

SHIVAJI UNIVERSITY, KOLHAPUR.



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2009

New Syllabus For

B.Sc. III

Food Science & Quality Control

(Sem.-V & VI)

Syllabus to be implemented from June 2012 onwards.

Semester V

Papre IX Fermentation Technology

Unit 1 . Basic of Fermentation

(8)

- 1.1 Definition.
- 1.2 Batch, Continuous & Dual fermentation.
- 1.3 Factors affecting fermentation process.
- 1.4 Strain improvement process.
- 1.5 Raw materials used for Fermentation.
- 1.6 Buffers & antifoaming agent.
- 1.7 Control of contamination in fermentation.

Unit 2. Fermentation Processes

(17)

- 2.1 Industrial production of different organic acids.

- a)Acetic acid b)Citric acid
- c) lactic acid d)Tartaric acid
- e) Oxalic acid

- 2.2 Industrial production of different vitamins.

- a) Vitamin A b) Vitamin B2
- c) Vitamin B12 d) Vitamin C
- e) Vitamin D

- 2.3 Industrial production of different amino acids.

- a)Glutamic acid b)Lysine
- c)Threonine d)Tryptophan

Unit 3. Fermented Foods

(10)

- 3.1 Organisms involved and their role in fermented foods.
- 3.2 Fermentation of tea , coffee & cocoa.
- 3.3 Preparation of idli, curd & soya fermented foods.
- 3.4 Process defects & spoilage of above mentioned foods.
- 3.5 Significance of fermented foods in Indian diet.

Unit 4. Food Beverages

(8)

4.1 Preparation of juices, squash & cordials

4.2 Preparation ,Processing & preservation of wine & beer.

Defects& spoilage occurred during their preparation.

4.3 Preparation of distilled spirits

Recommended Books.

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

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

3)Food microbiology by William c. Frazee & Dennis C. Westhoff.

4)Fermentation technology by Manish Shrivastav.

5) Fermented Beverage Production by Andrew Geoffrey Howard Lea,John Raymond Piggot.

Paper X Dairy Technology

Unit 1. Introduction of Dairy technology

(9)

1.1 Development of milk processing industry in India, present status & scope.

1.2 Dairy layout for small scale, Dairy design & sanitation layout.

1.3 Dairy equipment & sanitation.

Unit 2. Introduction of milk & primary processes

(8)

2.1 Food value & composition of milk.

2.2 Factors affecting composition of milk.

2.3 Buying , receiving ,collection , transportation of milk ,,storage & distribution of milk.

2.4 Processing of milk, filtration, clarification, cream separation & heat treatment of milk.

Unit 3. Different milk products

(16)

3.1 Milk product processing- cream, butter, khoa, paneer, ice-cream,condensed milk, evaporated milk.

3.2 Judging & grading of milk & its product.

3.3 Manufacturing of cheddar cheese- Introduction, manufacturing process, packaging , storage , defects & their prevention.

3.4 Dried milk products- Buttermilk powder, Whey powder,Ice cream mix Powder, Infant milk food, WMP & SMP.

4.1 Introduction.

4.2 Classification & composition of byproducts.

4.3 Principles & methods of utilization- Whey utilization & whey based beverages like lassi, buttermilk etc.

Recommended Books.

1) Outlines of Dairy technology by Sukumar De.

2) Yarpar, WJ & Hall, C.W. 1975, Dairy technology & Engineering AVI, Westport.

3) Warner J. M. 1976 Principles of dairy processing.

4) Rosenthal, I. 1991. Milk & milk products. VCH, New York.

Paper XI- Bakery & Confectionary products

Unit 1. Introduction of bakery & confectionary products (6)

- 1.1 Bakery development.
- 1.2 Properties of Bakery products.
- 1.3 Types & role of browning reaction.
- 1.4 Detrimental effects of browning.

Unit 2. Processing of Bakery Products

- 2.1 Raw material details , flour & its constituents, yeast, shortening, specific fats.
- 2.2 Baking & Roasting process.
- 2.3 Processes & formulation of Bakery products mainly bread, cake, biscuits, cookies & nankatai.

Unit 3. Processing of cocoa & confectionary ingredients (10)

- 3.1 Introduction.
- 3.2 Fermentation of cocoa.
- 3.3 Confectionary ingredients- starch & its derivatives, colours & flavours in Confectionary.
- 3.4 Gums pectin & gelatin in confectionary.

Unit 4. Confectionary products (14)

- 4.1 Sugar boiled confectionary- Crystalline & amorphous.
- 4.2 Chocolate confectionary- Introduction, raw materials , process of manufacturing , defects & their Prevention.
- 4.3 Hard candies & boiled toffees- Introduction, raw materials, process of manufacturing , defects & their prevention , storage & packaging.
- 4.4 Manufacturing of Chewingum.
- 4.5 Indian confectionary products – Sweetmeats, methods of preparation of different sweetmeats e.g. Mysorepak, Jalebi, barfi, pedha etc.

Recommended Books.

- 1) Bakery & confectionary by Christian Roecker.
- 2) Professional text to bakery & confectionary by John Kingslek.
- 3) Theory of bakery & confectionary by Yogambal Ashok kumar.
- 4) Food processing & preservation by B. Shivsankar.

Paper XII Food quality control & waste management

Unit 1. Quality control (8)

- 1.1 Definition & importance of quality control.
- 1.2 Quality attributes of food ,nutritional quality ,microbial quality, sensory Quality.
- 1.3 Effects of processing & storage on the quality of food.
- 1.4 Implant quality control techniques employed in food industries to maintain uniformity of products.

Unit 2. Food standard laws & regulations (12)

- 2.1 Food product order.
- 2.2 Executive agencies, I.S.I, AGMARK, standard for materials, bacteriological standards for foods with special references to fruit & vegetables, cereals, milk & milk products, meat &poultry products.
- 2.3 ISO- definition their rules & regulations.

Unit 3. Solid & liquid waste management in food industries (10)

- 3.1 Introduction of different food waste materials.
- 3.2 Potentials & prospects of byproducts, waste utilization available from food industries in India.
- 3.3 Different food wastes with special references to cereals ,fruits, vegetables, meat ,poultry, dairy industry & their possible utilization.

Unit 4. Effluent treatments (12)

- 4.1 Introduction.
- 4.2 Dissolved oxygen concentration as an indicator of water quality i.e. measurement of BOD & COD.
- 4.3 Treatment & disposal of effluent – disposal in seas & rivers, spray irrigation, land filling treatment, trickling filters, biologically aerated filters, Fluidized bed system, activated sludgeprocesses ,aerobic & anaerobic digestion.

Recommended Books.

- 1)Tannenbaum,S.R. Ed.1979 Nutritional & safety aspects of Food processing , Marcel Dekker, New York.
- 2) Ranganna.s.1986, Handbook of analysis & quality control for fruits & vegetables products Tata Mac Graw hill, New Dehi .
- 3) Principles of sensory evaluation of food by Amerine,M.A. angborn, R.M. & osseler E. B. 1965.
- 4) Waste management for the food industries by Ioanniss Arvanitayannis.
- 5) Utilization of byproducts & treatment of waste in the food industry by Vasso oreopolou.

Semester VI

Paper XIII Food Biotechnology

Unit 1. Biotechnology -Scope & importance (6)

- 1.1 Definition.
- 1.2 Traditional & modern biotechnology.
- 1.3 Biotechnology of India & global trends.
- 1.4 Prevention of misuse of biotechnology.
- 1.5 Potential of modern biotechnology.

Unit 2. Tools of genetic engineering (10)

- 2.1 Basic requirement.
- 2.2 Cutting & joining of DNA.
- 2.3 Cloning vectors.
- 2.4 Techniques of genetic engineering, cloning methods & DNA analysis.
- 2.5 Genetically modified foods.

Unit 3. Single cell protein & mushroom cultivation (12)

- 3.1 Micro organisms used in SCP.
- 3.2 Substrates used nutritional value cultivation & uses.
- 3.3 Historical Background & present status of Mushroom cultivation.
- 3.4 Recipes of mushroom.

Unit 4. Enzyme Biotechnology (15)

- 4.1 Definition & properties of enzymes.
- 4.2 Factors affecting activation & inhibition of enzymes.
- 4.3 Isolation of enzyme producing microorganisms, strain development, Formulation & inoculums preparation.
- 4.4 Purification of enzymes & their immobilization –different types, advantages & disadvantages.
- 4.5 Industrial production of protease, amylase & cellulase.

Recommended Books.

- 1) Knorr, D, 1982. Food biotechnology , Masel Dekker.
- 2) Joshi V.K. & Pandey ,A.Ed.1999.Biotechnology Food Fermentation .
- 3)Crueger,W& Crueger A1984. Biotechnology- A textbook of industrial Microbiology.
- 4) Bains W.1993.Biotechnology from A to Z oxford Univer.press.oxford.

