

DEPARTMENT OF CHEMISTRY
GOVT. DIGVIJAY PG AUTONOMOUS COLLEGE RAJNANDGAON
Session – 2018-19



Food Science and Quality Control

Vocational / Add-on Course

Syllabus for B.Sc. Part-I

Theory Paper	Title of Paper	Duration	Max. Marks	Min. Marks
Paper-I	Basic Nutrition	3hr	75	25
Paper-II	Food Microbiology sanitation & Hygiene	3hr	75	25
Practical		4hr	50	17

Approved by Board of Study for 2018-19

Department of Chemistry
Govt. Digvijay PG Autonomous College Rajnandgaon
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FOOD QUALITY CONTROL

Add-On Course - Food quality control

Eligibility for B.Sc. students along with B.Sc. Part – I

PAPER-I

Basic Nutrition

First Year : Certificate Course
Theory Paper – I : Basic Nutrition
Each Unit has 1.2 Credits

Paper – I

BASIC NUTRITION

Unit I : Introduction to Nutrition

Food as a source of nutrients, function of foods, definition of nutrition, nutrients, adequate, optimum and good nutrition, mal- nutrition, inter-relationship between nutrition and health, visible symptoms of good health, food guide, use of food in body, digestion, absorption, transport, utilization of nutrients in the body.

Unit II : (a) Water : As a nutrient, function source, requirement, water balance, effect of deficiency.

(b) Minerals : Calcium, iron, iodine, fluorine, sodium, potassium deficiency.

(c) Carbohydrates: Definition, classification, property, food sources, function, storage in body, test of carbohydrates.

Unit III : (a) Lipids : Nomenclature, classification, physical aspects, emulsions and emulsifier, chemistry of fat and oil processing.

(b) Vitamins : Classification, units of measurement, sources, functions and deficiencies about vitamin A, D, E, ascorbic acid, riboflavin, niacin, vitamin B6, B12, folic acid.

Unit IV : (a) Enzymes : Nomenclature, specificity, kinetics, factors influencing enzyme activity, controlling enzyme action.

(b) Energy : Unit of energy, energy value of food. The body needs for energy, B.M.R. activity.

Unit V : Amino Acids, Peptides and Proteins

Nomenclature, Classification, essential and non-essential amino acids, sources of amino acids and proteins, protein deficiency.

References

1. Guthrie, Hele, Andrews, Introductory Nutrition, 6th Ed. Loves, Times Mirror/Mosby College, 1988.
2. Mudambi S.R., Rajgopal M.V., Fundamental of Foods and Nutrition, 2nd Ed., Wiley Eastern Ltd. 1990.
3. Swaminathan S., Advanced text book of Food Nutrition Vol II, 2nd Ed., 1985.
4. Willson, E. Principle of Nutrition, 4th Ed., New York, John Wiley & Sons, 1979.

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PAPER-II

FOOD MICROBIOLOGY, SANITATION & HYGIENE

First Year : Certificate Course
Theory Paper – II : Food Microbiology, Sanitation & Hygiene
Each Unit has 1.2 Credits

Paper – II

FOOD MICROBIOLOGY, SANITATION & HYGIENE

Unit I

1. Introduction to Microbiology & its relevance to everyday life. General morphology of micro-organisms. General characteristics of bacteria, fungi, virus, protozoa, algae.
2. Control of micro-organisms, effect of environmental factors on growth of micro-organism, pH, water activity, oxygen availability, temperature and others.

Unit II

1. Microbiology of different food spoilage and contamination, sources, types, effects on the following : (a) Cereals & cereal products, (b) Sugar & Sugar products, (c) vegetables & fruit, (d) meat & meat products, (e) fish & other sea foods, (f) egg & poultry, (g) milk & milk products, (h) canned food.
2. Environmental microbiology, water, air, soil & sewage

Unit III

1. Microbial intoxication and infections : Sources of contamination of foods. Toxin production & physiological actions. Sources of infection of foods by pathogenic organisms : symptoms & methods of control.
2. Beneficial effects of micro-organisms
3. Relevance of microbiological standards, food safety.

Unit IV

1. The relation of micro-organisms to sanitation, effect of micro-organisms on food borne illness : Bacteria, virus, moulds, yeast & parasites.
2. Other food hazards : Chemicals, antibiotics, hormones
3. Metal contamination : Poisonous foods
4. Food contamination : Sources & transmission, water, air, sewage & soil as reservoir of infection & work of spread.

Unit V

1. Importance of personal hygiene of food handler : Habits, clothes, illness, education of food handling in handling and serving food.
2. Safety in food procurement, storage handling and preparation control of spoilage-safety of left to left, own food.
3. Cleaning methods : Sterilization and disinfections : products & methods, use of detergents, heat, chemical test for sanitizer strength.
4. Sanitation, kitchen design, equipments and system : structure & layout of food premises, maintaining clean environment, selecting & installing, cleaning equipment.
5. Waste product handling : Planning for waste disposal.

References

1. Frazier, W.C. Food Microbiology, 4th Ed. McGraw Hill, New York, 1988.
2. Kawata K. Environmental sanitation in India, Lucknow Pub. House, 1963.
3. Pelezar H.J. and Rober D. Microbiology, 2nd Ed. McGraw Hill, New York, 1968.
4. Banwart G.T. Basic Food Microbiology, CBS Pub, New Delhi, 1987.
5. Jay J.H. Modern Food Microbiolgy, CBS Pub, New Delhi.

FOOD QUALITY CONTROL

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First Year : Certificate Course

Details of Practical/Experiments/Field Work/Training/Sessionals	Total Marks 50
(Concerned with two theory papers)	(08Credits)

1. Practical/Experimental Work will be of 25 marks
2. Sessional work will be of 10 marks
3. Field work & training will be of 10 marks
4. Viva will be of 5 marks

Food Science and Quality Control

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Syllabus for B.Sc. Part-II

Theory Paper	Title of Paper	Duration	Max. Marks	Min. Marks
Paper-I	Food Preservation sensory evaluation and Food packaging	3hr	75	25
Paper-II	Post Harvest technology	3hr	75	25
Practical		4hr	50	17

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FOOD QUALITY CONTROL

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PAPER-I
FOOD PRESERVATION, SENSORY EVALUATION
&
FOOD PACKAGING

Unit I

1. Basic concept of food preservation
2. Preservation at home and community level
3. Principles of food preservation

Unit II

1. Spoilage of food
2. Temporary & permanent methods of food
3. Nutritive value of preserved food

Unit III

1. Palatability of food and the measurement of its accepted sensory testing
2. Sensory analysis
3. Sensory characteristics of food

Unit IV

1. Factors influencing sensory measurements
2. Altitude, motivation, psychological errors adaption
3. Types of test (Laboratory)
4. Objective methods of evaluation – Density, volume, tenderness, tension, viscosity, weight, moisture loss, etc.

Unit V

1. Importance of packaging

2. Various package forms – Products, tubes, tetrapacks, cans, bottles.
3. Packaging materials
4. Packaging methods and performances
5. Evaluation of packaging

References

1. Food Science & Quality Control, S. Shrivastava
2. Preservation of fruits & vegetables, Girdhari Lal, Siddappa and G.L. Tondon
3. Food Preservation, Sundar Lal Sharma
4. Food Processing & Preservation, G. Subbulakshmi, Shobha A. Udipi
5. Food: Facts & Principles, N. Shakuntla, M. Sadakrishnaswami
6. Packaging Management, Briston & Neil, Gower Press
7. Food & Packaging Interactions, Hotchickess, American Chemical Society

FOOD QUALITY CONTROL

Add-On Course - Food quality control

Eligibility for B.Sc. students along with B.Sc. Part – II

PAPER-II

POST HARVEST TECHNOLOGY

&

ANALYTICAL INSTRUMENTATION

Unit I

1. Principles of food processing (a) Physical & (b) Chemical
2. Processing technology of cereals, legumes, oil seeds, fruits, vegetables, milk & milk products, meat, fish & poultry
3. Enrichment & fortification of food

Unit II

1. Sprouting & fermentation
2. Additives
3. Preservatives
4. Quality Control in food industry, methods of evaluation & control of various aspects of quality of raw material, manufacturing process, the testing of finished products

Unit III

1. Basics of instrumentation – Physical, chemical principles and methodology
2. Colorimetry, photometry

Unit IV

1. Chromatography – principles & techniques (thin layer, gas, liquid & high performance liquid chromatography)
2. Electrophoresis – Principle & applications, paper, moving boundary (agar & beta carotene).

Unit V

1. Principles & applications of different techniques used in food & nutrition research
2. Spectrophotometry – phosphorus, ascorbic acid
3. Fluorimetry – Thiamin, Riboflavin
4. Radioactive trace techniques

FOOD QUALITY CONTROL

Add-On Course - Food quality control
Eligibility for B.Sc. students along with B.Sc. Part – II

Laboratory Course

Details of Practical/Experiments/Field Work/Training/Sessionals Total Marks 50

1. Visit to food preservation centre
2. Preparation of jam, jelly, marmalades
3. Preparation of sherbet, squash and cordials
4. Preparation of sauce and ketchups
5. Preparation by dehydration methods of chips, papad, badi
6. Sensory testing of food – visual perception, colour, odour, smell, flavor, texture & taste
7. Survey of recent marketed packaging materials
8. Quality testing of packaging materials

Food Science and Quality Control

Vocational / Add-on Course

Syllabus for B.Sc. Part-III

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Theory Paper	Title of Paper	Duration	Max. Marks	Min. Marks
Paper-I	Food Analysis and Food Toxicology	3hr	75	25
Paper-II	Food Manufacturing and Testing	3hr	75	25
Practical		4hr	50	17

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B.Sc. Part – III
Food Science And Quality control
Paper – I
Food Analysis and Food Toxicology

Objectives:

To be enable students –

1. To develop new food products which are marketable & nutritionally and economically viable.
2. To develop entrepreneurial abilities for small- scale food industries.

UNIT-I

1. Food composition & Factors affecting : carbohydrates, proteins, fats & oil, and natural emulsifiers, organic acids, oxidants, antioxidants, enzymes, pigment and colours, flavours, vitamins, & minerals, natural toxicants water.
2. Sampling techniques : preparation of sample physical methods – lactometry , refractometry, polarimetry, viscosity, surface tension.

UNIT – II

3. General chemical methods of analysis
 - a. Total carbohydrate- mono, disaccharides, starch and gum, crude = fiber and dietary fibre.
 - b. Total fat and different types of lipids.
 - c. Total protein – (micro Kjeldahl methods, biuret methods, lawry,s methods) non protein and specific protein.
 - d. Macro & micro nutrients – Na, K, P, Ca, Mg, Fe, Zn, Vitamins.

UNIT -III

1. Toxicology – introduction, importance and scope.
2. (i) food contamination
 - (ii) Naturally occurring toxins in various foods.
Substance – animal & plant foods.

(iii) substances intentionally added to food – antioxidants colours, stabilizers

3. Residual chemicals utilized in food production & processing.

- (i) chemical preservatives.
- (ii) Pesticides
- (iii) Heavy metals.
- (iv) Hormones in foods.

UNIT – IV

4. Food borne illness – microbial & parasitic food poisoning

- (i) Bacterial intoxication – Staphylococcal botulism
- (ii) Bacterial infections – Salmonellosis , clostridium, E coli infection
- (iii) Non- Bacterial- Mycotoxins.
- (iv) Parasites - trichinosis, Amoebic dysentery Tapeworm.

UNIT - V

5. (i) Introduction :-

- (a) Application of irradiation in food preservation
- (b) Effects of irradiation

(ii) Heat Treatments –

- (a) Changes during thermal processing and effects on food quality and nutrients.

