fats, Changes in fats and oils- rancidity, lipolysis, flavor reversion, Auto-oxidation and its prevention , Technology of edible fats and oils- Refining, Hydrogenation and Interesterification, Fat Mimetics

UNIT 3 Proteins

(15 lectures)

Classification and general structure of proteins, Nature of food proteins(plant and animal proteins), Properties of proteins (electrophoresis, sedimentation, amphoterism and denaturation,), Functional properties of proteins eg. organoleptic, solubility, viscosity ,binding gelation / texturization , emulsification , foaming.

UNIT 4 Carbohydrates

(15 lectures)

Classification (mono, oligo and poly saccharides), Structure of important polysaccharides(starch, glycogen, cellulose, pectin, hemicellulose, gums) Chemical reactions of carbohydrates -oxidation, reduction , with acid & alkali , Modified celluloses and starches, Browning reaction.

UNIT 5 Enzymes, Vitamins and Pigments

(20 lectures)

Vitamins: Structure ,Importance and Stability, Water soluble vitamins, Fat soluble vitamins

Plant pigments and their role in Food industry: Carotene, Xanthophyll, Chlorophyll, itter substances and Tanins.

Enzymes: Introduction, classification ,General characteristics,Enzymes in food processing ,Industrial Uses of Enzymes,Immobilized enzymes

REFERENCES:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
4. Potter,N.N.and Hotchkiss,J.H, Food Science, 5th Ed., Chapman & Hall,1995
5. DeMan, J.M., Principles of Food Chemistry, A VI, New York, 1980

Handwritten signatures and dates:
 [Signature] 27/4 [Signature] Dr. Bharti Dusey

FT 103 FOOD MICROBIOLOGY

Objectives of the paper

- To acquire an elementary knowledge about the aspects of interaction between micro organisms, food borne illness and food fermentation

Unit I Introduction to microbiology: (10 lectures)

Microbiology in daily life, Characteristics and morphology of bacteria, fungi, virus, protozoa & algae. Control of micro-organisms- Growth curve; Influence of environmental factors on growth-PH, Water activity, O₂ availability, Temperature, Pressure and Radiation

Unit II Cultures & Media: (20 lectures)

Different type of media- Selective media and differential media; Preparation of media- PDA media, Nutrient agar, Mac Conkey agar; Culturing techniques- Spread plate and streak plate, pour plate. Indicator microorganisms: Sources, methods of detection, growth & survival; significance of coliforms, faecal streptococci, entero bacteriaceae

Unit III Contamination and spoilage of different foods: (15 lectures)

Cereals, sugar and their products, Milk & milk products, Fruits and vegetables, canned foods, Meat, fish, egg and poultry

Unit IV Food borne illness: (10 lectures)

Food intoxication- Staphylococcal intoxication, botulism. Food infection- *Salmonellosis*, *Clostridium perfringens*, *Bacillus cereus gastroenteritis*, *E.coli* infection and others

Unit V Beneficial microorganisms: (20 lectures)

SCP- Microorganisms used, raw materials used as substrate, condition for growth and production, nutritive value and use of SCP;
 Fat from microorganisms- Microorganisms used, raw materials, production of fat;
 Production of amino acids;

Chandra
T. S. S. S. S.
27/9
Dr. Bharti Dasy

Production or other substances added to foods.

Production of enzymes- amylases, invertase, pectolytic enzymes, proteolytic enzymes, other enzymes

Fermentation- tempeh kedele, soya sauce production, vinegar, lactic acid bacteria fermented

food, Dairy based fermented foods- Kefir, yoghurt, cheese and butter; Yeast based fermented

foods- bread, wine and beer

REFERENCES

1. Frazier, W.C. Food Microbiology. 4th edition. Mc Graw Hill. New York, 2008
2. Khetarpaul, N. Food microbiology, Daya publishing house, New Delhi, 2009
3. Narayanan, L.M. and Mani, L. Microbiology. Saras Publications, Nagercoil.
4. Pelzar, H.J. and Rober, D. Microbiology 5th edition Mc Graw Hill. New York, 2009
5. Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology. 4th edition McGraw-Hill, New York. 1999

FT 104 TECHNIQUES OF FOOD ANALYSIS, FOOD PROCESSING & FOOD ENGINEERING

Objective of the paper:

- 1) To understand the principle of Unit operation
- 2) To acquaint with fundamentals of food engineering and its process
- 3) To understand the basics of designing of food plant and systems
- 4) To understand the basic and applied aspects of food analysis techniques
- 5) Enable the students to understand the food analysis techniques and how they are relevant to their food.