Paper XIV Technology of Meat ,Fish & Poultry Products

Unit 1. Importance of meat products (8)

- 1.1 Introduction & importance of meat products in india.
- 1.2 Chemical composition & microscopic Structure of meat.
- 1.3 Pre-slaughter inspection of animal.
- 1.4 Effect of feed, breed & management on meat production & quality.

Unit 2. Post slaughter operations (11)

- 2.1 Slaughtering of animal.
- 2.2 Bones & cuts of Carcass.
- 2.3 Methods of slaughtering & stunning , poultry inspection.
- 2.4 Quality & Grading of meat.
- 2.5 Meat tenderization ,ageing & rigour mortis,preservationof meat &poultry Products.
- 2.6 Meat plant sanitation &safety.

Unit 3. Egg & egg Products (11)

- 3.1 Structure, composition ,nutritive value & functional properties of egg.
- 3.2 Processing of Egg products.
- 3.3 Quality of egg & egg products.
- 3.4 Effect of heat on egg proteins.

Unit 4.Seafood (10)

- 4.1 Classification of seafoods.
- 4.2 Types of Fish.
- 4.3 Composition & structure of Fish.
- 4.4 Postmortem changes in fish.
- 4.5 Canning ,smoking,freezing & dehydration of fish.

Recommended Books.

- 1) Technology of Meat, Fish & Poultry products.
- 2) Lawrie,R.A.1975. meat science.2 nd ed.
- 3)Lavie.a. 1980. Meat handbook 4th edn AVI west port.
- 4)Portsmouth,J.I.1979, commercial Rabbit meat production by Saiga Survey, England.
- 5) Stadelmen w. J. 7 Cotterill O. j.1977. egg Science & Technology.

Paper XV Food Hygiene & Sanitation

Unit 1. Contamination & Food borne diseases (10)

- 1.1 Introduction of sources of contamination.
- 1.2 Classification of food according to ease with which it spoils.
- 1.3 Conditions & signs of spoilage in fresh, dry & preserved foods.
- 1.4 Mode of transmission of disease & food borne illness.
- 1.5 Bacterial & viral food intoxications.
- 1.6 Naturally occurring toxicants in food toxic metals & chemicals.
- 1.7 Food allergies, Control of food borne illness.

Unit 2. Personal Hygiene & Safety (7)

- 2.1 Necessity for personal hygiene, health of staff.
- 2.2 Personal appearance, sanitary practices, habits, protective clothing importance of rest & exercise.
- 2.3 Safety at the work place.

Unit 3. Sanitary procedures & pest control (14)

- 3.1 Importance of sanitary procedures in Food processing.
- 3.2 Special Food Operations- Introduction, mobile food units, vending Machines, street side foods & diseases.
- 3.3 Cleaning procedures – cleaning & sanitizing, their importance.
- 3.4 Pest control- importance, classification of pest, effect of pesticides on pest & their methods of application. Precaution to be taken while handling pesticides.

Unit 4. Food safety management (10)

- 4.1 Introduction
- 4.2 Good manufacturing practices
- 4.3 Good laboratory practices
- 4.4 HACCP
- 4.5 ISO-22000

Recommended Books.

- 1) Food hygiene & Sanitation by S. Roday.
- 2) Hospitality industry handbook on Hygiene & safety by Lisa Gordon-Davis.
- 3) Principles of food sanitation by Norman G. Marriott & Gravani.
- 4) Essentials of food sanitation by Norman G. Marriott & Robertson.

Paper XVI Processing of Snacks & Instant Foods

Unit 1. Traditional snack foods (8)

- 1.1 Cereal based traditional snack foods.
- 1.2 legume based traditional snack foods.
- 1.3 Fried snack foods.

Unit 2. Extruded snack foods (13)

- 2.1 Introduction of extrusion.
- 2.2 Types of extrusion.
- 2.3 Cold extrusion –noodles ,macaroni ,pasta.
- 2.4 Hot extrusion –Expanded Foods-Kurkure.
- 2.5 Extrusion machines- single screw extruders ,twin extruders, their working mechanism
- 2.6 Humidification, Puffing ,Roasting seasoning & packaging of these products.

Unit 3. Ready to Eat Foods (12)

- 3.1 Flakes & puffed products-cornflakes, popcorn in different flavor & Varieties ,raw materials, breakfast products produced by extrusion methods.
- 3.2 Soup mixed preparations.
- 3.3 Instant mix for idli, dhokla ,dosa ,gulabjamun, ice cream .

Unit 4. Ready to Cook foods (7)

- 4.1 Retort processing-principles, machineries & working.
- 4.2 Vegetables & gravy based dishes-their formulations &preparation.
- 4.3 Paneer based dishes.

Recommended Books.

- 1)Snacks food processing by Edmund W. Lausas.
- 2)Manufacture of snacks food,Namkeen, Pappad &potato products by Eiri.
- 3) Handbook of modern Bakery products by Eiri.
- 4) Technology of maize & Allied corn products sy Eiri.

List of Practicals

Chemical analysis of different foodstuffs

- 1) Extraction of Chlorophyll.
- 2) Extraction of Carotenoids.
- 3) Estimation of free amino acids by Ninhydrin Method.
- 4) Estimation of ash content of given food sample.
- 5) Estimation of phenol content of given food sample.
- 6) Estimation of crude fiber by weendes methods.
- 7) Estimation of pectin content of given food sample.
- 8) Estimation of BOD of given sewage sample.
- 9) Estimation of COD of given sewage sample.
- 10) Estimation of inorganic phosphate by Fiske- Subbarao methods.
- 11) Determination of MPN (most probable number) of given water sample.
- 12) Detection of adulterants and preservatives in milk.
- 13) Estimation of some common food additives- Sulphur dioxide, sodium benzoate, colours.
- 14) Analysis of wheat flour- alcoholic acidity, granularity of flour, crude gluten, total ash, pH value.
- 15) Analysis of Biscuits- moisture ash content, acidity of extracted fat.
- 16) Analysis of tea and roasted coffee- moisture, ash, tannin, caffeine.
- 17) Methods of analysis for sugar boiled confectionery and chocalates- moisture, reducing sugar, fat.
- 18) Study tour and report presentation.
- 19) Visit to waste treatment plants at dairy and food industries.

Microbial analysis of different foodstuffs

- 1) Isolation of salmonella sp from given Food sample.
- 2) Isolation of halophilic bacteria from given Food sample.
- 3) Isolation of different microorganisms from milk.
- 4) Effect of physical and chemical agents on growth of bacteria
-pH, temperature, heavy metals, antibiotics.

- 5) Microbial sampling of air from various sources e.g. indoor, outdoor, industrial area.
- 6) Analysis of water by Presumptive, Confirmed and completed test.
- 7) Isolation of E.coli from food sample and identification by IMViC test.
- 8) Bacteriological analysis of milk -SPC
-DMC
-Reductase test
- 9) Determination of efficiency of Pasteurization by Phosphatase test.
- 10) Isolation of microorganisms from common food items- curd, bread, pickles and spoiled foods.
- 11) Effect of pH, temp, substrate concentration on amylase enzyme.

Processing of non fermented and fermented foods

- 1) Preparation of cakes.
- 2) Preparation of cookies.
- 3) Preparation of bread.
- 4) Preparation of paneer.
- 5) Preparation of rusgulla.
- 6) Preparation of Gulabjam.
- 7) Preparation of Banana chips.
- 8) Preparation of icecream.
- 9) Preparation of cherry.
- 10) Preparation of resins.
- 11) Preparation of different sweetmeats.
- 12) Preparation of ragi-manchurian.
- 13) Preparation of sugar boiled candy.
- 14) Preparation of different soups.
- 15)) Preparation of idli.
- 16) Preparation of dhokla.
- 17) Preparation of shrikhand.
- 18) Preparation of fruitkhand.
- 19) Preparation of grape wine.
- 20) Preparation of sauerkraut..
- 21) Preparation of different squashes.

Practical Examination of 200 Marks -

1. The practical examination will be conducted on three days for not less than five hours on each day of practical examination
2. Each candidate must produce a certificate from the Head of the department in his / her college stating that he / she has completed practical course in satisfactory manner on the lines laid down from time to time by A. C on the recommendation of BOS and that laboratory journal has been properly maintained.
3. Candidates have to visit at least two places of interest (food industry/ Dairy/ Research lab) and submit the report of their visit at the time of the examination. The report duly certified by Head of the department.

Distribution of marks for practical examination -

Q. 1 Principle writing	20 Marks
Q. 2 Preparation of fermented food	30 Marks
Q. 3 Preparation of non fermented food	30 Marks
Q. 4 Chemical analysis of food sample	30 Marks
Q. 5 Microbial analysis of food sample	30 Marks
Q. 6 oral	10 Marks
Q. 7 journal	20 Marks
Q. 8 Tour report	10 Marks
Q.9 Project	20 Marks

200 Marks
