

B.Sc. Food Science And Quality Control
SYLLABUS 2013-2017
PROGRAMME SPECIFIC OBJECTIVES

DEPT OF FOOD SCIENCE AND QUALITY CONTROL
(MODEL III- VOCATIONAL PROGRAMME)
BCM COLLEGE , KOTTAYAM

PROGRAMME : B.Sc. Food Science and Quality Control

PSO No	PROGRAMME SPECIFIC OBJECTIVES (PSO)	GPO No.
PSO1	Understand the multidisciplinary sciences involved in Food , Safety and its Management	2
PSO2	Develop practical skills in laboratory knowledge and skills in basic food chemistry, microbiology and analysis of foods at basic and advanced levels	2,3
PSO3	Develop Industrial skill with on the job training and industrial projects in reputed food industries , food certification programmes	1,2,3
PSO4	Interpretations and explanations of testing methods employed in practical and theory , its levels , accuracy and significance	2,3
PSO5	Generate skill in handling food related micro organisms , chemicals , personal and consumer safety and implementation of sanitation and hygienic techniques in industry	2,3
PSO6	Differentiate concepts , tools and techniques related to statistical analysis , applied zoology , advanced chemistry and its applications in the science of Foods	1,2,3
PSO7	Creation of product formulations as a basis for research and development	1,3
PSO8	Understanding environmental issues, Its Over exploitation and its drastic effect on food chain as well as remedial measures to be adopted	4,5
PSO9	Basic understanding of management and entrepreneurship as options for start ups	1,3,4,5

SEMESTER- 1

BASIC NUTRITION

Course	Details
Code	FQQ1B52
Title	BASIC NUTRITION
Degree	B.Sc.
Branch(s)	Food Science
Semester	I
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Retrieve knowledge from foundational sciences as a basis for understanding the role of food and nutrients in health and disease.	Re	PSO1,6
2	Integrate scientific information, research, and critical thinking into evidence- based practice.	An	PSO4
3	Attribute professionalism and ethical behavior in all areas of practice.	An	PSO8
4	Infer the advocacy on issues that affect public health and nutrition policy.	U	PSO1
5	Interpret the basis for lifelong learning and interprofessional collaboration.	U	PSO8
6	Implement strategies for food access, procurement, preparation, and safety that are relevant for the culture, age, literacy level, and socio-economic status of clients and groups.	Ap	PSO1,4
7	Identify the food system management and leadership functions that consider sustainability in business, healthcare, community, and institutional arenas.	Re	PSO1,8

Course Description

Module	Course Description	Hrs	CO
1	Introduction to Nutrition		
1.1.	Food as a source of nutrient	1	1
1.2	Functions of Food	1	1
1.3	Adequate optimum and good nutrition	1	1
2	Inter relationship between Nutrition and Health		
2.1	Visible symptoms of good health	4	1
3	Malnutrition		

3.1	Definition,aetiology,remedialfactors,classification	3	1,4
4	Food guide	7	1,4
4.1	Basic five food group, How to use food guide	3	
5	Food assimilation		1,4
5.1	Digestion,absorption,transport utilization of nutrients in the body	4	1
6	Water		
6.1	Function,sources,requirement,water balance	2	1,5
7	Carbohydrates		
7.1	Composition, Classification ,food sources,functions, storage in the body		1,3,4,7
8	Fats		
8.1	Composition ,saturated and unsaturated fatty acids,classification ,food sources,functions of fats	4	1,3,4,7
9	Proteins		
9.1	Composition,sources,essential and non-essential amino acids,functions, deficiency	4	1,3,4,7
10	Energy		
10.1	Unit of energy,food as a source of energy,energy value of food,BMR activities	6	1,2,4,6,7
11	Acid base balance		
11.1	Respiratory mechanism and renal mechanisam	3	1,3,4,7
12	Minerals		
12.1	Functions,sources,units ,bio availability deficiency of following minerals calcium,iron,iodine,fluorine,sodium,potassium,	13	1,3,4,7
13	Vitamins		
13.1	Classification, units of measurement, sources, functions, deficiency and remedial measures about following vitamins Fat soluble vitamins a. Vitamin A b. Vitamin D c. Vitamin E d. Vitamin K Water Soluble Vitamins a. Ascorbic acid b. Thiamin c. Riboflavin d. Niacin e. Other member of B-Complex such as B ₆ , folic acid and B ₁₂	9	1,3,4,7

REFERENCES

1. Mudambi, S. R., Rajagopal M. V., Fundamentals of food and Nutritions, 2nd edition, Wiley Eastern Ltd, New Delhi 1990.
2. Swaminathan, M., Hand book of Food & Nutrition, Bappco Ltd, Bangalore, 1978.
- 3.Srilakshmi, B, Nutrition Science, New age international (P) Ltd publishers, New Delhi, 2006.
- 4.Swaminathan, M. Essential of food and Nutrition, Vol.I. Bangalore Printing and Publishing

Co. Ltd Bangalore.

5.Begum, R. A text book of foods, Nutrition and Dietetics. Second revised edition, Sterling Publishers(P) Ltd, New Delhi, 1991.

FOOD CHEMISTRY

Course	Details
Code	FQ1B53
Title	FOOD CHEMISTRY
Degree	B.Sc.
Branch(s)	Food Science
Semester	I
Type	CORE
Credits	4
Total hours	72
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Explain properties and reactions of the proximate principles(Carbohydrates, Proteins and Lipids) during storage and processing of food and how these influence the quality and properties of food.	U	PSO1,4
2	Explain the importance of water for food stability and quality.	U	PSO1
3	Differentiate the main classes of compounds influencing food pigments and antioxidants in food, knowledge on important sources of vitamins and minerals in food and how other quality aspects can be affected	U	PSO1
4	Interpret the role of enzymes and its mechanism of action in food	U	PSO1

Course Description

Module	Course Description	Hrs	CO
1	Carbohydrates		
1.1	Monosaccharide- Classification., Optical Activity D-and L-forms. Muta-Rotation. Straight and Ring structure of glucose, fructose and galactose.	4	1
1.2	Oligosaccharides- Classification.Reducing& Non-reducing sugar. Glycosidic bonds. Structure of sucrose, maltose, iso- maltose & lactose .Inversion of sucrose.	4	1
1.3	Polysaccharides Classification. Structure of starch, cellulose, glycogen, pectin, hyaluronic acid. Difference between amylose & amylopectin .Gelatinization of starch. Theories of gel formation. Adsorption of solvent, three dimensional network, Particle orientation	5	11
1.4	Reactions of monosaccharides Reactions involving glycosidic-OH group.Reactions involving alcoholic-OH group.Reactions involving both glycosidic& alcoholic-OH group.Reaction with methyl iodide, conc.sulphuric acid, weak alkalies, alanine, phenyl-hydrazine, & hydroxyl	5	1,3,4

	amine.Oxidationreactions.Browningreactions Enzymatic& Non-enzymatic browning.		
2.	PROTEINS		
2.1	Amino acids, peptides and proteins Classification of aminoacids,structure,essential amino acids, zwitterion, isoelectricpoint,amphoteric property, Peptide bond, naming of peptide chain, biological roles.	4	1,3
2.2	Classification of protein according to shape; classification of protein according to composition and solubility Structure of protein, chemical bonds involved in protein structure	4	1,3
2.3	Physical-chemical properties of proteins;colour and taste, shape of size, molecular weight, colloidal nature,amphoteric nature, ion bonding capacity,solubility,opticalactivity,precipitation with antibodies	4	1,3
2.4	Denaturation-agents causing denaturation,changes occurring during denaturation	3	1,3
2.5	Chemical reaction-hydrolysis,Reactions involving COOH group,Reactions involving NH ₂ group,Reactions involving R groups or side chain.Estimation of protein by paper electrophoresis and paper chromatography, biological function of protein.	3	1,3
3	LIPIDS		
3.1	Classification of lipids according to chemical composition, fatty acids; saturated and unsaturated fatty acids. Fatty acids-essential fatty acids structure, chemical composition of fat, monoglycerides, diglycerides, nomenclature of triglycerides	4	1,3
3.2	Physical properties - melting point,polymorphism,softening point, slipping point, specific gravity, refractive index, smoke flash and fire points, turbidity points,	4	1,3
3.3	Chemical properties- RM, P,K values saponification value, iodine value, acid value Reactions- reaction involving-COOH group, reaction involving double bond, reaction involving OH groups	4	1,3
3.4	Flavor changes in fats and oils Hydrolytic and oxidative rancidity; mechanism of auto oxidation of fat; reversion,	3	1,3,4
3.5	Technology of edible fats and oils; hardening of fat hydrogenation and inter esterification and Structure- phospholipids, glycolipids, sphingo lipids, cholesterol Emulsion and emulsifiers	3	1,3,4
4	ENZYMES		
4.1	Nomenclature and classification; active site and allo steric site; enzymes specificity, enzyme as a catalyst, enzymes kinetics, derivation of Michaelis-Menton equation; Line waver-bark equation, factors influencing enzyme activity, effect of substrate concentration,effect of enzyme concentration ,effect of temperature,PH	5	1,3,4
4.2	Enzyme inhibitors- reversible and irreversible; derivation of equation for	5	1,3,4

	competitive, non competitive and uncompetitive enzyme inhibitors, graphical representation Enzyme activators; regulation of enzyme activity- zymogens inactivation, covalent modification and feed back inhibition Enzymes used in food industry		
5	VITAMINS, MINERALS AND WATER		
5.1	Vitamins & Minerals-Classification and structure, fortification enrichment, restoration.	3	1,2
5.2	Food pigments ; classification,structure of heme, chlorophyll,carotenoids.reactions of myoglobin and chlorophyll,flavonoids- anthocyanin, anthoxanthin and flavones	3	1,3
5.3	Water-structure of water and ice, physical constants of water and ice, hydrogen bonding ,free water and bound water.	2	1,2

REFERENCES

1. Fundamentals of Biochemistry J L Jain 4th Edition 1990 S.Chand&Company, New Delhi
2. Aurand, L.W. and Woods, A.E. 1973. Food Chemistry. AVI, Westport.
3. Birch, G.G., Cameron, A.G. and Spencer, M. 1986. Food Science,3rd Ed. Pergamon Press, New York
4. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York.
5. Meyer, L.H. 1973. Food Chemistry. East-West Press Pvt. Ltd.,New Delhi

METHODOLOGY IN DISCIPLINE OF FOOD SCIENCE

Course	Details
Code	FQ1B51
Title	Methodology in the Discipline of Food Science
Degree	B.Sc.
Branch(s)	Food Science
Semester	I
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand some basic concepts of research and understand its methodology in relation to food science	U	PSO1,4
2	Implement and define appropriate research and its parameters	Ap	PSO1,4,5
3	Plan and design an innovative food product	C	PSO6

Course Description

Module	Course Description	Hrs	CO
1	Introduction to Food Science		
1.1	What is Food science and Quality Control?	3	1
1.2	Early history of food science, its developments	3	1,
1.3	Preparation of a career in food science	3	1
1.4	Activities of food scientists	2	1
1.5	Components of a food industry	2	1
1.6	Allied industries, International activities, Interrelated operations	2	1
2	World Food Needs and Hazards		
2.1	Nature of Nutritional problems its dimensions	2	4
2.2	Food related hazards	2	4
2.3	Role of technology	3	4
3	Innovations		
3.1	Importance of new products and product technology	4	3
3.2	New applications of membranes in food processing	4	3
3.3	Cross flow membrane technology	3	3
3.4	Next generation products, Competitive behaviour, Consumer behaviour and	4	3

	internet, marketing		
4	Methods and Tools Of Science		
4.1	Hypotheses: Observations, evidences and proofs Posing a question: formulation of hypotheses :Hyphetico- Deductive model, Inductive model Mathematical methods vs Scientific methods	12	2
5	Experimentation in Science		
5.1	Design of an experiment: experimentation, observation, data collection, interpretation and deduction, Scientific instruments used in food science	4	2
5.2	Making observations: direct, indirect controlled and uncontrolled, human and machine observations, human error.	5	2
6	Data Handling and Ethics in Science		
6.1	Documentation of experiments , nature and types of data ,Significance of statistical tools in data presentation , Data presentations- graphs , tables, histograms and pi diagrams	7	2
6.2	Statistical testing of hypotheses, null hypotheses, significance tests, Correlation, Computer applications in food science	7	2

REFERENCES:

- 1) Potter, N.N. Food Science 5th edition. CBS publishers and distributors, New Delhi. 1996.
- 2) Kroger, M and Shapiro, R. Changing food technology. (Vol. 1-3) Technomic publishing Co. Inc, USA. 1987.
- 3) Raj, G.D. Encyclopaedia of Food Science. (Vol 1-3). Anmol publications Pvt. Ltd, New Delhi. 1997.
- 4) Kumar, A and Meenakshi, N. Marketing management. Vikas publishing house Pvt. Ltd. 2006.
- 5) Srilakshmi, B. Nutrition Science, New age International (P) Ltd publishers, New Delhi. 2006.
- 6) Mahajan, B.K, Methods in Biostatistics , 6th edition, Jaypee brothers Medical publishers(P)Ltd, New Delhi, 2003.
- 7) Kothari, C.R, Research Methodology- Methods and Techniques, 2nd edition New age International (P) Ltd publishers, New Delhi. 2000.

SEMESTER II

FOOD COMMODITIES

Course	Details
Code	FQ2B55
Title	Food Commodities
Degree	B.Sc.
Branch(s)	Food Science
Semester	II
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	To understand what are food commodities and the commonly consumed foods that are ingested for their nutrient properties	Re	PSO1,3
2	To understand the composition, nutrient value, processing methods, preservation and storage methods of various commodities	Re	PSO1,3,5
3	Attribute professionalism and ethical behaviour in all areas of practice of processing of foods	An	PSO9
4	Infer the advocacy on issues that affect public health and nutrition policy.	U	PSO1,8
5	Apply knowledge of various commodities into product development	U	PSO7
6	Implement strategies for food access, procurement, preparation, and safety that are relevant for the culture, age, literacy level, and socio-economic status of clients and groups.	Ap	PSO1,3,4,8,9

Course Description

Module	Course Description	Hrs	CO
1	Cereal and Cereal Products		
1.1	Rice, Wheat and their products- structure, processing, uses in variety of preparations, selection, storage and nutritional aspects.	5	1,2,3,4,5,6
2	Pulses and Legumes		1,2,3,4,5,6
2.1	Production, selection, variety, storage, processing, uses in variety of preparations, nutritional aspects and cost	5	1,2,3,4,5,6
3	Milk and Milk Products		1,2,3,4,5,6

3.1	Composition, classification , quality processing, spoilage, storage , uses , nutritional aspects, product processed milk, curd, butter, butter milk, paneer, cheese and ice cream	8	1,2,3,4,5,6
4	Egg		1,2,3,4,5,6
4.1	Production, nutritive value, structure, composition, egg quality, evaluation of egg quality, grading, storage, processing, effect of heat on egg proteins, egg products	6	1,2,3,4,5,6
5	Fish Meat and Poultry		1,2,3,4,5,6
5.1	Classification, composition and nutritive value, spoilage, selection, purchase, processing, storage	10	1,2,3,4,5,6
6	Vegetables And Fruits		1,2,3,4,5,6
6.1	Vegetables classification, composition, nutritive value, cole-crops-cabbage, cauliflower, root vegetables, fruit vegetables, cucumbers, leafy vegetables, perennial and other vegetables. Fruits composition, classification, tropical and subtropical fruits - amla, avocado, banana, dates, guava, jackfruit, jambu fruit, mango, papaya, passion fruit, pineapple, pomegranate, sapota, dry fruits. Fruit products jams, jelhes, maimalades processing	6	1,2,3,4,5,6
7	Sugar and Sugar Products		1,2,3,4,5,6
7.1	Sugar from cane gur, khandasari sugar, raw sugar, refined and white sugar processing. Boiled sugar processing Forms of sugar, liquid sweetness, reactions of sugars, sugar boiled confectionary crystalline and amorphous confectionary.	6	1,2,3,4,5,6
8	Fats And Oils		1,2,3,4,5,6
8.1	Fats nutritional importance of oils and fats, functions of oils and fats in foods, processing, classification. Oils vegetable oils and sources of edible oils, oils from other sources	8	1,2,3,4,5,6
9	Spices And Condiments		1,2,3,4,5,6
9.1	Compositions, classification, flavouring extracts, major spices of India (pepper, cardamom, ginger, chillies) process, composition and uses. Minor spices of India Coriander, cumin, cinnamon, fenugreek, garlic, mace and nutmug, onions, mustard, saffron, cloves, asafoetida, processing and uses. Flavour Constituents of Spices, vegetables and fruits, fermented products, meat, sea food	5	1,2,3,4,5,6
10	Neutraceuticals		1,2,3,4,5,6
10.1	Definition, Types , Uses	4	1,2,3,4,5,6
11	Tea And Coffee		1,2,3,4,5,6
11.1	Tea classification, processing, composition, preparation of tea products. Coffee classification, processing, composition, coffee making, soluble coffee	6	1,2,3,4,5,6

REFERENCES

- 1.Srilakshmi, B.. Food Science (3rd edition), New Age International (P) Limited Publishers, New Delhi, 2003.
2. National Institute of Industrial Research Board, Hand Book on SPICES Asia Pacific Business press

Inc. New Delhi.

3.Potter, N.N. Food Science (5th edition), CBS publishers and Distributors, New Delhi, 1995.

