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(2014) with CGPA-3.16

Revised Syllabus For

B.Sc. III Food Science & Quality Control

(Sem. – V and VI )

Syllabus to be implemented from June 2015-16 onwards.
Paper IX – Fermentation Technology

Unit - I - Basic of Fermentation 08
1.1 Introduction to Fermentation
1.2 Basic Structure of Fermentation
1.3 Fermentation media – a) Constituents b) Design of fermentation media
1.4 Types of Fermentation process – Batch, Continuous & Dual
1.5 Factors affecting Fermentation process
1.6 Control of contamination in Fermentation

Unit – II – Beneficial aspects for Fermentation 10
2.1 Benefits of Fermentation
2.2 Microorganism involved in Fermentation
2.3 Microbial activities with specific role in Fermentation
2.4 Significance of Fermentation food in Indian diet
2.5 Factors influence growth & Metabolic activities of microbes in food Fermentation
2.6 Purity & Nature of food Fermentation

Unit – III – Fermented Foods 17
3.1 Fermented Milk – Curd, Yoghurt, Buttermilk
3.2 Fermented Cereals – Idli, Dhokla, Bread, Sausage, Miso, Tempeh
3.3 Fermented Beverages – Wine, Beer, Sake, Distilled Liquors
3.4 Fermented Vegetables – Sauerkraut, Pickles, Green Olives
3.5 Fermentation of Coca, Tea, Coffee
3.6 Fermentation of Acetic acid, Vit B12 & Glutamic acid

Unit – IV – Down Stream processing – 08
4.1 Introduction to downstream processes
4.2 Criteria of selection of recovery process
4.3 Removal of Microbial cells – a) Foam Separation b) Precipitation
4.4 Filtration & Centrifugation
4.5 Cell Distruption – a) Physicomechanical b) Chemical method
4.6 Extraction & Drying

Recommended Books :-
1. Biotechnology – Food Fermentation - Dr. S. K. Singh
2. Industrial Biotechnology - M. S. Rangannath & Shriram Shridhin
3. Food Microbiology - William Frazier, Dannise Westhoff
4. Food Biotechnology - S.N. Tripathy
Unit - 1 - Introduction of Dairy Technology

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 equipments & sanitation

Unit - 2 – Introduction of milk & primary processes

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

3.1 Milk product Processing – cream, Butter, Khoa , Paneer, Ice-cream, condensed milk & evaporated milk
3.2 Judging & grading of milk & its products
3.3 Manufacturing of Cheddar cheese – Introduction, Manufacturing process, packaging, storage, defects and their prevention
3.4 Dried milk products – Buttermilk powder, Whey Powder, IceCream mix Powder , Infant milk food, WMP & SMP

Unit – 4 – Byproducts Utilization

4.1 Introduction
4.2 Classification & Composition of byproducts
4.3 Principles & methods of Utilization – Whey utilization & whey based beverages like lassi & buttermilk.

Recommend Books

1. outline of Dairy technology by Sukumar De
2. Yarpar, WJ & Hall, C. W. 1975 Dairy technology & Engineering AVI Westport
Unit – I – Introduction of Bakery raw material

1.1 Essential & optional ingredients
1.2 Role of ingredient
1.3 Baking principle - Caramelisation, Maillard browning
1.4 Introduction of bakery products & equipments
1.5 Effect of baking conditions

Unit - II – processing of bakery Products

2.1 Cake: Types, formulation & process, Principle of cake characters of cake
2.2 Bread: Formulation & process, principle of cake preparation,
2.3 Biscuits & cookies: Definition, difference, between biscuits & cookies, types of cookies & biscuits, Cracker & general defects

Unit – III – Confectionary products

3.1 Introduction to Confectionary
3.2 Ingredients
3.3 Sugar boiled Confectionary – a) Crystalline b) Amorphous
3.4 Indian Confectionary

Unit – IV – Processing Confectionary products

4.1 Chocolate processing – Introduction, Types, methods of manufacture, its use, storage & general defects.
4.2 Hardboiled candy – Raw materials, method, defects & storage
4.3 Chewingum – Raw material, method, packaging
4.4 Indian Confectionary - Burfi, Pedha preparation

Recommended Books -

1. Technology of Confectionary, Chocolate, Toffee, Candy, Chewing gum, Lollipop, Jelly production
2. Food production operation - Ravindra Bali
3. International Cuisine and Food Production management – Parvindarbali
5. The Complete technique book on bakery production by Niir Board
# Paper XII - Food Quality Control & Waste Management