Unit-I

(10 lectures)

Colorimetry : Introduction, beers & principles of colorimeter, & application in food industry.

Flourimetry: Introduction, basic principle, & application in food industries

Spectroscopy: General principle of spectroscopy & application in food industries

Different Carbohydrate, Protein, Lipid, Fibre and Moisture analysis methods.

Shanmugam
1/4

CC
27/4

Dr Bharti Dubey

UNIT-II

(20 lectures)

Separation processes

Centrifugation: General principles, instrument & types of centrifuges, preparatory & analytical centrifugation & applications

Chromatographic Techniques: General introduction to principles, partition & adsorption chromatography-paper, thin layer, gas & liquid, ion exchange & affinity chromatography, gel filtration, HPLC and application in food industry

UNIT III- Introduction, Size reduction and mixing and grinding (12 lectures)

Concept of Unit operation, Units and dimensions, Unit conversions, dimensional analysis, Mass and Energy Balance, Related numericals

Mixing and grinding: concept and equipments used in food processing industry

UNIT IV - Design of food plant and Fluid flow in Food Processing (20 Lectures)

Important considerations for designing of food plants, Types of layout

Fluid Flow in food Processing : Liquid Transport systems, Properties of Liquids, Newton's Law of Viscosity, Principle of Capillary tube and rotational viscometer, Properties of Non-Newtonian fluids, Flow characteristics, Reynolds Number, Bernoulli's Equation, Concept of Flow Measurement devices, Related basic numericals

UNIT V – Heat and Mass Transfer (20 Lectures)

Systems for heating and cooling food products, Thermal Properties of Food, Modes of heat transfer, Application of steady state heat transfer- estimation of conductive heat transfer, coefficient, convective heat transfer coefficient, overall heat transfer coefficient, and, design of tubular heat exchanger. Related basic numericals, Fick's Law of Diffusion, Membrane separation systems-Electrodialysis system, Reverse Osmosis, Membrane System, and Ultrafiltration Membrane System, Membrane devices used for RO and UF: Plate and Frame, Tubular, Spiral wound and hollow fiber devices.

References:

- 1) Rao DG. 2010. Fundamentals of food engineering. PHI learning private ltd.
- 2) Singh RP and Heldman DR. 1993, 2003, 2009. Introduction to food engineering. Academic press 2nd, 3rd and 4th edition.
- 3) Rao C G 2006 Essentials of food process engineering. B S publications
- 4) Fellow P. 1988 Food processing technology
 - 5) Desrosier NW and Desrosier JN, The Technology of Food Preservation, CBS Publication, New Delhi, 1998
 - 6) Paine FA and Paine HY, Handbook of Food Packaging, Thomson Press India Pvt Ltd, New Delhi- 1992
 - 7) Potter NH, Food Science, CBS Publication, New Delhi, 1998
 - 8) Ramaswamy H and Marcott M, Food Processing Principles and Applications CRC Press, 2006
 - 9) Rao PG, Fundamentals of Food Engineering, PHI Learning Pvt Ltd, New Delhi, 2010

Handwritten signatures and notes:
 - A signature on the left, possibly "Thypl".
 - A signature in the middle with "27/4" written below it.
 - A signature on the right that reads "Dr. Bharti Dubey".

FT 105 LAB COURSE I

FOOD MICROBIOLOGY LABORATORY

Objective:

- To study the basic rules and requirements of a microbiology laboratory.
- Give emphasis towards the preparation of biological stains, reagents, media and their composition.
- To get thorough different methods for staining of microorganisms. 1. Microbiology laboratory basic rules and requirements:

- a. Sterilization techniques
- b. Basic requirements of a microbiological lab- common glass ware; test tube, culture tube and screw capped tubes, Petri dish, pipette, Pasteur pipette, glass spreader, inoculation needle, busen burner, water bath, autoclave, laminar air flow, incubator, hot air oven, quebec colony counter, centrifuge, microscope.
- c. Disposal of laboratory waste and culture.

2. Staining of microorganisms

a. Methods for detection of specific bacteria:

- wet mount preparation for motile bacteria,
- hanging drop mount method,
- Petri dish culture method for detection bacteria.

b. Methods for staining of micro organism:

- Simple staining (Monochrome staining)
- Gram staining for differentiation of bacteria
- Negative staining of bacteria
- Endospore staining

3. Composition, preparation and sterilization of media:

- a. PDA media
- b. Nutrient agar media
- c. Mc-Conkey agar media

4. Demonstration of techniques for pure culture of microorganisms:

- a. Streak plate method
- b. Pour plate method

Handwritten signature

Handwritten signature
27/11

Handwritten signature
Dr. Bharti Dubey

c. Serial dilution agar plate method

5. Microbiology of:

a. Milk:

- standard plate count method,
- enzymatic test of milk by methylene blue reductase test,
- quality testing of milk by resazurin test,
- determination of phosphates activity of milk,
- detection of mastitis through milk test

b. Meat, Fish, Egg

c. Water: (MPN test)

- Presumptive test
- Confirmed test
- Completed test

FOOD CHEMISTRY LABORATORY

1. Study different types of browning reactions: enzymatic and non enzymatic.
2. To study gelatinization behavior of various starches
3. To study the concept of gluten formation of various flours.
4. To study malting and germination.
5. To study dextrinization in foods.
6. Identification of pigments in fruits and vegetables and influence of pH on them.
7. Comparison of conventional and microwave processing of food
8. Determination of ash in food samples.
9. Instruments used for food processing.
10. Determination of Acidity of different food samples.

FT106 LAB COURSE II

FOOD ANALYSIS

1. Qualitative analysis of carbohydrates
2. Qualitative analysis of Proteins
3. Analysis of lipids: acid value, iodine value, saponification value etc
4. Estimation of carbohydrates in food materials
5. Estimation of proteins in food materials
6. Estimation of crude fibre in food materials
7. Estimation of ascorbic acid in food materials

(Handwritten signatures and dates)
 C.T. Singh
 27/4
 Dr. Bharti

- 8. Estimation of calcium in food materials
- 9. Estimation of cholesterol in food materials
- 10. Estimation of calorific value of foods

NUTRITION

- 1. Identification of food sources for various nutrients using food composition tables.
- 2. Record diet of self using 24 hour dietary recall and its nutritional analysis.
- 3. Introduction to meal planning, concept of food exchange system.
- 4. Planning of meals for adults of different activity levels for various income groups.
- 5. Planning of nutritious snacks for different age and income groups.
- 6. Preparation of nutritious snacks using various methods of cooking.
- 7. Nutritional labeling of food products.
- 8. Estimation of BMI and other nutritional status parameters.

SECOND YEAR SYLLABUS

FT 201 PRINCIPLES OF FOOD PREPARATION (BAKERY AND CONFECTIONERY)

Objectives of paper

- To understand the fundamentals of baking
- To learn the technologies behind bakery products.
- To understand industry trends

UNIT-I BAKERY INDUSTRY

(8 lectures)

Current status, growth rate, and economic importance of Bakery Industry in India. Product types, nutritional quality and safety of products, pertinent standards & regulations.

UNIT II BREAD, BUNS AND PIZZA BASE

(10 lectures)

Ingredients & processes for breads, buns, pizza base, Equipments used, product quality characteristics, faults and corrective measures

UNIT III CAKES

(10 lectures)

Ingredients & processes for cakes, Equipments used, product quality characteristics,

Manda
27/6
Dr. Bharti Duly

faults and corrective measures. Different types of icings.

UNIT IV BISCUITS, COOKIES & CRACKERS

(12 lectures)

Ingredients & processes, Equipments used, product quality characteristics, faults and corrective measures.

Modification of bakery products for people with special nutritional requirements

e.g. high fibre, low sugar, low fat, gluten free bakery products.

UNIT-V

(12 lectures)

CONFECTIONERY PRODUCTS: Definition, importance of sugar confectionery and flour confectioner. Types of confectionery products-chocolate boiled sweets caramels toffees.

Fondants. Manufacturing process and spoilage of confectionery products. Good manufacturing practices (GMP) in baking and confectionery industries.

REFERENCES:

1. Matz, Samuel A., "Bakery Technology and Engineering", Third Edition, Chapman & Hall, London,
2. Cauvain, Stanley P, and Yound, Linda S., " Technology of Bread Making", Second Edition Aspen publication, Maryland, 2005.
3. Pomeranz. Y. "Modern Cereal Science and Technology". MVCH Publications, New York.2003.
4. Samuel A., Matz., " Equipment for Bakers", Pan Tech International Publication, 2009.
5. Manley, Duncan., " Biscuit Doughs Manual 2", Woodhead Publishing Ltd., England. 2009.

FT 202 TECHNOLOGY OF FRUITS AND VEGETABLES & FOOD PACKAGING TECHNOLOGY

Objectives of the paper

1. To impart knowledge of different methods of fruits and vegetable processing.
2. To learn about processing of various spices, tea, coffee and cocoa.
3. To impart comprehensive overview of the scientific and technical aspects of food packaging.
4. To instill knowledge on packaging machinery, systems, testing and regulations of packaging.

UNIT 1 CANNING AND BOTTLING OF FRUITS AND VEGETABLES

(12 Lectures)

Importance of fruits and vegetable, history and need of preservation, reasons of spoilage, method of preservation (short & long term).

Selection of fruits and vegetables, process of canning, factors affecting the process- time and temperature, containers of packing, lacquering, syrups and brines for

Chandra T. S. et al.

27/11/2013 Dr. B. Hartopue

canning, spoilage in canned foods.

UNIT 2 FRUITS BEVERAGES, PICKLES, CHUTNEYS AND SAUCES AND TOMATO PRODUCTS (20 Lectures)

Introduction, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification), preservation of fruit juices (pasteurization, chemically preserved with sugars, freezing, drying, tetra-packing, carbonation), processing of squashes, cordials, nectars, concentrates and powder.

Processing, types and causes of spoilage in pickles and tomato products processing

UNIT 3 JAMS, JELLIES AND MARMALADES (10 Lectures)

Introduction, Jam: Constituents, selection of fruits, processing & technology, Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing & technology, defects in jelly, Marmalade : Types, processing & technology, defects.

UNIT 4: INTRODUCTION TO FOOD PACKAGING AND PACKAGING MATERIAL (20 Lectures)

Packaging Functions and Requirements, Printing of packages, Barcodes & other marking Paper and paper-based materials, corrugated fiber board (CFB).

Plastics, formation- Injection molding, Blow molding, Types of plastics, Lamination, Biodegradable plastics, Edible packaging and Bio-composites. Environmental Concerns- recycling and disposal of plastic waste

Metal packaging- Metals: Tinplate, tinning process, components of tinplate, tin free can (TFC) types of can, metallic films, lacquers

Glass: Composition, Properties, Methods of bottle making, Types of closures.

Unit IV: TESTING AND REGULATORY ASPECTS OF FOOD PACKAGING AND PACKAGING MACHINERY SYSTEM (22 Lectures)

Testing Procedures for Packaging Materials- thickness, tensile strength, puncture resistance, bursting strength, seal strength, water vapor permeability, CO2 permeability, oxygen permeability, grease resistance,

Testing Procedures for Packaged Foods - Compatibility and shelf life studies, evaluation of transport worthiness of filled packages.

Food Packaging Laws and Regulations.

Bottling machines, Cartoning systems, Seal and Shrink packaging machine; Form, Fill and Sealing machine (FFS).