4. Manay, N.S, Shadaksharaswamy, M., Foods- Facts and Principles., New Age International Publishers., New Delhi., 2004

FOOD PRESERVATION TECHNOLOGY

Course	Details
Code	FQ2B56
Title	Food Preservation Technology
Degree	B.Sc.
Branch(s)	Food Science
Semester	II
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the basic principles of food preservation processes	Re	PSO1,3
2	Understand the mechanisms of spoilage of foods and raw materials	Re	PSO1,3,4,6
3	Recognize the range of processing operations used in food preservation techniques	Re	PSO1,5
4	Recall the sources and variability of raw food material and the impact on food processing operations	U	PSO1,5
5	Compare food quality (texture, sensory, structure/appearance, etc.) to the chemical composition, processing and storage conditions	U	PSO1,3,5
6	Recognize effects of processing and storage conditions on shelf life of food	Re	PSO1,4,5

Course Description

Module	Course Description	Hrs	CO
1	INTRODUCTION TO FOOD PRESERVATION		
1.1	Introduction and Importance	3	1
1.2	Principles and Types	3	1
2	PRESERVATION BY USE OF HIGH TEMPERATURE		
2.1	Pasteurization	2	1,3,4,5
2.2	Streilization	2	1,3,4,5
2.3	Canning	2	1,3,4,5

2.4	History and steps involved, types of cans and bottles.	1	1,3,4,5
2.5	Spoilage encountered	1	1,3,4,5
3	PRESERVATION BY USE OF LOW TEMPERATURE		
3.1	Refrigeration-Advantages, systems. Factors to be considered, common spoilage	6	1,3,4,5
4	PRESERVATION BY USE OF VERY LOW TEMPERATURE		1,3,4,5
4.1	Freezing, difference between refrigeration and freezing, methods of freezing, steps involved in freezing, common food spoilage, types of freezing, maintenance of freezers	8	1,3,4,5
5	PRESRVATION BY REMOVAL OF MOISTURE		1,3,4,5
5.1	Concentration, principles and types of concentrated foods. Drying and dehydration-merits and demerits, factors affecting drying, preparation of food for drying. Freeze drying, dehydrofreezing-advantages mechanism of freeze drying and dehydrofreezing.	8	1,3,4,5
6	PRESERVATION BY USING SUGAR		
6.1	Sugar concentration, principles of gel formation, preparation of jam, jelly, marmalades, preserve, candy, glazed, crystallized fruits, FPO specification	7	1,3,4,5
7	PRESERVATION BY USING CHEMICALS AND SALTS		1,3,4,5
7.1	Chemical preservatives-definition, role of preservatives, permitted preservatives. Pickling-principles involved and types of pickles	7	1,3,4,5
8	FERMENTATION		1,3,4,5
8.1	Advantages, factors affecting, types of fermentation, common fermented foods-wine, beer, distilled liquors, vinegar and cheese manufacture	10	1,3,4,5
9	IRRADIATION		
9.1	Properties of irradiation, advantages, mechanism, affects on foods, permitted doses, dose determination factors. Microwave heating-properties, mechanism, advantages and applications.	8	1,3,4,5
10	COMBINATION PRESERVATION	4	1,3,4,5

REFERENCES

1. Subalakshmi, G and Udipi, S.A. Food processing and preservation; New Age International Publishers, New Delhi, 2001.
2. Srilakshmi, B. Food Science. New Age International Publishers, New Delhi, 2003.
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6. Cruess, W.V. Commercial Fruits and Vegetable Products, Anees Offset press, New Delhi, 1997

FOOD MICROBIOLOGY

Course	Details
Code	FQ2B54
Title	Food Microbiology
Degree	B.Sc.
Branch(s)	Food Science
Semester	II
Type	CORE
Credits	4
Total hours	72
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand causes of food borne illnesses	Re	PSO1,5
2	Explain the characteristics, growth, morphology and prevention of disease causing micro organisms, food borne illnesses and suspect foods in a commercial kitchen	Re	PSO1,4,5
3	Recognize food poisoning, chemical food poisoning, and food infection	Re	PSO1
4	Illustrate proper techniques for storing supplies and rodent control techniques	U	PSO1,3,5
5	Describe proper handling techniques for potentially hazardous foods	Re	PSO1,3,5
6	Identify proper hygienic requirements for food handlers and premises	Re	PSO1,3,5,8
7.	Identify and understand the nature of micro organisms, its media and equipment beneficial effects	Re	PSO1,3,5

Course Description

Module	Course Description	Hrs	CO
1	INTRODUCTION TO MICROBIOLOGY		
1.1	Characteristics and morphology of bacteria, fungi, virus, algae and protozoa	8	1
2	CONTROL OF MICROORGANISM		7
2.1	Growth curve Effect of pH, Water activity, O ₂ availability, temperature on the growth of microorganisms	6	7
3	CULTURES AND MEDIA		2
3.1	Different type of media.	10	2

	Preparation of media Culturing techniques		
4	INDICATOR MICROORGANISM		7
4.1	Sources, methods of detection, growth & survival & significance of a) coliforms b) faecal streptococci c) enterobacteriaceae	3	
5	CONTAMINATION AND SPOILAGE OF DIFFERENT FOODS		1,3
5.1	a) Cereals, sugar and their products. b) Milk & milk products c) Vegetables & fruits d) Canned foods e) Meat, fish, egg and poultry	12	1,3,5,6
6	ENVIRONMENTAL MICROBIOLOGY		1,3,5,6
6.1	Water- test for E.coli Air, Soil and sewage Biogeochemical activity of microorganisms in soil.	10	1,3,5,6
7	MICROBIOLOGICAL INTOXICATIONS AND INFECTIONS		
7.1	Toxic production and physiological action Methods of control Microbiological standards	12	2,3,5,6,7
8	BENEFICIAL MICROORGANISMS.		2,3,5,6,7
8.1	Micro organisms of industrial importance a) biomass b)fermentation c) enzymes & hormones Antibiotics & vaccines Micro organisms & effluent treatment	11	2,3,5,6,7

REFERENCES:

1. Frazier, W.C. Food Micro biology . 4th edition. Mc Graw Hill. Newyork.
2. Pelzar, H.J. and Rober, D. Microbiology 5th edition Mc Graw Hill. Newyork
3. Banwart, G.T. Basic Food Microbiology. CBS Publishers, New Delhi.
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5. Bryan,F.L., Diseases transmitted by foods. Munich Publishers, Atlanda.
6. Jacob.M, Safe food handling, a training guide for Manager, WHO, Geneva, MARRIOTT.N.G (1989)

III SEMESTER

POST HARVEST TECHNOLOGY

Course	Details
Code	FQ3B57
Title	POST HARVEST TECHNOLOGY
Degree	B.Sc.
Branch(s)	Food Science
Semester	III
Type	CORE
Credits	4
Total hours	90
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the types of foods, its processing and importance	U	PSO1
2	Describe the process of plant and animal foods, manufacturing products to produce a variety of food products, value addition	Re	PSO1
3	Identify the areas of concern in the processing of products, in relation to process control and export.	Re	PSO1
4	Exemplify the requirements for export and chemical and physiological structure and changes of plant and animal foods	U	PSO1
5	Distinguish processing techniques used to produce a variety of milk products.	An	PSO1
6	Analyse the process of harvesting, processing and storage of sea foods	An	PSO1,2,3
7	Evaluate variety of egg products produced in the food processing industry including egg structure and egg quality.	Ev	PSO1,2,3
8.	Illustrate the advances in processing technology	U	PSO1

Course Description

Module	Course Description	Hrs	CO
1	Physical principles underlying food processing operations such as		
1.1	Thermal processing Refrigeration Freezing	4	1,2

1.2	Dehydration Ionizing radiation.	5	1,2
2	Chemical changes in food		
2.1	Chemical changes in food that affect the Texture, Colour, Flavour during processing and storage	4	4
2.2	Chemical changes in food that affect the Odour, Stability and nutritive quality during processing and storage	3	4
3	Processing technology		
3.1	Cereals: <ul style="list-style-type: none"> • Wheat- milling , Bread , biscuits and cake manufacture, functions of ingredients • Rice- milling , Parboiling of rice, changes during parboiling, advantages and disadvantages. • Corn- milling ,corn flakes. 	4	1,2,3,4
3.2	Legumes- processing. Oilseeds -extraction, refining, hardening of fat-hydrogenation and inter esterification.	4	1,2,3,4
3.3	Fruits and vegetables Ready to serve beverages, formulation general steps involved in the processing, FPO specification. Tomato puree, tomato ketchup- general steps involved in processing. Preservatives used in fruit and vegetables processing, FPO specification.	4	1,2,3,4
3.4	Milk & Milk products Pasteurized Milk- General steps involved in Processing , calculation of standardization of milk- application of Pearson Square method, Method of manufacture of sterilized milk, tonedmilk.Cream principles of cream separation, factors influencing fat percentage of cream ,application of Pearson square method for standardization of cream. Butter-Theories of churning. Ice-cream Hardening Dried Milks- definition ,method of manufacture of whole milk powder and skim milk powder.	21	1,5
3.5	Meat, Fish, Poultry and egg Meat processing - ante mortem inspection , post mortem inspection, tenderization , curing , smoking , canning , reactions involving colour changes in meat, general steps involving in the manufacture of sausages. Fish Processing - general steps involved in block and IQF freezing . Poultry Processing- general steps involved . Egg processing- - freezing and drying of egg products	16	1,6,7
4	Extrusion technology		
4.1	Single screw extruder, Advantages of extrusion cooking	5	8
5	Fermentation technology		
5.1	Microbes involved, common cultures of importance in food industry, fermentation in a food industry	6	8
5.2	High Protein food technology , Biomass, SCP, protein isolates, nutrient	5	8

	supplements and health drinks		
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REFERENCES

1. Kent, J.A. Riegels Handbook of Industrial Chemistry, 7th edition. Van Nostrand Reinhold Company, New York. 2003.
2. Dubey, R.C. A Textbook of Biotechnology. S.Chand & Company Limited, New Delhi. 2000.
3. Prescott and Proctor B.E. Food Technology. MC Graw hill Book Co. New York 1997.
4. Potter, N. N., Hotchkiss, J. H. Food Science . CBS Publishers, New Delhi. 2000.

ANALYTICAL INSTRUMENTATION

Course	Details
Code	FQ3B58
Title	ANALYTICAL INSTRUMENTATION
Degree	B.Sc
Branch(s)	Food science
Semester	III
Type	CORE
Credits	4
Total hours	90
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	To impart an understanding the basic and modern techniques in the instrumentation equipments used for analysis	Re	PSO1,3
2	An ability to apply the knowledge of science, and technology and the use of instruments in detection for presence or absence of contaminants	Re	PSO1,2,3,5
3	Understand the techniques, skills, and modern tools necessary in analytical detection during food processing operations of food samples	U	PSO1,3,5,7
4	Apply knowledge for detection of adulterants in food and shelf-life extension of food products	Ap	PSO1,3,5

Course Description

Module	Course Description	Hrs	CO
1	Basic principles of chromatography	8	1,2,3,4
2	Paper Chromatography Introduction, general principles, procedure, types of paper chromatography, applications	2	1,2,3,4
3	Thin layer chromatography Introduction, principle, procedure, general application.	2	1,2,3,4
4	Column liquid chromatography General procedure, qualitative analysis, separation and resolution, quantitative analysis.	1	1,2,3,4
5	HPLC (High performance liquid chromatography)		
5.1	Introduction, principle of separation, components of an HPLC system	7	1,2,3,4

5.2	Pump, injector, column (column hardware and column packing materials in brief) detector and different types of detectors, recorder, Application of HPLC	7	1,2,3,4
6	Gas chromatography Introduction, sample preparation, principle of separations, components gas supply system, injection port, oven, column and stationary phases, types of columns, detectors different types of detectors, recorder, types of carrier gases used.	12	1,2,3,4
7	Spectrophotometry introduction and principles	11	1,2,3,4
8	Ultra violet and visible absorption spectroscopy basis of absorption spectroscopy, deviations from Beers law, procedural consideration, and calibration curves. Instrumentation and instrument design, application.	16	1,2,3,4
9	Fluorimetry introduction, principle and techniques, instrumentation and application.	8	1,2,3,4
10	Radiotracer techniques radioactive counters, solid, gas and liquid scintillation.	8	1,2,3,4
11	Measurement of enzyme activity	4	1,2,3,4
12	Electrophoresis definition , types of electrophoretic methods, free solution electrophoresis, tisetius method, paper or agar gel electrophoresis, PAGE.	4	1,2,3,4

REFERENCES:

1. Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett Publishers, Boston , London.2004.
2. Mahindru, S.N. Food additives. Characteristics, detection and estimation. Tata Mc Graw-Hill Publishing Company Limited, New Delhi.2000.
3. Pearson, D. The Chemical Analysis of Foods. Churchill Livingstone, New York. 2002.
4. Sharma, B.K. Instrumental Methods of Chemical Analysis. Goel Publishing House, New Delhi. 2004.

FOOD PACKAGING MATERIALS AND TESTING

Course	Details
Code	FQ3B59
Title	FOOD PACKAGING MATERIALS AND TESTING
Degree	B.Sc.
Branch(s)	Food Science
Semester	III
Type	CORE
Credits	4
Total hours	90
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the types and concepts of packaging	U	PSO1
2	Interpret the role and function of packaging materials used for a range of consumer food needs and wants.	U	PSO1,8
3	Illustrate the properties of food packages to conversion technologies, processing and packaging technologies and user requirements including safety, convenience and environmental issues.	U	PSO7,8
4	Measure and evaluate the chemical, physical and mechanical properties of packages and packaging.	Ev	PSO1,3,4
5	Analyse the principles and practices of different types of packaging materials	An	PSO1,8

Course Description

Module	Course Description	Hrs	CO
1	INTRODUCTION TO FOOD PACKAGING		
1.1	Definition, functions of packaging	2	1
1.2	Requirements for effective packaging.	1	1
2	CLASSIFICATION OF PACKAGING		
2.1	Primary Secondary and tertiary packaging	3	1,2
2.2	Flexible, rigid and Semi- rigid packaging.	3	1,2
3	MATERIALS FOR FOOD PACKAGING, TYPES, USES, MERITS		

	DRAWBACKS.		
3.1	Paper	5	1,2,3
3.2	Glass	4	1,2,3
3.3	Plastic	4	1,2,3
3.4	Tin, Aluminum	4	1,2,3
4	Different forms of food containers		
4.1	Boxes	2	1,2,3
4.4	Jars	2	1,2,3
4.3	Cans	2	1,2,3
4.4	Bottles	2	1,2,3
5	MODERN CONCEPTS OF PACKAGING TECHNOLOGY.		
5.1	Aseptic packaging	3	3,5
5.2	Form Fill Seal packaging, Easy - Open End, Boil in- bags, Closures	4	3,5
5.3	Retort Pouches	3	3,5
5.4	Edible Films	4	3,5
6	Food packaging Laws & Specifications	7	
7	QUALITY TESTING OF PACKAGING MATERIALS		
7.1	(a) Physical Test	4	4,5
7.2	(b) Chemical Test	4	4,5
7.3	(c) Transportation hazards and testing	4	4,5
8	SHELF LIFE TESTING OF DIFFERENT PACKAGED FOODS.		
8.1	Tin, Plastic	6	4,5
8.2	Oxygen interactions, moisture interchanges and aroma permeability	7	4,5
9	Interaction of packages with foods		

9.1	global migration of plastics, tin can corrosion	10	1,2,3
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REFERENCES:-

- 1.Sacharow, S., Griffin, R.C. Food Packaging. AVI Publishing Company, West Port, Connecticut. 2000.
- 2.Davis, E.G. Evaluation of tin & plastic containers for foods. CBS Publishers, New Delhi. 2004.
- 3.Cruess, W.V. Commercial Fruit & Vegetable Products. Allied Scientific Publishers, Delhi. 2003.
- 4.Potter, N. N., Hotchkiss, J. H. Food Science . CBS Publishers, New Delhi. 2000.
- 5.Raj, G .D. Encyclopaedia of Food Science, Vol 2. Anmol Publications PVT Ltd, New Delhi.

SEMESTER IV

FOOD SAFETY AND QUALITY ASSURANCE

Course	Details
Code	FQ4B60
Title	FOOD SAFETY AND QUALITY ASSURANCE
Degree	B.Sc.
Branch(s)	Food Science
Semester	IV
Type	CORE
Credits	4
Total hours	108
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the scientific concepts of chemistry and microbiology to the development, monitoring and maintenance of food safety and quality assurance systems specific to the food processing industry.	U	PSO1,5
2	Differentiate effectiveness of practical applications of food safety and quality assurance system elements in a food manufacturing environment, across the logistics chain from the farm to the consumer.	An	PSO1,5
3	Understand the law and regulations applicable to food processing from the perspective of food safety and quality assurance and their effects on operational activities in a food manufacturing facility.	U	PSO1,5
4	Understand Food safety and quality system audit tools (i.e. GFSI, ISO) that inform compliance of food processing operations to laws and regulations.	U	PSO1,5

Course Description

Module	Course Description	Hrs	CO
1	QUALITY CONTROL CONCEPTS AS APPLIED TO THE FOOD INDUSTRY.		
1.1	General concepts of quality and quality control. Major quality control functions	8	1,4
2	STANDARD TESTS FOR QUALITY ASSESSMENT.		
2.1	Standard tests for quality assessment	16	1,4

	Microanalytical tests Microbiological tests Histological tests Standard test methods		
3	STANDARDS AND SPECIFICATIONS.		
3.1	Voluntary and compulsory standards Packaging and labeling standards Specifications- consumer, company, in-process, finished products Development of specification-a sample study ISO AND HACCP	25	1,3,4
4	QUALITY CONTROL IN FOOD INDUSTRY		
4.1	Methods of evaluation and control of the various aspects of quality of raw materials manufacturing process and testing of finished products	8	2,3,4
5	QUALITY ASSURANCE AND TOTAL QUALITY CONTROL		
5.1	Nature of TQC Approaches to TQC Role of Management	12	1,4
6	STATISTICAL QUALITY CONTROL.		
6.1	Definition How to determine the need for SQC The control chart, definition, uses, process control.	12	1,4
7	QUALITY IMPROVEMENT TECHNIQUES.		
7.1	Quality improvement plans (QIP) Quality control circles (QCC)	7	2,3,4
8	EXTERNAL QUALITY CONTROL ACTIVITIES		
8.1	Inspection Pre shipment inspection and inspection at port of destination and inspection at port of destination Certification and quality marks Standardization and national standards bodies Testing laboratories	20	2,3,4

REFERENCES:

1. Kent, J.A.Riegels Handbook of Industrial Chemistry, 7th edition. Van Nostrand Reinhold Company, New York. 2003.
2. Dubey, R.C. A Textbook of Biotechnology. S.Chand& Company Limited,NewDelhi. 2000.
3. Prescott and Proctor B.E.Food Technology. MC Graw hill Book Co. New York 1997.
4. Potter, N. N, Hotchkiss, J. H. Food Science . CBS Publishers, New Delhi. 2000.

MANAGEMENT IN FOOD INDUSTRY

Course	Details
Code	FQ4B64
Title	MANAGEMENT IN FOOD INDUSTRY
Degree	B.Sc.
Branch(s)	Food Science
Semester	IV
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Classification and mobilization of people and resources . Students identify and secure customers, stakeholders, and team members through networks, primary customer research, and competitive and industry analyses in order to prioritize and pursue an initial target market in real-world projects.	U	PSO 3,8,9
2	Understand different methods to assess the attractiveness of business opportunities	U	PSO9
3	Understand what characterizes an attractive business opportunity and common pitfalls during the business process	U	PSO9
4	Understand the dynamics of how teams develop and function as well as the various types of conflicts that can arise during teamwork	U	PSO9
5	Design new food products which are marketable and nutritionally and economically viable	Cr	PSO7
6	Understand the implementation of management principles in food industries	U	PSO1,3,9

Course Description

Module	Course Description	Hrs	CO
1	Management characteristics, objectives, principles, challenges, importance, levels of management, Food industry and management planning flow of work in the industry, work simplification techniques.	12	6
2	Business forecasting and decision making -definition and methods of forecasting, Characteristics, steps, techniques and types of decisions	8	2,3,4,5,6
3	Organization structure definition, role, types of organization charts, types of organizations, line and staff conflict. Departmentation definition, need, dangers and methods	13	4,5,6
4	Plant - location and layout, hygienic practices, personal cleanliness, maintenance of equipment, pest control.	6	1,6

5	Consumer behaviour - definition, types of consumers , application in food industry	5	1,4,6
6	Current consumer trends fabricated , functional, fast, ready- to eat and convenience foods.	7	1,4,6
7	Product Development - need for new products, stages in product development, factors to be considered for it, product diversification	8	2,3,5,6
8	Pricing and distribution of new product - kinds of pricing penetration and skimming , new product pricing strategies, channels of distribution middlemen and franchise, whole saler and retailer.	8	2,3,5,6
9	Sales promotion meaning , types, promotional mix, role of advertising and after sales service	5	2,3,5,6

REFERENCES:

1. Kotler, P. Keller, K.L. Marketing management, 12th edition. Pearson Education, Singapore. 2006 .
2. Paine, Frank A (Ed) Modern Processing, Packaging and Distribution System for Food Blackie, Glasgow and London 1997.
3. Raphael, H J. Olsson, D. L. Package production Management 2nd edition AVU Publishing. Co., Inc, Connecticut 1996.
4. Bender, F.E. Kramer, A. K. Systems analysis for the food industry AVI Publishing. Co., Connecticut 2000.
5. Hayes, G. D. Food Engineering data handbook. Longman scientific and Technical, New York .2004.
6. Ramaswamy, V.S. and Namakumari, S. Marketing management- planning , implementation and control, 3rd edition. Macmillan India Ltd, New Delhi. 2007.
7. Sharma, R.K. and Gupta, S.K. Business Management. Kalyani Publishers, New Delhi. 2001.

SENSORY EVALUATION

Course	Details
Code	FQ4B61
Title	SENSORY EVALUATION
Degree	B.Sc.
Branch(s)	Food Science
Semester	IV
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand ability to identify solutions to problems related to the sensory analysis of food and to apply and expand upon the theoretical concepts as presented in lectures	U	PSO1,2
2	Illustrate familiarity and competence with the practical skills and techniques used to analyse the sensory properties of food. This will include experimental planning, the preparation of suitable samples	U	PSO2,4,5,6
3	Recognize terminology, appropriate to the field of sensory analysis, correctly and contextually.	Re	PSO1
4	Explain the benefits and limitations (scientific and ethical) of the sensory evaluation of food	U	PSO1

Course Description

Module	Course Description	Hrs	CO
1	Definition of sensory evaluation , Importance of sensory evaluation ,Practical requirements for conducting sensory tests limitations of sensory	3	1,3
2	General testing conditions---Testing area ,testing set up ,lighting, testing schedule,preparation of samples, sample coding ,evaluation card preparation.	2	2
3	Sensory assessment of food quality.		
3.1	<ul style="list-style-type: none"> Taste sensation on the tongue ,Recognition test for the four basic tastes.,Water quality for sample preparations ,Standard compounds used for preparing basic tastes. ,Taste modifiers, Perception of sweet taste. Odour and Smell Anatomy of nose ,Smelling techniques, ,VonskramlkTest,Theories of olfaction. 	10	1,2,3,4
3.2	<ul style="list-style-type: none"> TextureDefinition of texture, Classification of textural characteristics ,glossary of textural terms ,Definition for mechanical properties ,Texture measurement. Colour vision and appearance measurement-Structure of eye, Visual perception and colour of foods. 	10	1,2,3,4

3.3	<ul style="list-style-type: none"> • Flavour and aroma ---Demonstration of the physiology of aroma perception , Definition of flavour , Flavour profile methods ,Flavour • Temperature sensation , pain sensation , touch sensation kinesthetic sensations, and sound sensations 	10	1,2,3,4
4	Sensory testing of foods-		
4.1	<ul style="list-style-type: none"> • Threshold tests • Difference tests • Ranking tests • Hedonic tests • Acceptance and preference tests • Scoring test • Sensitivity tests 	10	1,2,3,4
5	Application of sensory analysis to food industry problems, Number of panel members and samples required for sensory analysis.	2	1,2,3,4
6	Data analysis-importance of data analysis, tests of significance ,null hypothesis ,mean, median ,variance, standard deviation, t-test ,chi-square test	15	2,3
7	Sensory evaluation of products-baked products ,milk, spices, fruits and vegetables	10	1,2,3,4

REFERENCE

1. Jellinek, G., Sensory Evaluation of Food-Theory and Practice., Elis Horwood Ltd.,England.,1985.
2. Srilakshmi,B., Food Science., New Age International (P) Limited., New Delhi.,2005.
3. Manay,S., Shadaksharaswamy,M., Food Facts and Principles, New Age International (P) L imited., New Delhi., 2008.

SEMESTER V

FOOD ANALYSIS AND ADULTERATION TESTING

Course	Details
Code	FQ5B64
Title	FOOD ANALYSIS AND ADULTERATION TESTING
Degree	B.Sc.
Branch(s)	Food Science
Semester	V
Type	CORE
Credits	4
Total hours	108
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand ,concept,standards and regulations, the use of standard techniques of foodanalysis and the treatment of its calculation	U	PSO1,3,4
2	Interpret modern instrumental methods to analyse chemical and physical properties of foods	U	PSO1,3,4
3	Understand principles and methods for the proximate analyses of foods. Evaluation of test methods	U	PSO1,2,3,4
4	Estimate the use of Official Methods of Analysis of AOAC International	Ap	PSO1,2,3,4
5	Analyse the chemical and physical properties of food using Instrumental methods	A	PSO1,2,3,4
6	Applications of food analysis in research, government, trade and the food industry.	Ap	PSO1,6

Course Description

Module	Course Description	Hrs	CO
1	Introduction to food analysis proximate principles, population and sampling, importance of sampling, official methods of analysis.	6	1
2	Sampling techniques types of sampling, sampling plan, preparation of samples,problems in sampling.	8	1
3	Chemical methods of analysis of foods		
3.1	Chemical methods of analysis of foods moisture assay oven drying methods, Distillation methods, Karl Fischer titration (chemical method) and physical methods.	10	2.3.4.5
3.2	Total carbohydrate, starch ,crude fibre. Protein analysis	10	2.3.4.5
4	Food adulteration - definition, classification intentional & incidental,	10	2.3.4.5

	health hazards caused by various adulterants and the critical level of metals in various foods.		
5	Food laws voluntary, mandatory, national and international.	12	1
6	Role of voluntary agencies legal aspects of consumer protection.	6	1
7	Food standards - national and international.	16	1

REFERENCE

1. Kalia, M. Food Analysis and Quality Control. Kalyani Publishers, New Delhi. 2002.
2. Winton, A.L and Winton, K.B. Techniques of food analysis. Allied Scientific Publishers, New Delhi. 1999.
3. Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett Publishers, Boston, London. 2003.
4. Connell, J.J. Control of fish quality. Blackwell Scientific Publications, Cambridge

FOOD TOXICOLOGY

Course	Details
Code	FQ5B65
Title	FOOD TOXICOLOGY
Degree	B.Sc.
Branch(s)	Food Science
Semester	V
Type	CORE
Credits	4
Total hours	72
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the definitions of toxicology and Toxicity	U	PSO1
2	Recognize different types of toxic responses	Re	PSO1
3	Classify Toxicants	U	PSO1
4	Determine toxic effects of specific food toxicants	Ap	PSO1,2,4,7
5	Infer action of specific food toxicants	U	PSO1,2,4,7
6	Estimate the issues related to presence and management of food toxicity and potentially toxic compounds in our food supply	Ap	PSO1,2,4,7

Course Description

Module	Course Description	Hrs	CO
1	IMPORTANCE OF TOXICOLOGY		
1.1	Scope, Basic division, goals, Basic concept	10	1
2	NATURALLY OCCURRING TOXICANTS IN VARIOUS FOODS		
2.1	Toxicants in Plant foods-	4	1,2,3,5,6
2.2	Seafood toxins	4	12,,3,56
2.3	Antivitamins	4	1,2,3,5,6
2.4	Radioactive metals in foods- Toxic minerals- other inorganic compounds occur in Food & Water	3	1,2,3,56
3	TOXICANTS OF PUBLIC HEALTH HAZARD		
3.1	Chemical contaminants	3	1,2,3,5,6
3.2	Pesticide residues- types of pesticides	3	12,,3,56
3.3	Automobile emissions(CO, SO ₂ , NO), Hydrocarbons- photochemical products-	4	1,2,3,5,6
3.4	Heavy metals(Mercury, Arsenic, Lead, Cadmium, Aluminium, Tin)	3	1,2,3,56
3.5	Food additives- types- health hazards	4	1,2,3,5,6
3.6	Radioactive substances-kinds of radiators- sources of radiations- biological effect of radiations	4	1,2,3,56
4	XENOBIOTICS		

4.1	Absorption, Assimilation,	4	1,4,5,6
4.2	Utilization and excretion of xenobiotics	4	1,4,5,6
4.3	Biotransformation- Phase I and Phase II	4	1,4,5,6
5	CARCINOGENS		
5.1	Types- Mechanism of chemical carcinogens-mutagens and Teratogens	14	1,4,5,6

REFERENCES:

- 1.B.Jacob, Chemical analysis of food and food products by Morris, 3rdedtn,
- 2.Nutritional and Toxicological aspects of food processing edt. Walker and E.QuattrucciTayloss and Francis New York 1980

OPEN COURSE- FOOD FACTS AND PRINCIPLES

Course	Details
Code	FQ5D67
Title	FOOD FACTS AND PRINCIPLES
Degree	B.Sc.
Branch(s)	Food Science
Semester	V
Type	CORE
Credits	3
Total hours	72
Hours per week	4

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the various nutrients and their nutritional functions	U	PSO 1
2	Integrate the knowledge of nutritional principles and their application in disease prevention and treatment	An	PSO1,7
3	Understand the concepts and practice of hygiene and safety in food preparation and service	U	PSO 1,5
4	Design and innovate novel food products	Cr	PSO 1,7

Module	Course Description	Hrs	CO
1	FOOD		
1.1	Definitions and Functions	1	1
1.2	Food groups, Food guide	1	1
2	Classification of foods		
2.1	Organic Foods ,natural foods	1	1,2
2.2	Functional Foods	2	1,2
2.3	Probiotic and Prebiotic Foods	2	1,2
2.4	Fabricated Foods	2	1,2
2.5	Functional Foods	1	1,2
2.6	Space Foods	2	1,2
2.7	Health Foods	1	1,2
2.8	Nutritional Foods	1	1,2
2.9	Convenience and fast foods	1	1,2
3	METHODS OF PRESERVATION		
3.1	Low temperature	2	3
3.2	High temperature	3	3
3.3	Use of preservatives	3	3

3.4	Dehydration	3	3
3.5	Irradiation	3	3
4	FOOD ADULTERATION		
4.1	Definition and types	2	3
4.2	Intentional	4	3
4.3	Incidental	4	3
4.4	Methods of detection	4	3
5	PREPARATION OF VARIETY OF FOODS		
5.1	Jam	2	3,4
5.2	Jellies	2	3,4
5.3	Marmalades	2	3,4
5.4	Purees	2	3,4
5.5	Sauces	3	3,4
5.6	Pickles	3	3,4
6	FOOD PACKAGING		
6.1	Definition ,Functions and requirements for Effective Packaging	3	3
6.2	Classification of packaging	3	3
6.3	Materials for food packaging	3	3
6.4	Modern concepts of food packaging technology	5	3

References:

1. Giridhar Lal, G.S, Siddappa and G.L Tandon, Preservation of fruits and vegetables, Indian council of agricultural Research, New Delhi
2. N.Shakunthalamanay and M.Shadhakaraswamy, Food Facts and Principles, New Age international Publishers

PRACTICALS

FOOD ANALYSIS AND ADULTERATION TESTING [T & P] – 1

Course	Details
Code	FQ5B64
Title	FOOD ANALYSIS AND ADULTERATION TESTING [T & P] - 1
Degree	B.Sc.
Branch(s)	Food Science
Semester	V
Type	CORE
Credits	5
Total hours	108
Hours per week	5

COURSE OUTCOME

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the applications of various equipments, apparatus and analysis by chemical techniques in food	U	PSO1,2,3,4,5
2	Understand the mechanism and principles, procedures and calculations of various techniques employed for detection of adulterants in food and general analysis	U	PSO1,2,3,4,5
3	Identify the various chemical techniques in the analysis of foods and adulterants present if any	Re	PSO1,2,3,4,5
4	Understand the quality assessment of food products by estimation of all quality parameters	U	PSO1,2,3,4,5

Course Description

Module	Course Description	Hrs	CO
1	Introduction to laboratory equipment and apparatus. Introduction to investigative techniques- qualitative and quantitative analyses	2	1
2	Analysis of squash sugars, acidity, ascorbic acid, preservatives (SO ₂ and benzoic acid), qualitative test for preservatives and test for synthetic colours	6	
3	Analysis of milk - milk solids, ash, fat, protein, lactose, acidity, qualitative tests. Basic tests for milk analysis taste, flavour and appearance, alcohol test	5	1,2,3,4
4	Analysis of condensed milk total milk solids, fat, acidity, sugars and qualitative tests	5	1,2,3,4
5	Analysis of vinegar total solids, acidity and specific gravity	3	1,2,3,4
6	Analysis of honey moisture, sugars and qualitative tests.	4	1,2,3,4

7	Detection of adulteration in various foods milk, condensed milk, honey, squash, sugar and salt	5	1,2,3,4
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Reference

Jacobs, M.B. The chemical analysis of foods and food products. Krieger Publications, London. 2000

BASIC MICROBIOLOGY PRACTICALS

Course	Details
Code	FQ5B65
Title	BASIC MICROBIOLOGY PRACTICALS
Degree	B.Sc.
Branch(s)	Food Science
Semester	V
Type	CORE
Credits	3
Total hours	90
Hours per week	7

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand and know parts of microscope, type and its principle	U	PSO1,2,3,4,5
2	Understand the theoretical concepts of related stain	U	PSO1,2,3,4,5
3	Understand different methods of staining technique	U	PSO1,2,3,4,5
4	Understand various accessories for microbiology practicals	U	PSO1,2,3,4,5

Course Description

Module	Course Description	Hrs	CO
1	Study of compound microscope.	2	1,4
2	Working and handling of common microbiological laboratory equipments and materials	4	1,2,4
3	Preparation of microscopic examination.	2	1,2
4	Monochrome staining	5	1,2,3
5	Differential staining.	5	1,2,3
6	Capsule staining	5	1,2,3
7	Spore staining.	5	1,2,3
8	Microscopic examination of living organisms- Hanging Drop Mount method for the demonstration of bacterial motility	6	1,2,3,5
9	Negative staining of bacteria.	5	1,2,3,4,5
10	Composition ,preparation and sterilization of media nutrient agar, potato dextrose agar, Mc Conkey agar, EMB agar	14	1,3,5
11	Isolation, enumeration and characteristics of micro organisms	14	1,2,3,4,5
12	Microbiology of air and surface isolation of microorganism from air by settle plate method	23	1,3,5

REFERENCE:

Dubey, R.C. and Maheshwari, D.K. Practical microbiology. S.Chand and Company Limited, Ramnagar.2002.

FOOD CHEMISTRY

Course	Details
Code	FQ5B66
Title	FOOD CHEMISTRY
Degree	B.Sc.
Branch(s)	Food Science
Semester	V
Type	CORE
Credits	2
Total hours	72
Hours per week	5

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the applications of various equipments, apparatus and analysis by chemical techniques in food	U	PSO1,2,4,5
2	Understand the mechanism and principles , procedures and calculations of various techniques employed for detection of adulterants in food and general analysis	U	PSO1,2,4,5
3	Understand basic preparation of solutions and buffers.	U	PSO1,2,4,5
4	Understand the functioning and principle of various instruments	U	PSO1,2,4,5

Module	Course Description	Hrs	CO
1	Qualitative tests for carbohydrates	6	1,2,3
2	Qualitative tests for proteins.	7	1,2,3
3	Standardisation of Sodium hydroxide.	3	1,2,3
4	Standardisation of Hydrochloric acid.	3	1,2,3
5	Standardisation of Sodium thiosulphate.	3	1,2,3
6	Standardisation of Potassium permanganate.	3	1,2,3
7	Standardisation of EDTA solution.	3	1,2,3
8	Standardisation of Fehlings solution. .	3	1,2,3
9	Estimation of Glucose by Lane and Eynons method.	4	1,2,3
10	Estimation of Sucrose by Lane and Eynons method.	6	1,2,3,
11	Estimation of Aldose by WillstattersIodometric titration.	6	1,2,3,
12	Moisture assay by oven drying method	6	1,2,3,4
13	Estimation of Starch	6	1,2,3,

14	Estimation of Crude fiber	6	1,2,3
15	Paper chromatography	7	1,2,3,

REFERENCE:

Sadasivam,S. Manickam, A. Biochemical Methods,2nd edition. New Age International (P) Limited, New Delhi.2001.

SEMESTER VI

ENTREPRENEURSHIP DEVELOPMENT

Course	Details
Code	FQ6B70
Title	Entrepreneurship Development
Degree	B.Sc.
Branch(s)	Food Science
Semester	VI
Type	CORE
Credits	3
Total hours	72
Hours per week	4

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand Entrepreneurship and help Innovation minors to be able to sell themselves and their ideas . Students master oral and visual presentation skills and establish a foundation of confidence in the skills necessary to cause others to act.	U	PSO1
2	Focus on Entrepreneurship and Innovation minorsto be able to find problems worth solving . Students advance their skills in customer development, customer validation, competitive analysis, and iteration while utilizing design thinking and process tools to evaluate in real-world problems and projects in management	An	PSO3,8,9
3	Classification and mobilization of people and resources . Students identify and secure customers, stakeholders, and team members through networks, primary customer research, and competitive and industry analyses in order to prioritize and pursue an initial target market in real-world projects.	U	PSO 3,8,9
4	Understand different methods to assess the attractiveness of business opportunities	U	PSO9
5	Understand what characterizes an attractive business opportunity and common pitfalls during the entrepreneurial process	U	PSO9
6	Understand the dynamics of how teams develop and function as well as the various types of conflicts that can arise during teamwork	U	PSO9
7	Plan, organize, and execute a project or new venture with the goal of bringing new products and service to the market	Cr	PSO9

Course Description

Module	Course Description	Hrs	CO
1	Concept of entrepreneurship, essential attributes of an entrepreneur, women entrepreneurs, intrapreneurs, entrepreneurs and economic development	8	1
2	Dynamic of opportunity identification, process of selection of the right business, decision making steps and caution. Types of enterprises demand based, resource based, import substitution and export promotion. Large, Medium, SSI, Partnership and sole proprietorship	12	1
3	Project formulation- various approaches principles of product selection and development techno-economic feasibility of the project, structure of project report.	18	1,2,3,4,5
4	Financial management Financial institutions, role of central and state governments in promoting entrepreneurship incentives, subsidies and grants, fiscal and tax concessions. Agencies and their role DIC, SISI, EDII, NIESBUD, NEDB.	16	5
5	Resource management management of men, machine and materials. CPM and PERT as planning tools for establishing SSIs.	6	1,2,3,4,5
6	Problem solving skills and SWOT techniques.	6	1,2,3,4,5
7	Marketing management Marketing for small business, strategies for sales promotion, pricing policy and its implications on sale, after sales service	8	6,7
8	Management of SSI		
8.1	Sickness in SSI s and their remedial measures Coping with uncertainties Stress management Social responsibility and business ethics	8	1,2,3
9	Legal issues		
9.1	Complications Registration and licensing Income tax, sales tax and excise rules. Pollution control.	8	2,6

REFERENCES

- Deshpande, M. R. Entrepreneurship of small scale industries concept growth and management. Deep & Deep publication, Rajouri, New Delhi. 2002.
- Gupta, C. P. Entrepreneurship Development in India. Sultan Chand and Sons, New Delhi. 2005.
- Abraham, M.M . Entrepreneurship Development & Management, Prakash Publications, Changanacherry. 2000.

FOOD ADULTERATION AND TESTING (T & P) -II

Course	Details
Code	FQ6B69
Title	Food Adulteration and Testing(T & P) -II
Degree	B.Sc.
Branch(s)	Food Science
Semester	VI
Type	CORE
Credits	4
Total hours	108
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand and identify food hazards, adulteration and traceability	Re	PSO1,2,3,5
2	Understand how to validate a method to monitor chemical contaminants	Re	PSO1,2,3,5
3	Understand how to perform advanced analysis methods for food hazards, adulteration and traceability	U	PSO1,2,3,5

Course Description

Module	Course Description	Hrs	CO
1	Physical methods of food analysis food rheology, viscosity, surface tension, refractometry, polarimetry, freezing point and specific gravity, SFI, smoke, flash, fire and cloud points, cold test.	8	1,2,3
2	Chemical methods of analysis of foods Fat analysis solvent extraction-three classes, Goldfish method and Soxhlet method, wet extraction method-Gerber method, acid value, iodine value, saponification value and peroxide value	10	1,2,3
3	Micro nutrient Analysis Ash analysis dry, wet and low temperature plasma ashing, soluble and insoluble ash in water, ash insoluble in acid. a) Calcium EDTA titration. b) Phosphorus colorimetry. c) Sodium , potassium, copper, iron, zinc. d) Vitamins fat soluble, niacin, thiamin, riboflavin.	18	1,2,3
4	Composition and quality criteria for <ul style="list-style-type: none"> • milk & milk products • oils & fats • spices & condiments • food grains 	16	1,2,3
4.1	Composition and quality criteria for	16	1,2,3

	<ul style="list-style-type: none"> • flavours • canned foods • fruits & vegetable products • flesh foods 		
4.2	Composition and quality criteria for <ul style="list-style-type: none"> • sugars & preserves • beverages alcoholic(wine, beer, rum, brandy) & non alcoholic (tea, coffee, soft drinks). 	10	1,2,3

REFERENCES:

1. Kalia, M. Food Analysis and Quality Control. Kalyani Publishers, New Delhi. 2002.
2. Winton, A.L and Winton, K.B. Techniques of food analysis. Allied Scientific Publishers, New Delhi. 1999
3. Nielsen, S.S. Introduction to the chemical analysis of foods. Jones and Bartlett Publishers, Boston, London. 2003
4. Connell, J.J. Control of fish quality. Blackwell Scientific Publications, Cambridge, 2000.
5. PFA ACT.
6. Elsevier, E. Handbook of analysis and quality control for fruit and vegetable products. ABC Publishers, Bangalore.2002.

CHOICE BASED COURSE

COCONUT & BEVERAGE TECHNOLOGY

Course	Details
Code	FQ6B72
Title	Coconut & beverage technology
Degree	B.Sc.
Branch(s)	Food Science
Semester	VI
Type	Choice Based
Credits	3
Total hours	72
Hours per week	4

Course Outcomes

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand convergence and synergy among numerous ongoing governmental programmes in the field of coconut and beverage development in order to bring in horizontal and vertical integration of these programmes	U	PSO 1,3,7
2	Understand adequate, appropriate, timely and concurrent attention to all the links in the production, post harvest and consumption chain of coconut, its products and beverages as well as modern and traditional technology	U	PSO 1,3,7
3.	Understand economically desirable diversification and value addition to generate skilled employment	U	PSO1,3,7
4	Generate knowledge on the origins and development of Beverage and Coconut as well as its products, its role, types, Processing, Benefits, Value addition and Harmful effects in excess, Spice technology	Cr	PSO 1, 7,9
5	Understand and help prepare students to meet the challenges associated with the Beverage and Coconut Industry	U	PSO1,7,9

Course Description

Module	Course Description	Hrs	CO
1	Alcoholic beverages		
1.1	Beer – Beer making, fermentation process, ingredients, different types of beer, lager, pilsners, ale, stout, porter, Role of hops in beer making	2	2,3,4,5
1.2	Wine making- history, different types of wine- white, red, dry, sweet, champagne and sparkling wine	2	2,3,4,5
1.3	Whisky- origin, composition, alcoholic contents and properties, different types of whiskey- scotch, Canadian and Irish	2	2,3,4,5
1.4	Rum- source and content, procedures	1	2,3,4,5
1.5	Gin-source and content, procedure	1	2,3,4,5

1.6	Brandy – content and properties, procedure	2	2,3,4,5
1.7	Vodka –source and content procedure	2	2,3,4,5
2	Carbonated beverages		
2.1	Growth and development of carbonated soft drinks	4	2,3,4,5
2.2	Ingredients- water, carbohydrate sugars, high intensity sweeteners, flavourings and emulsions, acids, colours, preservatives and other additives	4	2,3,4,5
2.3	Containers and closures- glass bottles, plastic bottles, metal cans	4	2,3,4,5
3	Water		
3.1	Mineral water and other bottled waters- product types, water sources, bottling materials	4	2,3,4,5
3.2	Water treatment-filtration methods, deionizing, additions, substitution	4	2,3,4,5
3.3	Microbiology of bottled water- shelf life and environmental issues	4	2,3,4,5
4	Confectionary Science and Technology		
4.1	Introduction, present trends in the industry, ingredients, various forms of confectionary and chocolates	4	2,3,4,5
4.2	Classification of confections, rock candy, hard candy, fondants, and creams, marshmallows, caramel and fudge, classification of chocolates- sweet, milk and white	4	2,3,4,5
4.3	Ways to store chocolate, cocoa and cocoa powder	4	2,3,4,5
5	Coconut Technology		
5.1	Introduction , potential products from coconut farm, copra , manufacture, grades of copra	4	2,3,4,5
5.2	Coconut oil extraction	4	2,3,4,5
5.3	Products specifications- coconut milk cream- manufacture and preservation <ul style="list-style-type: none"> ● Dessicated coconut ● Spray dried coconut milk powder ● Packed tender coconut water ● Vinegar from coconut ● Other products 	4	2,3,4,5
6	Spice technology		
6.1	Introduction of Indian spices- chillies, ginger, black pepper, coriander, cardamom, turmeric, garlic, saffron- composition	6	4
6.2	Spice oils and oleoresins, technology of manufacturing oleoresins and spice oils	6	4

REFERENCE:

1. Srilakshmi, Food Science. New Age International Publishers, New Delhi,2003
2. Potter,N.N,Hotchmiss, J.H. Food Science, CBS Publishers, New Delhi,2002

FOOD MICROBIOLOGY PRACTICAL

Course	Details
Code	FQ6B70
Title	Food Microbiology Practicals
Degree	B.Sc.
Branch(s)	Food Science
Semester	VI
Type	CORE
Credits	3
Total hours	90
Hours per week	7

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the advanced concepts of related media and cultures	U	PSO1,2,4,5
2	Understand different methods of advance staining technique	U	PSO1,2,4,5
3	Understand advanced accessories for food microbiology practicals	U	PSO1,2,4,5
4	Illustrate biochemical methods of testing	U	PSO1,2,4,5
5	Analyze food Samples	An	PSO1,2,4,5

Course Description

Module	Course Description	Hrs	CO
1	Microbiology of milk a) Quantitative analysis of milk by standard plate count (SPC) method. b)Enzymatic test of milk by Methylene Blue Reductase Test (MBRT). c)Quality testing of milk by Resazurin test. d)Determination of phosphatase activity of milk. e)Detection of mastitis through milk test. f)Detection of calcium and phosphorus in milk	30	1,3,5
2	Microbiological analyses of food products. a)Meat b)Fish c)Sauce.	25	1,3,5
3	Microbiology of water a)presumptive test for coliform group of bacteria or determination of most probable number. b) Confirmed test for coliform bacteria. c)Completed test for coliform bacteria	20	1,3,5
4	Biochemical testing a)triple sugar iron agar test b)indole production test c)methyl red test d)VogesProskauer test e)Citrate utilization test.	15	1,3,5

REFERENCE:

Dubey, R.C. and Maheshwari, D.K. Practical microbiology. S.Chandand Company Limited, Ramnagar.2002

FOOD ANALYSIS AND ADULTERATION TESTING PRACTICALS- II

Course	Details
Code	FSQB69
Title	Food Analysis and Adulteration Testing Practicals-II
Degree	B.Sc.
Branch(s)	Food Science
Semester	VI
Type	CORE
Credits	2
Total hours	72
Hours per week	2.5

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the applications of various equipments, apparatus and analysis by chemical techniques in food	U	PSO1,2,3,4,5
2	Understand the mechanism and principles , procedures and calculations of various techniques employed for detection of adulterants in food and general analysis	U	PSO1,2,3,4,5
3	Identify the various chemical techniques in the analysis of foods and adulterants present if any	Re	PSO1,2,3,4,5
4	Understand the quality assessment of food products by estimation of all quality parameters	U	PSO1,2,3,4,5

Course Description

Module	Course Description	Hrs	CO
1	ANALYSIS OF JAM <ul style="list-style-type: none">• Totals Solids• Acidity• Pectin Content• Total Sugar• Fruit content• Test for synthetic color	5	1,2,3,4
2	ANALYSIS OF WHEAT FLOUR <ul style="list-style-type: none">• Gluten• maltose figure• moisture• acidity• crude fibre• sedimentation value.	5	1,2,3,4
3	ANALYSIS OF COFFEE/TEA EXTRACTIVES <ul style="list-style-type: none">• Chicory• caffeine• qualitative tests	3	1,2,3,4

4	ANALYSIS OF SPICES <ul style="list-style-type: none"> • moisture • total ash • acid insoluble ash • volatile oils 	5	1,2,3,4
5	ANALYSIS OF VINEGAR <ul style="list-style-type: none"> • total solids • acidity • specific gravity. 	3	1,2,3,4
6	ANALYSIS OF BUTTER/GHEE <ul style="list-style-type: none"> • fat • qualitative tests. 	4	1,2,3,4
7	DETECTION OF ADULTERATION IN VARIOUS FOODS <ul style="list-style-type: none"> • Jam • food flours • coffee • tea • spices and powdered spices • fats and oils. 	5	1,2,3,4

ADVANCED FOOD CHEMISTRY PRACTICALS

Course	Details
Code	FS5 CRP23
Title	Advanced food chemistry practicals
Degree	B.Sc.
Branch(s)	Food Science
Semester	VI
Type	CORE
Credits	2
Total hours	72
Hours per week	2.5

Course Outcome

CO No.	Expected Course Outcomes Upon completion of this course the students will be able to:	Cognitive level	PSO No.
1	Understand the applications of various equipments, apparatus and analysis by chemical techniques in food	U	PSO1,2,4,5
2	Understand basic preparation of solutions and buffers.	U	PSO1,2,4,5
3	Understand the mechanism and principles, procedures and calculations of various techniques employed for estimation of components in food and general analysis	U	PSO1,2,4,5
4	Identify the various chemical techniques in the analysis of foods and adulterants present if any	Re	PSO1,2,4,5

Course Description

Module	Course Description	Hrs	CO
1	Estimation of alpha-amino nitrogen by Sorensens Formaldehyde titration	3	1,2,3,4
2	Estimation of protein Kjeldahl's method	7	1,2,3,4
3	Estimation of Saponification value.	4	1,2,3,4
4	Estimation of Acid value	3	1,2,3,4
5	Estimation of Iodine value.	5	1,2,3,4
6	Estimation of Peroxide value.	5	1,2,3,4
7	Estimation of Chlorophyll and Carotenoids.	7	1,2,3,4
8	Estimation of Sulphur dioxide.	5	1,2,3,4
9	Estimation of Benzoic acid.	5	1,2,3,4
10	Estimation of Vitamin C.	5	1,2,3,4

11	Estimation of Protein- Biuret method.	3	1,2,3,4
12	Estimation of Protein by Lowrys method.	6	1,2,3,4
13	Estimation of Sugar by phenol- sulphuric acid method.	4	1,2,3,4
14	Estimation of Sugar by Resorcinol method	2	1,2,3,4
15	Estimation of Calcium.	5	1,2,3,4
16	Estimation of Iron.	3	1,2,3,4