## Unit – I – Introduction of Quality Control

1.1 Definition and importance of Quality control  
1.2 Principles of Quality Control  
1.3 Quality attributes of Food – Nutritional quality, Microbial, Sensory  
1.4 Sample & Sampling Method of Quality Evaluation  
1.5 Quality assurance in Food Services System

## Unit – II – Sampling & analysis of Foods

3.1 Sampling – Objectives, Guidelines, Methods  
3.2 Hazards – Microbial, Physical, Chemical  
3.3 Analysis of Food – Chemical: Moisture, Fat, Protein, Crude fibre  
   Microbial: DMC, Coliform determination  
3.4 Ensuring safe Food

## Unit – III – Food Standard laws and safety management.

2.1 Food laws – HACCP, CCP, Codex, alimentarius Commission  
2.2 ISO/22000: Food Safety managements system  
2.3 Food Quality Management: Quality Management Principles

## Unit – IV – Waste Management and Effluent treatment of Food industry

4.1 Introduction to Waste Management  
4.2 Waste disposal – Types of Waste  
4.3 Method of Waste disposal – Land filling, anaerobic, recycling digestion  
   Measurement of BOD & COD  
4.4 Effluent treatment: Disposal in Sea, river, spray, Irrigation, land filling treatment, Trickling filers, Biological aerated filter, Fluidized bed system,  
   Activated sludge process, aerobic & anaerobic digestion  
4.5 Safe disposal of waste

### Recommended Books :-

1. An introduction to Food Science and Technology & Quality management - Devendra Bhatt & Priyanka Tomar  
2. Food Quality Management - Manoranjan Kalia  
3. Hand book of analysis & Quality Control - Rannanganna
Semester VI
Paper XIII - Food Biotechnology

Unit – I Biotechnology – Scope & Importance 06
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 biotechnology

Unit – II – 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 – III – Single cell protein & mushroom cultivation 12
3.1 Microorganisms used in SCP.
3.2 Substrates used nutritional value cultivation & uses
3.3 Historical Background & present status of Mushroom cultivation

Unit – IV – Enzyme Biotechnology 15
4.1 Definition & Properties of enzymes
4.2 Factors affecting activation & inhibition of enzymes
4.3 Isolation of enzymes 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 & cellulose

Recommended Books
### Unit - I - Importance of meat products

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 Transportation, feeding of animal before slaughtering

### Unit - II - Stunning & slaughter operations

2.1 Slaughtering of animal  
2.2 Bones & cuts of Carcass  
2.3 Quality and grading of meat  
2.4 Post Mortom inspections  
2.5 Meat tenderization, aging curring & rigour mortis, preservation of meat & Poultry products  
2.6 Meat plant sanitation & safety

### Unit - III - Egg & Egg products

3.1 Structure, composition, Nutritive value & functional properties of egg  
3.2 Processing of Egg  
3.3 Quality of egg & Egg Products  
3.4 Effects of heat on egg proteins

### Unit - IV - Seafood

4.1 Classification of Seafood  
4.2 Types of fish  
4.3 Composition and 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 2nd ed  
Unit – I – Contamination & Food Born Diseases

1.1 Introduction of sources of contamination
1.2 Classification of food according to ease which it spoils
1.3 Conditions & signs of spoilage in fresh, dry & Preserved food
1.4 Mode of transmission of disease & food born illness
1.5 Bacterial & Viral food intoxications
1.6 Naturally occurring intoxications
1.7 Food allergies, control of food born illness

Unit – II – Personal Hygiene & safety

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

Unit – III – Sanitary procedures & pest control

3.1 Importance of sanitary procedures in Food processing
3.2 Special Food Operations – Introduction, mobile food units, vending machines, street side foods and 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 – IV – Food safety management

4.6 Introduction
4.7 Good manufacturing practices
4.8 Good laboratory practices
4.9 HACCP
4.10 ISO- 22000

Recommended book –

1. Food Hygiene & Sanitation - S. Roday
2. Hospitality industry handbook on Hygiene & safety – Lisa Gordomn – Davis
3. Principles of food sanitation – Norman G. Marriott & Gravani
4. Essentials of food sanitation – Norman G. Marriott & Robertson
Unit – 1 – Introduction of Packaging

1.1 Introduction
1.2 Principles of packaging
1.3 Requirements of food packaging
1.4 Characteristics of Packaging materials
1.5 Basic Packaging material – paper, plastic, Polyethylene
   Aluminum Foil, glass, metals, & edible films, others
1.6 Effect of Packaging on nutritive value of food