6. Carcinogens

- (i) Definition and classification
- (ii) Dietary factors.

7. Genetically Engineered foods :

Definition, Application of gene technology safety.

REFERENCE :

1. Principles & techniques of practical biochemistry Williams and K. Wiston, Edward Arnold pub.
2. Trace Analysis and Technological Development Ed. M.S. Das.
3. Microbiological Assay- an introduction to Quantitative principles & Evaluation. Bowitt W Academic Press 1977

Press 1977

4. Nutritional and toxicological Aspects of food processing ed. Walker and E.Quattrucci Tayloss & Francis New York 1980.
5. Mannual of Food Quality Control Addition Contamixents Techniques 1980.
6. The Chemical Analysis of food & food products By Morris B. Jacobs, 3rd Ed. Roberte Kriger.
7. Toxicological Aspects of food Edt. K.Lava miller E. Isevier Applied Science London & New York.

B.Sc Part-III
Food Science And Quality Control
Paper-II
Food Manufacturing Adulteration And Testing

Unit-I

MM:50

1. Market Research →Concept of market , type of market , Scope of market research , importance of market research , production of market research.
2. Consumer Research→ Consumer – meaning and definition consumer responsibility , consumer products , consumer behavior , importance of consumer research.
3. Food consumption pattern and the various factors affecting this pattern- economical , social , psychological and physiological.
4. Trends in social change and its role in diet pattern . Food situation in india and outside.
5. Tapping the un-conventional post haervrst losses.
6. Prospects of food processing for export . Traditional food status and need for revival in the context of westernized untraditional foods.
7. Product developing → primary and secondary processing , types of food products eg- quick cooking , fast food , convenience food.

8. Food laws → states and Municipal laws , voluntary , Mandatory , National and international , Role of voluntary agencies and legal aspects of consumer protection. Food Standard → Indian and international.
9. Food Adulteration → Composition and quality criteria for the following – milk & milk products , flesh foods Food grains flours , fruit & vegetable products , Oil & fats , Spices & condiments , Beverages-alcoholic & non alcoholic canned foods.

Unit-V

1. Entrepreneurship , plant , location , investment
2. Food laws , equipment and space
3. Costing of product
4. Advertising and marketing.
5. Large scale preparation of consumer products
6. Transporting – types/mode.

REFERENCE:

1. Ritson , C. Gofton L. McKenzie J. The Food Consumer John Wiley & Sons- New York , 1986
2. Association of food scientists & food technologists' proceedings of second international food science- food science & technological & Food convention (Indian Trends in food science & technology) IFCON—88 & 18-12-1988(FTR) Mysore.
3. Bender , Pe, Kromer , A. Kahan , G Systems Analysis for food Industry AVI , Publ Co , Connecticut 1976.
4. Prevention of food adulteration Act 1988
5. ISI publication
6. Pearson's Chemical analysis of Food-Egan Kiv and Sawyer.
7. Methods in food analysis – Jacob.
8. Handbook of analysis and quality control for fruits & vegetable products
9. Chemical methods of food analysis – Jacob.
10. Standard Methods for examination of dairy products – E.M. Master.

Part –B
B.Sc. Part-III
Food Science and Quality Control

MM:50

1. Analysis of Food and Testing of Adulteration in Food
Analysis of food simple Physical & Chemical Test.
2. To analyse protins, mineral and vitamins by colorimeter.
3. To analyse proteins by electrophoresis.
4. To analyse facts and vitamins by paper and thin layer chromatography.
5. To analyse facts gravimetrically.
6. To analyse facts by volumetric methods.
 - a. Testing food Adulteration-:
7. Milk and Milk products.
8. Oil & Fats
9. Canned foods
10. Fruits & vegetable products.
11. Spices and condiments.
12. Flours.
 - a. Student will be taken to different types of food manufacturing units and food service establishments.
 - b. Project report to be submitted.