Vacuum, Controlled and Modified atmosphere packaging systems; Aseptic packaging systems; Retort packaging, Active and Intelligent packaging systems

REFERENCES:

1. Robertson GL, Food Packaging Principles and Practice, CRC Press, Taylor and

Mmmmm
27/4 Dr Bharti Dasy

Francis Group, 2012

2. Paine FA and Paine HY, A Handbook of Food Packaging, Blackie Academic and Professional, 1992
3. Girdharilal, Siddappaa, G.S and Tandon, G.L.1998. Preservation of fruits & Vegetables, ICAR, New Delhi
4. W B Crusess.2004. Commercial Unit and Vegetable Products, W.V. Special Indian Edition, Pub: Agrobios India
5. Manay, S. & Shadaksharaswami, M.2004. Foods: Facts and Principles, New Age Publishers
6. Ranganna S.1986. Handbook of analysis and quality control for fruits and vegetable products, Tata Mc Graw-Hill publishing company limited, Second edition.
7. Srivastava, R.P. and Kumar, S. 2006 . Fruits and Vegetables Preservation- Principles and Practices. 3rd Ed. International Book Distributing Co.

FT 203 FOOD SAFETY, FOOD QUALITY TESTING, EVALUATION AND FOOD LAWS

Objectives of paper

- To understand the following:
- Food safety and hygiene
- Types of hazards associated with food
- Food regulations (national as well as international)
- Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.
- Emerging concerns

UNIT I Introduction to Food Safety, Food Hazards of Physical and Chemical Origin (10Lectures)

Definition , Types of hazards, biological, chemical, physical hazards , Factors affecting Food Safety , Importance of Safe Foods

Food Hazards of Physical and Chemical Origin: Introduction , Physical Hazards with common examples , Chemical Hazards(naturally occurring ,environmental and intentionally added) , Packaging material as a threat , Impact on health ,Control measures

UNIT II Food Hygiene, Hazards and Management (12 Lectures)

Introduction , Indicator Organisms , Food borne pathogens: bacteria, viruses and eukaryotes ,Seafood and Shell fish poisoning , Mycotoxins, Control parameters , Temperature control , Food storage ,

Chandra
12

Dr. Bharti

(18)

Sources of contamination ; Control methods using physical and chemical agents Personnel Hygiene

UNIT III Food Safety Management Tools

(20 Lectures)

- Basic concept , Prerequisites- GHPs ,GMPs, HACCP , ISO series
- TQM - concept and need for quality, components of TQM, Risk Analysis
- Accreditation and Auditing

UNIT IV Food laws and regulations:

(20 Lectures)

Food safety 2006, 2011 act and regulation, FSSAI. Various organizations dealing with inspection and traceability and authentication, Certifications (BIS, AGMARK, ISO, FPO, MFPO, PFA, MPO, etc.) , International Food Laws

UNIT V Food Quality Management

(10 Lectures)

Introduction to food quality management – Definition of quality, quality concepts, quality perception, quality attributes.

Concepts of quality management: Objectives, importance and functions of quality control and quality assurance; Quality management systems in India

Quality in the Agri- food production chain-Techno- managerial approach, food quality relationship and food quality management functions. Dynamics on the agri- food production chain, core developments in food quality management.

References:

1. Early R.1995.*Guide to Quality Management Systems for Food Industries*. Blackie Academic.
2. Krammer A & Twigg BA.1973. *Quality Control in Food Industry*. Vol. I, II. AVI Publ.
3. Chhabra TN & Suria RK. 2001. *Management Process and Perspectives*. Kitab Mahal.
4. Jhingan ML. 2005. *International Economics*. 5th Ed. Virnda Publ.
5. Kotler P. 2000. *Marketing Management*. Prentice Hall.
6. Reddy SS, Ram PR, Sastry TVN & Bhavani ID. 2004. *Agricultural Economics*. Oxford & IBH.
7. Lawley, R., Curtis L. and Davis,J. *The Food Safety Hazard Guidebook* , RSC publishing, 2004
8. De Vries. *Food Safety and Toxicity*, CRC, New York, 1997
9. Marriott, Norman G. *Principles of Food Sanitation*, AVI, New York, 1985
10. Forsythe, S J. *Microbiology of Safe Food*, Blackwell Science, Oxford, 2000

C. J. S. / 8

Dr. Bharti Joshi

FT 204 PRINCIPLES OF FOOD PRESERVATION

Objectives of paper:

- To study the importance microorganisms in food preservation
- To introduce the basics of various food processing and preservation technologies.

UNIT I Food Preservation by Low temperature

15 lectures

Freezing and Refrigeration :Introduction to refrigeration, cool storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, types of freezing i.e. slow freezing, quick freezing, introduction to thawing, changes during thawing and its effect on food.

Unit II Food Preservation by high temperature

10 lectures

Thermal Processing- Commercial heat preservation methods: Sterilization, commercial sterilization, Pasteurization, and blanching.

Unit III Food Preservation by Moisture control

15 lectures

Drying and Dehydration - Definition, drying as a means of preservation, differences between sun drying and dehydration (i.e. mechanical drying), heat and mass transfer, factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry. Evaporation – Definition, factors affecting evaporation, names of evaporators used in food industry.

Unit IV Food Preservation by Irradiation

10 lectures

Introduction, units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry, concept of cold sterilization.

Unit V Food Preservation by Chemical preservatives and Fermentation

15 lectures

Chemical Preservation: Preservation of Food by use Class I and Class II preservatives
Concentration and Fermentation: Processing and application in preservation of food, Pickling, Curing, etc.

REFERENCES

1. B. Srilakshmi, Food science, New Age Publishers,2002
2. Meyer, Food Chemistry, New Age,2004
3. Bawa. A.S, O.P Chauhan etal. Food Science. New India Publishing agency, 2013
4. Frazier WC and Westhoff DC, Food Microbiology, TMH Publication, New Delhi, 2004

FT 205 LAB COURSE I

A. PACKAGING

1. Testing of different types of packaging materials.
2. Determine moisture content in given package samples.
3. Test for modified starch in different package materials.
4. Test for water absorbency in corrugated fibre board box.
5. Test for types of adhesive used in CFB.

Chand
19

aw
2014
Dr Bharti Debroy

- 6. Development of new food products and formulations.
- 7. To perform flap bend test in CFB.
- 8. Test for formal shock resistance in glass bottles.
- 9. Graphical representation of moisture contents in different food products.
- 10. Determination of shelf lives.

B. PROCESSING AND PRESERVATION

- 1. Concept of shelf life of different foods
- 2. To study the concept of Asepsis and sterilization
- 3. Determination of pH of different foods using pH meter.
- 4. Study quality characteristics of foods preserved by drying/dehydration/ freezing.
- 5. To perform pasteurization of fluids using different methods.
- 6. To perform blanching of different plant foods
- 7. Determination of moisture in different food samples.
- 8. Determination of TSS in different food samples.
- 9. Preservation of food by the process of freezing
- 10. Drying of food using Tray dryer/other dryers
- 11. Preservation of food by canning(Fruit/Vegetable/meat)

FT 206 LAB COURSE II

- 1. Canning of fruits and vegetables.
- 2. Dehydration of fruits and vegetables.
- 3. Preparation of tomato juice.
- 4. Preparation of tomato puree.
- 5. Preparation of tomato paste.
- 6. Preparation of various types of pickles.
- 7. Preparation of tomato ketchup.
- 8. Preparation of tomato mock tail.
- 9. Preparation of tomato soup.
- 10. Preparation of tomato chutney.
- 11. Preparation of jackfruit pickles.
- 12. Preparation of jams
- 13. Preparation of lime squashes.
- 14. Preparation of jellys.
- 15. Preparation of jam marmalades.
- 16. Pectin determination
- 17. Determination of chemical preservatives in fruits and vegetables.
- 18. Blanching of fruits and vegetables for quality estimation.

[Handwritten signature]
 27/4
 Dr Bhavita Dubey

[Handwritten signature]
 20

IIIrd year

(21)

FT 301 PROCESSING OF CEREAL, PULSES & OIL SEEDS

Objectives of paper

- To teach technology of milling of various cereals
- To impart technical knowhow of pulses

UNIT I TECHNOLOGY OF CEREALS

(15 lectures)

Introduction Wheat --Types , milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Products and By-products.

Rice – Physicochemical properties , milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of by products.

UNIT III

(10 lectures)

Corn – Milling (wet & dry) , cornflakes, corn flour

Barley- Milling(pearl barley, barley flakes & flour

UNIT IV

(10 lectures)

Oats – Milling (oatmeal,oatflour & oatflakes)

Sorghum and millets – Traditional & commercial milling (dry &wet)

UNIT V TECHNOLOGY OF PULSES AND OILSEEDS

(10 lectures)

Milling of pulses, Dry milling, Wet milling, Improved milling method

Oilseeds: Processing, Milling, extraction process and by product utilization

Recommended Readings:

1. Kent, N.L. 2003. Technology of Cereal, 5th Ed. Pergamon Press.
2. Chakraverty. 1988. Post Harvest Technology of Cereals, Pulses and Oilseeds, revised Ed., Oxford & IBH Publishing Co. Pvt Ltd.
3. Marshall, Rice Science and Technology. 1994. Wadsworth Ed., Marcel Dekker, New York.
4. Manay, S. and Sharaswamy, M. 1987. Food Facts and Principles.Wiley Eastern Limited.

C. J. Singh
C.J. Singh 21

Dr. Bharti Singh
21/1/21
Dr. Bharti Singh

FT 302 Processing of milk and milk products

Objectives

- To know the need and importance of dairy and fishery industry
- To know the compositional and technological aspects of milk and fish.
- To study processed milk and fish products.

UNIT I Physical properties of milk (8 Lectures)
 Color, taste, pH and buffering capacity, refractive index, viscosity, surface tension, freezing, boiling point, specific heat, OR, electrical conductivity, Platform test

UNIT II Lactose (10 Lecture)
 Lactose (alpha and beta forms and their differences)
 Significances of lactose in dairy industry, caseinate formation

UNIT II Milk fat (10 Lectures)
 Composition and structure, factors affecting melting point, boiling point, solubility and Refractive Index, fat constants (saponification value, iodine value, RM value, Polenske value, peroxide value).
 Chemical reactions of fat (hydrolysis, auto-oxidation), condition favouring auto-oxidation, prevention, measurement of auto-oxidation.

UNIT III Protein and Enzymes (10 Lectures)
 General structure, amphoteric nature, difference between casein and serum protein, different types of casein (acid and rennet), uses of casein, fractionation of protein.
 Enzymes- catalase, alkaline phosphatase, lipases and proteases.

UNIT IV Market milk industry and milk products (10 Lecture)
 Systems of collection of milk, Reception, Platform testing, Various stages of processing

- Filtration, Clarification
- Homogenization
- Pasteurization

UNIT V (10 Lectures)
 Description and working of clarifier, cream separator, homogenizer and plate heat exchanger. Flow diagram of following milk products – Butter, ghee, flavored milk, yoghurt, dahi, shrikhand, ice-cream, condensed milk, milk powder, channa, paneer, cheese (cheddar).

G.T. Suf

27/4/22
Dr. Bharti Dubey

FT 303 PROCESSING OF MEAT, POULTRY AND SEA FOODS

Objectives:

- To understand need and importance of livestock, egg and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by-product utilization.

UNIT I Meat Quality

(15 lectures)

Livestock and poultry population in India, Development of meat and poultry industry in India and its need in nation's economy, Glossary of live market terms for animals and birds.

Meat quality

Effects of feed, breed and environment on production of meat animals and their quality

Meat Quality-color, flavor, texture, Water-Holding Capacity(WHC), Emulsification capacity of meat.

UNIT II Slaughter process

(10 lectures)

Slaughter, inspection and grading, Antemortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig A Generic HACCP model, dressing of carcasses, post-mortem examination of meat

UNIT III Preservation of meat

(10 lectures)

Refrigeration and freezing, thermal processing- canning of meat, retort pouch, dehydration, irradiation, and RTE meat products, meat curing. Sausages-processing, types and defects

UNIT IV Preservation of eggs and Poultry

(12 lectures)

Egg: General structure, composition and nutritive value of egg and its products.

Refrigeration and freezing, thermal processing, dehydration, coating

Quality identification of egg shells; factors affecting egg quality measures.

UNIT V Fish Curing and Smoking

(8 lectures)

Drying and salting of fish, water activity and shelf-life , salting process, salting methods (brining, pickling, kench curing, gaspe curing), types of salts, dried and salted fish products- pindang, fishwood, dried shrimp. Preservation by smoking, smoke production , smoke components, quality, safety and nutritive value of smoked fish, processing and equipment, pre-smoking processes, smoking process control. Traditional chimney kiln, modern mechanical fish smoking kiln, examples of smoked and dried products.

Chandra
C.T. Syi

274

Dr. Bhartendu

REFERENCES:

- 1) Lawrie R A, Lawrie's Meat Science, 5th Ed, Woodhead Publisher, England, 1998
- 2) Parkhurst & Mountney, Poultry Meat and Egg Production, CBS Publication, New Delhi, 1997
- 3) Pearson & Gillet Processed Meats, 3 Ed, CBS Publication, New Delhi, 1997
- 4) Shai Barbut, Poultry Products Processing, CRC Press 2005
- 5) Stadelman WJ, Owen J Cotterill Egg Science and Technology, 4th Ed. CBS Publication New Delhi, 2002
- 5 To prepare casein and calculate its yield.
- 6 Quality evaluation of fish/prawn.
- 7 Subjective evaluation of Fresh Fish.
- 8 Cut out examination of canned fish.(Sardine, Mackerel, Tuna)
- 9 Fish product formulation/canning.

FT 304 ADVANCES IN FOOD TECHNOLOGY & ENTREPRENEURSHIP DEVELOPMENT

Objectives

- 1. To study design of plant and processing equipment and advances in the field of food technology.
- 2. To acquire an overall concept about Entrepreneurship development
- 3. To enable students to apply approach to developed food unit

UNIT I (8 Lectures)

Historical development and eras of modern food processing: Recent advances in bakery industry, evaluation and utilization of thermal heating, aseptic processing, UHT processing and Extrusion technique.

UNIT II

Advances in Non-thermal processing of foods: (10 Lectures)

Bio-preservation, Ultrasonification, high-hydrostatic pressure processing, pulsed electric processing, ohmic heating

UNIT III (15 lectures)

Entrepreneurship : Definition, Characteristics and significance. Types & functions of an entrepreneur, Qualities of a good Entrepreneur, Entrepreneurial motivation factors.

Women Entrepreneurship : Opportunities and problems.
Search for a business idea, sources of ideas, selection of project idea.

Chandra
27/4
Dr. Bharti Dubey

Unit-IV (12 lectures)

Preparation of detailed Project Report.
Selection of Types of organisation. Concept and characteristics of Sole Proprietorship, Partnership and Co-operative Society. Factors influencing the choice of organisation.

UNIT V (20 lectures)

Role of Regulatory institutions: Particular study of DIC, Pollution Control Board, Food and Drugs Administration, Electricity Board & Municipal Corporation.
Role of Promotional Institutions: KVIC, MPFC, Scheduled banks, Women Economic Development Corporation of MP.
Incentives and Subsidies: Concepts and needs. Capital Investment Subsidy, Interest Subsidy, Subsidy for power, Margin Money Assistance, Special incentives to Women Entrepreneurs.

Recommended Books -

1. Entrepreneurial Development by S.S. Khanka (S.Chand)
2. Entrepreneurial Development by Taneja & Gupta (Galgotia Pub.)
3. Entrepreneurial Development by Vasant Desai (Himalaya)
4. Entrepreneurial Development in India by C.B. Gupta & Srinivasan (Sultan Chand & Sons)

FT 305 LAB COURSE I

- 1) Physical characteristics of Wheat.
- 2) Estimation of Gluten Content of flour.
- 3) Estimation of Pelenske Value of flour.
- 4) Estimation of Potassium Bromate in flour.
- 5) Fermenting power of yeast.
- 6) Physical Characteristics of Rice and paddy.
- 7) Cooking characteristics of rice.
- 8) Determination of sedimentation power of flour

FT 306 LAB COURSE II

- 1 To perform platform tests in milk.(Acidity,COB,MBRT,specific gravity,SNF)
- 2 To estimate milk protein by Folin method.
- 3 To estimate milk fat by Gerber method.
- 4 Preparation of flavoured milk/. Pasteurization of milk
- 5 To prepare casein and calculate its yield.
- 6 Quality evaluation of fish/prawn.
- 7 Subjective evaluation of Fresh Fish.
- 8 Cut out examination of canned fish.(Sardine,Mackerel,Tuna)
- 9 Fish product formulation/canning.


Chand
C. J. R. K.

27/4

Dr Bharti

307: INDUSTRIAL PROJECT

CO
27/11


Dr. Bharti Joshi