Unit – II – General Packaging of Food Products

2.1 Packaging of milk & milk product
2.2 Packaging of Fruits & Vegetables
2.3 Packaging of cereal & cereal products
2.4 Packaging of snack foods
2.5 Packaging of sugar & Confectionary

Unit – III – Modern Packaging System

3.1 Machineries for Food Packaging
3.2 Controlled Atmosphere Packaging
3.3 Aseptic Packaging
3.4 Edible coating films

Unit – IV – Packaging Laws & Regulation

4.1 Introduction
4.2 SWMA
4.3 PFA Rules & AGMARK Rules
4.4 FPO Rules & MPO Rules

Recommended Books –

1. Modern packaging techniques by EIRI board
2. Hand book of Food packaging techniques by Eiri Board
3. Food processing & preservation by G. Subhulakshmi & Vdigr

List of Practical

1. Chemical analysis of foodstuffs
   i) Extraction of Chlorophyll
   ii) Extraction of Carotenoids
   iii) Estimation of free amino acids by Ninhydrin Method
   iv) Estimation of ash content of given food sample
   v) Estimation of phenol content of given food sample
   vi) Estimation of crude fiber by Weendes methods
   vii) Estimation of pectin content of given food sample
   viii) Estimation of BOD of given sewage sample
   ix) Estimation of COD of given sewage sample
   x) Estimation of inorganic phosphate by Fisk – Subbarao Methods
   xi) Determination of MPN (most probable Number) of given water sample
xii) Detection of adulterants and preservatives in milk

xiii) Estimation of some common food additives – Sulphur dioxide, Sodium benzoate, colors

xiv) Analysis of wheat flour – alcoholic acidity, granularity of flour, crude gluten, total ash, pH value

xv) Analysis of Biscuits – Moisture ash content, acidity of extracted fat

xvi) Analysis of tea and roasted coffee – moisture, ash, tannin, Caffeine

xvii) Methods of analysis for sugar boiled confectionary and chocolates – moisture, reducing sugar, Fat.

xviii) Study tour and report presentation

xix) Visit to waste treatment plants at dairy and food industries

**Microbial analysis of different foodstuffs**

i) Isolation of salmonella sp from given Food sample

ii) Isolation of halophilic bacteria from given Food sample

iii) Isolation of different microorganism from milk

iv) Effect of physical and chemical agents on growth of bacteria – pH, temperature, Heavy metals, antibiotics

v) Microbial sampling of air from various source e.g. indoor, outdoor, industrial area

vi) Analysis of water by Presumptive, Confirmed and completed test

vii) Isolation of E. coli from food sample and identification by IMVIC test

viii) Bacteriological analysis of milk – SPC

- DMC
- Reductase test

ix) Determination of efficiency of Pasteurization by Phosphatase test

x) Isolation of microorganisms from common food items- curd, bread, pickles and Spoiled foods

xi) Effect of pH temp, substrate connection 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 Gulabjamun

7) Preparation of Banana chips

8) Preparation of Ice-cream

9) Osmotic dehydration

10) Preparation of Resins

11) Preparation of different Sweetmeats

12) Preparation of Ragi - Manchurian
Preparation of Sugar Boiled Candy
Preparation of different Soups
Preparation of Idli
Preparation of Dhokla
Preparation of Shrikhand
Preparation of Fruitkhand
Preparation of Grape wine
Preparation of Sauerkraut
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 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) 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 –

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<thead>
<tr>
<th>Q. No</th>
<th>Questions</th>
<th>Marks</th>
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<tbody>
<tr>
<td>Q. 1.</td>
<td>Principle writing</td>
<td>20 Marks</td>
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<tr>
<td>Q. 2.</td>
<td>Preparation of fermented</td>
<td>30 Marks</td>
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<tr>
<td>Q. 3.</td>
<td>Preparation of non fermented Food</td>
<td>30 Marks</td>
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<td>Q. 4.</td>
<td>Chemical analysis of food sample</td>
<td>30 Marks</td>
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<tr>
<td>Q. 5.</td>
<td>Microbial analysis of food sample</td>
<td>30 Marks</td>
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<td>Q. 6.</td>
<td>Oral</td>
<td>10 Marks</td>
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<td>Q. 7.</td>
<td>Journal</td>
<td>20 Marks</td>
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<td>Q. 8.</td>
<td>Tour report</td>
<td>10 Marks</td>
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<td>Q. 9.</td>
<td>Project</td>
<td>20 Marks</td>
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<td>Total</td>
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Nature of Question papers (Theory)

COMMON NATURE OF QUESTION FOR THEORY PAPER MENTIONED SPERATELY: