B.Sc FOOD SCIENCE
&
QUALITY CONTROL

SYLLABUS RESTRUCTURE PROPOSAL

2009

SEMESTER I,II, III, IV, V &VI

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&
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2009
MAHATMA GANDHI UNIVERSITY

LIST OF EXPERT COMMITTEE MEMBERS
FOOD SCIENCE AND QUALITY CONTROL

1) Smt. Beena Cherian,
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NEED AND SCOPE OF FOOD SCIENCE & QUALITY CONTROL

With liberalization of Indian economy, all-round industrial growth has been witnessed in all sectors with improvement in social and economic conditions of our people. This has created demand for more and better quality foods. With advancement in production technology, high yield levels will lead to large amount of marketable surplus of food grains and crop residues, demanding appropriate handling, processing, preservation, storage, marketing and utilization. The development of processing industries to preserve the perishable agricultural produce will not only improve economic and nutritional status of our population but it may help in employment generation in rural as well as urban areas of the country. This can be achieved by linking production, and post harvest technology in synergistic way.

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

The importance of Food Science and Quality Control lies in the fact that it has capability to provide food to our population through scientific conservations, eliminating avoidable losses and making available more balanced and nutritious food. High value products from low grade material can be produced by innovative and appropriate processing and packaging technologies and also from by-products and residue waste using integrated approach. Thus modernization of post harvest operations and agro-processing industries through innovative and appropriate technology has a vital role to play in national economy in general and rural economy in particular. Considering the above aspects, the role of food technologist does not stop at farm level but it continues till the harvested crops and animal products are processed, preserved and further modified into useful and nutritious products, until it utilized by the consumer. So, the post-harvest handling and processing need to be attended on priority basis at national and international level. Moreover, with development of processing industries, it is quite likely that the demand for food scientists and technologists will increase in the next few decades. Hence, specializations offered at graduate level need to be strengthened considering occupational needs as well as demands of the food industries.

The field of food quality assurance has evolved substantially over the past decade, and certain key developments have become widely accepted. These include Quality Systems (e.g., ISO) and HACCP. Consequently, it has become essential for undergraduate Food Science and Quality Control students preparing for careers in the food industry to have some basic training in these systems as part of the curriculum in their university or college programs. The BSc programme integrates the latest principles, practices, and terminology of food safety systems with those of quality management systems to provide an understanding of a single food quality management system. Modules define industry terminology, review the differences and components of food quality and food safety, explain quality programs and quality systems, and thoroughly examine Good Manufacturing Practices and HACCP. Designed primarily as an undergraduate-level programme, it combines the fundamentals of food science and quality management courses in its curriculum.

Food Science is basically an interdisciplinary programme involving chemistry, microbiology and quality assurance. Hence, basic knowledge of these three disciplines becomes mandatory if student wishes to pursue career in this discipline. In order to develop strong and need based programme, core courses in above disciplines should be there for developing Food Science and Quality Control discipline for effective preservation, processing and utilization of perishable agricultural produce ensuring its quality.

In addition, the programme offers industrial training in the third and fifth semesters, which gives the students an opportunity to familiarize the food industrial unit operations while learning.

Pre-requisites

Any student who has passed +2 examination in the science stream can apply for the six semester BSc Food Science &Quality Control Programme .It is a programme offering 33 courses which are given below:

Common courses - 2
Complementary courses - 8
Core courses - 21
Choice based course - 1
Open Course -1

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EXPECTED LEARNING OUTCOMES

Upon successful completion of this course:

- Students will gain basic understanding and appreciation of food science and quality control .
- Students will explore their interests within the broad aspects of food science, allowing them to match their interests with potential career opportunities in food industry.
- Students will learn basic food composition and its effect on food characteristics.
- Students will gain fundamental understanding of a relationship between environment, microorganisms, food borne illness and food safety.
- Students will learn basic concepts of management in food industry.
- Students will gain general understanding of food quality, hygiene and sanitation.

DETAILED SCHEME

SL NO	STUDY COMPONENTS	NO: OF COURSES	CREDIT PER COURSE	TOTAL CREDITS	
A	**COMMON COURSES**				
	ENGLISH	2	4	8	
	TOTAL			**8**	
B	**CORE COURSES - FOOD SCIENCE**				
	1. THEORY	10	4	40	
	2. PRACTICAL	2	3	6	
	3. THEORY & PRACTICAL	2	4	8	
	4. CHOICE BASED	1	3	3	
	5. PROJECT/ DISSERTATION	1	3	3	
	6. PRACTICAL	2	2	4	
	7.THEORY	4	3	12	
	TOTAL			**76**	
C	**COMPLEMENTARY COURSES**				
	1.CHEMISTRY	2	3	6	10 - THEORY
		2	4	8	8 - PRACTICAL
	2.ZOOLOGY / MATHS	2	3	6	10 - THEORY
		2	4	8	8 - PRACTICAL
				28	
D	**OPEN COURSE**	1	4	4	
E	**INDUSTRIAL TRAINING**	2	2	4	
GRAND TOTAL				**120**	

DETAILED SCHEME OF INSTRUCTION OF THE CORE COURSES

SI NO	COURSE CODE	TITLE OF THE COURSE	EXAM DURATION HRS	CREDIT PER COURSE	CON HO P W
		FIRST SEMESTER			
1	FQIB51	METHODOLOGY IN THE DISCIPLINE OF FOOD SCIENCE	3	3	
2	FQIB52	BASIC NUTRITION	3	3	
3	FQ1B53	FOOD CHEMISTRY	3	4	
		SECOND SEMESTER			
4	FQ2B54	FOOD MICROBIOLOGY	3	4	
5	FQ2B 55	FOOD COMMODITIES	3	3	
6	FQ2B56	FOOD PRESERVATION TECHNOLOGY	3	3	
		THIRD SEMESTER			
7	FQ3B57	POST HARVEST TECHNOLOGY	3	4	
8	FQ3B58	ANALYTICAL INSTRUMENTATION	3	4	
9	FQ3B59	FOOD PACKAGING MATERIALS AND TESTING	3	4	
10		INDUSTRIAL TRAINING	0	2	
		FOURTH SEMESTER			
11	FQ4B60	FOOD SAFETY AND QUALITY ASSURANCE	3	4	
12	FQ4B61	SENSORY EVALUATION	3	4	
13	FQ4B62	MANAGEMENT IN FOOD INDUSTRY	3	4	
		FIFTH SEMESTER			
14	FQ5B63	FOOD TOXICOLOGY	3	4	
15	FQ5B64	FOOD ANALYSIS AND ADULTERATION TESTING (T & P) -I	3+3	4	
16	FQ5B65	BASIC MICROBIOLOGY- (P)	3	3	
17	FQ5B66	FOOD CHEMISTRY (P)	3	2	
18	FQ5D67	OPEN COURSE	3	4	
19		INDUSTRIAL TRAINING	0	2	
		SIXTH SEMESTER			
20	FQ6B68	ENTREPRENEURSHIP DEVELOPMENT	3	4	
21	FQ6B69	FOOD ANALYSIS AND ADULTERATIION TESTING (T & P) - II	3+3	4	
22	FQ6B70	FOOD MICROBIOLOGY - (P)	3	3	
23	FQ6B71	ADVANCED FOOD CHEMISTRY- (P)	3	2	
24	FQ6B72	CHOICE BASED COURSE	3	3	

25	FQ6B73	PROJECT / DISSERTATION	0	3	

DETAILED SCHEME OF INSTRUCTION OF THE COURSES

SI NO	COURSE CODE	TITLE OF THE COURSE	CREDIT PER COURSE	CONTACT HOURS PER WEEK	TOTAL CONTACT HOURS FOR THE COURSE
		FIRST SEMESTER			
1	FQIB51	METHODOLOGY IN THE DISCIPLINE OF FOOD SCIENCE	3	4	72
2	FQIB52	BASIC NUTRITION	3	4	72
3	FQ1B53	FOOD CHEMISTRY	4	4	72
4	COMMON	ENGLISH	4	5	90
5	COMPLEMENTARY CHEMISTRY		3	2T+2P	72
6	6 COMPLE ZOOLOGY		3	2T+2P	72
		TOTAL CREDITS	**20**		
		SECOND SEMESTER			
7	FQ2B54	FOOD MICROBIOLOGY	4	4	72
8	FQ2B 55	FOOD COMMODITIES	3	4	72
9	FQ2B56	FOOD PRESERVATION TECHNOLOGY	3	4	72
10	COMMON	ENGLISH	4	5	90
11	COMPLEMENTARY CHEMISTRY		3	2T+2P	72
12	COMPLEMENTARY ZOOLOGY		3	2T+2P	72
		TOTAL CREDITS	**20**		
		THIRD SEMESTER			
13	FQ3B57	POST HARVEST TECHNOLOGY	4	5	90
14	FQ3B58	ANALYTICAL INSTRUMENTATION	4	5	90
15	FQ3B59	FOOD PACKAGING MATERIALS AND TESTING	4	5	90
16		INDUSTRIAL TRAINING	2		
17	COMPLEMENTARY	CHEMISTRY	4	3T+2P	90
18	COMPLEMENTARY	ZOOLOGY	4	3T+2P	90
	TOTAL CREDITS		**22**		
		FOURTH SEMESTER			
19	FQ4B60	FOOD SAFETY AND QUALITY ASSURANCE	4	6	108
20	FQ4B61	SENSORY EVALUATION	4	5	90
21	FQ4B62	MANAGEMENT IN FOOD INDUSTRY	4	4	72
22	COMPLEMENTARY		4	3T+2P	90
23	COMPLEMENTARY	ZOOLOGY	4	3T+2P	90

	TOTAL CREDITS		**20**		
		FIFTH SEMESTER			
14	FQ5B63	FOOD TOXICOLOGY	4	5	90
15	FQ5B64	FOOD ANALYSIS AND ADULTERATION TESTING(T & P) -I	4	6	108
16	FQ5B65	BASIC MICROBIOLOGY- (P)	3	5	90
17	FQ5B66	FOOD CHEMISTRY (P)	2	4	72
18	FQ5D67	OPEN COURSE	4	4	72
19	I	INDUSTRIAL TRAINING	2	0	0
		TOTAL CREDITS	**19**		
		SIXTH SEMESTER			
20	FQ6B68	ENTREPRENEURSHIP DEVELOPMENT	4	5	90
21	FQ6B69	FOOD ANALYSIS AND ADULTERATIION TESTING (T & P) - II	4	6	108
22	FQ6B70	FOOD MICROBIOLOGY - (P)	3	5	90
23	FQ6B71	ADVANCED FOOD CHEMISTRY- (P)	2	4	72
24	FQ6B72	CHOICE BASED COURSE	3	5	90
25	FQ6B73	PROJECT / DISSERTATION	3	0	0
		TOTAL CREDITS	**19**		

FQ1B51 - METHODOLOGY IN THE DISCIPLINE OF FOOD SCIENCE

Credits- 3 72 hrs

.**OBJECTIVES**

- to have a broad outline of the methodology of food science
- to enable students to apply scientific methods independently
- to understand the nature of unit operations in the food industry.

I- Food Science an introduction
What is Food science and Quality control
Early history of food science, its developments
Preparation of a career in food science
Activities of food scientists
Components of a food industry
Allied industries
International activities

Interrelated
operations��
������ 15 hrs

II. World Food Needs and Hazards
Nature of Nutritional problems – its dimensions
Food related hazards
Role of
technology��
��� 7 hrs

III. Innovations
Importance of new products and product technology
New applications of membranes in food processing
Cross flow membrane
technology��
Next generation products
Competitive behaviour
Consumer behaviour and internet
marketing�� 15 hrs

IV. Methods and Tools Of Science
Hypotheses: Observations, evidences and proofs
Posing a question: formulation of hypotheses :Hypthetico- Deductive model, Inductive model
Mathematical methods vs Scientific
methods��
12 hrs

V. Experimentation in Science
Design of an experiment: experimentation, observation, data collection, interpretation and deduction
Scientific instruments used in food
science�� ���
Making observations: direct, indirect controlled and uncontrolled , human and machine observations, human
error.��
 ������ ����9 hrs

VI. Data Handling and Ethics in Science
Documentation of experiments , nature and types of data
Significance of statistical tools in data presentation
Data presentations- graphs , tables, histograms and pi diagrams
Statistical testing of hypotheses, null hypotheses, significance tests, Correlation
Computer applications in food
science��
14hrs

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.

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FQQ1B52 - BASIC NUTRITION

Credit:

3

(72 hrs)

OBJECTIVES :-

To enable the students to

1. Under stand the relationship between nutrition and human well being
2. Know and understand the functions, importance of all nutrients for different age group and special group.

1. **Introduction to nutrition**
Food as a source of nutrients, function of foods, adequate optimum and good nutrition 3 hrs

2. Inter relationship between nutritional and health.
Visible symptoms of good health, Assessment of the nutritional status 4 hrs

3. Malnutrition
Definition, aetiology, remedial factors, classification 3 hrs

4. Food guide
Basic Five food groups how to use food guide. 3 hrs

5. Food assmiliation
Digestion, absorption, transport utilization of nutrients in the body 4 hrs

6. Water
function, Sources, requirement, water balance. 2 hrs

7. Carbohydrates
composition, classification, food sources, functions, storage in body. 4 hrs

8. Fats
Compositions, saturated and unsaturated fatty acids, classification, food sources, functions of fats. 4 hrs

9. Proteins
Composition, Sources, essential and non-essential amino acid, functions, protein deficiency (very brief) 4 hrs

10. Energy
unit of energy, food as a source of energy, energy value of food 6 hrs
The body's need for energy, BMR activities.

11. Acid base balance
Respiratory mechanism and renal mechanism 3 hrs

12. Minerals
functions, sources, units, bio availability, deficiency of following minerals
Calcium, iron, Iodine, Fluorine, Sodium, Potassium 13 hrs
Fat Soluble vitamins

13. Vitamins
Classification, units of measurement, sources, functions, deficiency and remedial measures about following vitamins 9 hrs
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}

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.

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FQ1B53 - FOOD CHEMISTRY

Credits-4

(72hrs)

OBJECTIVES:

To enable the students to:
a. Acquire knowledge on the macro and micro constituents of the food
b. Know the structure and chemical characteristics of constituents of food

I CARBOHYDRATES (18 hours)

CLASSIFICATION, STRUCTURE, PROPERTIES AND REACTIONS OF CARBOHYDRATES

Monosaccharide
Classification., Optical Activity.D-and L-forms.Muta-Rotation.Straight and Ring structure of glucose, fructose and galactose.Industrial & Laboratory preparation of glucose & fructose.

Oligosaccharides
Classification.Reducing & Non-reducing sugar.Glycosidic bonds.Structure of sucrose, maltose, iso maltose & lactose.Inversion of sucrose.

Polysaccharides
Classification.Structure of starch, cellulose, glycogen, pectin, hyaluronic acid.Difference between amylase & amylo pectin.Gelatinization of starch.Theory gel formation Adsorption of solvent, three dimensional network, Particle orientation.

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 amine.Oxidation reactions.Browning reactions Enzymatic & Non-enzymatic browning.

II PROTEINS (18hours)

CLASSIFICATION, STRUCTURE, PROPERTIES AND REACTIONS OF PROTEINS

Amino acids, peptides and proteins
Classification of aminoacids,structure,essentional amino acids, zwitter ion,isoelectric point,amphoteric property
Peptide bond, naming of peptide chain, biological roles.Classification of protein according to shape; classification of protein according to composition and solubility Structure of protein, chemical bonds involved in protein structure
Physical-chemical properties of proteins;colour and taste, shape of size, molecular weight, colloidal nature,amphoteric nature, ion bonding capacity,solubility,optical activicty,precipitation with antibodies.
denaturation-agents causing denaturation,changes occurring during denaturation
Chemical reaction-hydrolysis,Reactions involving COOH group,Reactions involving NH2 group,Reactions involving R groups or side chain.Estimation of protein by paper electrophoresis and paper chromatography, biological function of protein.

III LIPIDS (18 hours)

CLASSIFICATION, STRUCTURE, PROPERTIES AND REACTIONS OF LIPIDS

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
Physical properties - melting point,polymorphism,softening point, slipping point, specific gravity, refractive index, smoke flash and fire points, turbidity points,
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
Flavor changes in fats and oils
Hydrolytic and oxidative rancidity; mechanism of auto oxidation of fat; reversion
Antioxidants- natural and synthetic
Technology of edible fats and oils; hardening of fat hydrogenation and inter esterification
Structure- phospholipids, glycolipids,sphingo lipids, cholesterol
Emulsion and emulsifiers.

IV ENZYMES (10 hours)

Nomenclature and classification; active site and allo steric site; enzymes specificity, enzyme as a catalyst, enzymes kinetics, derivation of Michaels-, Menton equation; Line waver-bark equation, factors influencing enzyme activity, effect of substrate concenteration,effect of enzyme concentration ,effect of temperature,PH
Enzyme inhibitors- reversible and irreversible; derivation of equation for 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

V VITAMINS, MINERALS AND WATER (8 hours)

Vitamins & Minerals-Classification and structure, fortification enrichment, restoration.
Food pigments ; ciassification,structure of heme, chlorophyll,carotenoids.reactions of myoglobin and chlorophyll,flavonoids- anthocyanin, anthoxanthin and flavones
Water-structure of water and ice, physical constants of water and ice, hydrogen bonding ,free water and bound water.

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.

SEMESTER-I

???? ????????????MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

???????????????????????????????? MODEL QUESTION PAPER

FQ1B51 METHODOLOGY IN THE DISCIPLINE OF FOOD SCIENCE

**Time:3hrs????????????????????????????

15. Food analysis deals with the principles ,methods & techniques for quantitative analyses of food products and ingredients.
16. Questions affecting the sentiments of the respondent should be included in a questionnaire.

Part B
(Short answer type questions. Weightage 1 each)
Define

17. Null hypothesis.
18. Consumer behaviour.
19. Laboratory method.
20. Correlation.
21. Marketing.
22. Quality Control.
23. Food hazard.
24. Schedule.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.
25. Briefly explain cross flow membrane technology.

26. Differentiate mathematical methods from scientific methods.

27. Which are the components of a food industry?

28. What is internet marketing?

29. Which are the common tools used for the presentation of data?

30. Briefly explain the scientific instruments used in food science.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

31. Give an account of the computer applications in food science.

32. Write an essay on new generation food products.

33. What is the significance of data collection in research? Give the description of four methods of data collection.

MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE AND QUALITY CONTROLPROGRAMME
MODEL QUESTION PAPER

FQ1B52 - BASIC NUTRITION

Time: 3 hours ***Max Weightage: 25***

Instructions:

1. Time allotted for the examination is 3 hours.
2. Answer all questions in Part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the answers are correct, B for 3, C for 2, D for 1 and E for 0.

3. Answer any 5 questions from Part B, any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer

1. Scurvy is a disease caused by the deficiency of
   a) Vit A b) Vit D c) Vit C d) Vit B

2. Nutrition is a study of
   a) diseases b) toxicity of foods c) food and health
   d) chemical changes in the body

3. Fat soluble vitamins are
   a) A,D,E and K b) A, B, C and D c) C, D,E and K
   d) B,C, E and K

4. The enzyme of saliva that breaks down carbohydrate is
   a) Protease b) Amylase c) Lipase d) Oxidase

Fill up the following:

5. Biological value is used to measure the quality of ------
6. Cobalt is a constituent of -------
7. Matose is composed of ------
8. The disease caused by the deficiency of niacin -----

Name the following:

9. Current carbohydrate coin of the body
10. The vitamin necessary for the synthesis of visual purple-----
11. The chemical name of Vit B_{12}
12. Limiting amino acid in pulses

True of false

13. Sucrose is composed of two molecules of glucose
14. Carbohydrates can spare proteins
15. Fats are the cheapest source of energy
16. Hyponatremia is the deficiency disease of potassium

(1x4 = 4)

Part B
(Short answer types questions. Weightage 1 each)

Answer any 5 out of the following
Define/Explain

17. Malnutrition
18. BMR
19. Nutrients
20. Reference man
21. Water balance
22. Calorific value of foods
23. Macronutrients
24. Complete protein

(1x5 = 5)

Part C
Short essay type questions. Weightage 2 each
Answer any four out of the following

25. Describe the importance of iodine in the diet and the disease associated with its deficiency.
26. In brief describe a method for the determination of energy value of foods with neat sketch.
27. What is the role of water in human nutrition? What are the symptoms and effect of deficiency of water in human subject.
28. Describe the term Acid-base balance. Explain two major mechanisms which operate to maintain it in the body.
29. Describe the major symptoms of protein deficiency in adults. What is protein energy malnutrition.
30. Mention the names of five food groups. In brief describe any two of these groups.

(2x4 = 8)

Part D
(Essay type questions, weightage 4 each)

Answer any 2 from the following

31. Describe the role of iron, calcium, phosphorus and sodium in the human nutrition. What are the factors which affect their bioavailablity from the diet?
32. How are the carbohydrates classified. Mention an example and a rich source of each class Briefly mention, how are these channelized in the body for utilization or storage after digestion.
33. What do you understand by anaemia. Mention the role of iron and folic acid in the alleviation of the symptoms of anaemia. Mention few good sources of iron and folic acid.

(4x2 = 8)

MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE AND QUALITY CONTROLPROGRAMME

MODEL QUESTION PAPER

FQ1B53 - FOOD CHEMISTRY

Time: 3 hours ***Max Weightage: 25***

Instructions:

1. Time allotted for the examination is 3 hours.
2. Answer all questions in Part A. This contains 4 bunches of 4 objective type questions.
3. For each bunch Grade A will be awarded if all the answers are correct, B for 3, C for 2, D for 1 and E for 0.

Answer any 5 questions from Part B, any 4 from Part C and any 2 from Part D.

Part A

(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer

1. Methionine is a
a) basic aminoacid b) acidic aminoacid
c) aromatic aminoacid d) Sulphur containing amino acid

2. Lactose contains
a) a molecule of glucose and one molecule of fructose
b) a molecule of glucose and a molecule of galactose
c) two molecules of glucose
d) a molecule of galactose and a molecule of fructose

3. The oxygenated derivatives of carotenes are
a) anhoxanthine b) anthocyanin c) tannin d) xanthophylls

4. An apoenzyme is an enzyme which contains
a) both protein and cofactor b) only the protein factor
c) only the cofactor e) no protein and no cofactor

Name the following

5. Antihaemorrhagic vitamin
6. Hydrolysis of sucrose
7. Muscle pigment
8. Condensation product of sugar with non-sugar

Fill up the following:

9. ----- is a measure of the amount of volatile water insoluble fatty acids present in fats/oils.
10. The enzyme which converts starch to high fructose corn syrup is -----
11. The mineral which is a major structural constituent of chlorophyll is -----
12. The enzyme which consist of multiple protein subunits and which can show a change in the affinity for its substrate are called -----

State true or false

13. Denaturation of protein involves the modification primary, tertiary and quarternary structures.
14. Reichert Meissel value gives the amount of butyric acid and caproic acid.
15. Water shows maximum density at 0C
16. Maillard reaction involves reaction between reducing sugar and amino acid.

(1x4 = 4)

Part B

(Short answer type questions, weightage 1 each)

Answer any 5 out of the following:

17. What do you mean by mutarotation?
18. Define the term restoration
19. Give the structure of Vitamin C
20. What is a Zwitter con?
21. What do you mean by drying oils and terpeneless oil?
22. What do you understand by the term group specificity?

23. Define the term water activity.
24. What are reducing sugar? Give an example.

(1x5 = 5)

Part C
(Short essay type questions, weightage 2 each)

Answer any 4 out of the following:

25. Monoglycerides are good emulsifying agents whereas triglycerides are not. Why?
26. What do you mean by denaturation and what are the agents causing denaturation?
27. What are modified cellulose and what are its uses?
28. What are the various factors affecting enzyme activity? Briefly describe any four.
29. Give the Haworth Cyclic structures and Fischer projection formula for α and β-
D-Fructoses.
30. Write a short note on fortification of foods with examples.

(2x4 = 8)

Part D
(Essay type questions, weightage 4 each)

Answer any 2 from the following:

31. Define the term rancidity. What are the different types of rancidity?
32. What are changes occurring in Chlorophyll and myoglobin during processing?
33. Explain briefly
a. Gelatinization
b. Structures of
protein (4x2= 8)

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FQ2B54 - FOOD MICROBIOLOGY

Credits
4
72Hrs

OBJECTIVES

To help the students to:

a) acquire an elementary knowledge about micro organisms.
b) develop an understanding of industry and in maintenance of health.

I Introduction to microbiology
8Hrs
Microbiology in daily life.
.Characteristics and morphology of bacteria, fungi ,virus ,protozoa & algae.
II Control of micro-
organisms.
6Hrs
Growth curve
Effect of i) PH ii) Water activity iii) O_2 availability
& iv) temperature on the growth of microorganisms.
III Cultures &
Media

10Hrs

- Different type of media.
- Preparation of media
- Culturing techniques

IV Indicator microorganisms 3Hrs

- Sources, methods of detection, growth & survival & significance of
- a) coliforms b) feacal streptococci c) enterobacteriaceae

V Contamination and spoilage of different foods. 12Hrs

- a) Cereals, sugar and their products.
- b) Milk & milk products
- c) Vegetables & fruits
- d) Canned foods
- e) Meat, fish, egg and poultry

VI Environmental microbiology 10Hrs

- Water- test for E.coli
- Air, Soil and sewage
- Biogeochemical activity of microorganisms in soil.

VII Microbiological intoxications and infections 12Hrs

- Toxic production and physiological action
- Methods of control
- Microbiological standards

VIII Beneficial microorganisms. 11Hrs

- Micro organisms of industrial importance
- a) biomass b)fermentation c) enzymes & hormones
- Antibiotics & vaccines
- Micro organisms & effluent treatment

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.
4. Narayanan, L.M., Mani,L., Microbiology.Saras Publications, Nagercoil.
5. Bryan,F.L., Diseases transmitted by foods. Munich Publishers, Atlanda.

FQ2B55- FOOD COMMODITIES

Credits:

3

72 hours

OBJECTIVES

1. To understand the basic commodities both raw and processed in food industries and various aspects of their production and distribution.
2. To discuss the qualities and standards of available commodities and their suitability for different purposes

I. **Cereal and Cereal Products**

8 hrs

Rice, Wheat and their products- structure, processing, uses in variety of preparations, selection, storage and nutritional aspects.

II. **Pulses and Legumes**

5hrs

Production, selection, variety, storage, processing, uses in variety of preparations, nutritional aspects and cost.

III. **Milk and Milk Products**

8 hrs

Composition, classification, quality, processing, spoilage, storage, uses, nutritional aspects. Products – Processed milk, curd, butter, butter milk, paneer, cheese and ice cream.

IV.

Egg

6 hrs

Production, nutritive value, structure, composition, egg quality, evaluation of egg quality, grading, storage, processing, effect of heat on egg proteins, egg products.

V. **Fish, Meat and Poultry**

10 hrs

Classification, composition and nutritive value, spoilage, selection, purchase, processing, storage.

VI. **Vegetables and Fruits**

6 hrs

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.

VII. **Sugar and Sugar Products**

6 hrs

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.

VIII. **Fats and Oils**

8 hrs

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.

IX. **Spices and Condiments**

��� 5 hrs

Compositions, classification, flavouring extracts, major spices of India (pepper, cardamom, ginger, chillies) � process, composition and uses.

Minor spices of India ������������������������������ ������������������������������ ������ ����4 hrs

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 �

X.

Neutraceuticals ������������������������������ ������ ������ ������4 hrs

Definition, types, uses.

XI. **Tea and Coffee** ������ 6 hrs

Tea � classification, processing, composition, preparation of tea products.

Coffee � classification, processing, composition, coffee making, soluble coffee.

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.

FQ 2B56-FOOD PRESERVATION TECHNOLOGY

Credit:
3 ������ **72 HRS**

Objectives

To enable the students to
1) acquire knowledge on different preservation techniques used to enhance the shelf span of food product.

I) Introduction to food preservation 6 hours

�� Basic principles of food preservation, types of spoilage, importance of food ��
preservation. ��

8 hours

II) Preservation by use of high temperature

��➢ Pasteurization, sterilization, canning.➢ History and steps involved,➢ ➢➢➢ types of➢ cans and bottles.➢ Spoilage encountered.	6 hours
III) Preservation by use of low temperature ➢➢➢➢ Refrigeration-Advantages, systems.➢ Factors to be considered, common➢ ➢➢➢➢ spoilage	8 hours
IV) Preservation by use of very low temperature ➢➢➢➢➢ Freezing, difference between refrigeration and freezing, methods of freezing, ➢➢➢➢➢ steps involved in freezing, common food spoilage, types of freezing,➢➢➢ ➢➢➢➢➢ maintenance of➢ freezers.	8 hours
v) Preservation by removal of moisture. ➢➢➢ 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.	7 hours
VI) Preservation by using sugar ➢➢➢➢➢ Sugar concentration, principles of gel formation, preparation of jam, jelly, ➢➢➢➢➢ marmalades, preserve, candy, glazed, crystallized fruits, FPO specification.	10 hours
VII) Preservation by using chemicals and salts ➢➢➢➢➢➢➢➢➢➢➢➢ ➢➢➢➢ Chemical preservatives-definition, role of preservatives, permitted ➢➢➢➢➢➢➢➢➢➢➢➢➢➢➢➢➢➢➢➢ preservatives. ➢➢➢➢➢➢➢➢➢➢➢➢ ➢➢➢➢ Pickling-principles involved and types of pickles.	8 hours 4 hours
VIII) Fermentation ➢➢➢➢➢➢➢➢➢➢➢➢ ➢➢➢ Advantages, factors affecting, types of fermentation, common fermented foods-wine, beer, distilled liquors, vinegar and cheese manufacture.	
IX➢ Irradiation ➢➢➢➢➢➢➢➢➢➢➢➢ ➢ Properties of irradiation, advantages, mechanism, affects on foods, permitted doses, dose determination factors. ➢➢➢➢➢➢➢➢➢➢➢➢ ➢ Microwave heating-properties, mechanism, advantages and applications.	
x) Combination preservation	

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.
3. Potter, N.N. and Hotchkiss J. H. Food Science.➢ CBS publishers and distributors. 1996.
4. Srivastava, R.PO and Kumar, S. Fruit and vegetable preservation, International Book distribution Company, Lucknow, 1994.
5. MC.Williams, M and Paine, H. Modern Food preservation. Surjeet Publications, Delhi, 1984.
6. Cruess, W.V. . Commercial fruits and vegetable products, Anees Offset press, New Delhi, 1997.

SEMESTER-II

********** MAHATMA GANDHI UNIVERSITY

SECOND SEMESTER B.Sc FOOD SCIENCE & QUALITY CONTROL (PROGRAMME) EXAMINATION 2010

MODEL QUESTION PAPER

FQ2B54 - FOOD MICROBIOLOGY

Time: 3 hours******* ********** Max Weightage: 25***

Instructions:

4. Time allotted for the examination is 3 hours.
5. Answer all questions in Part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the answers are correct, B for 3, C for 2, D for 1 and E for 0.
6. Answer any 5 questions from Part B, any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions, weightage one for each bunch)

Fill in the blanks

1. Green rots in egg is caused by the bacterium ----------.

2. A culture that contains only one kind of microorganism is known as ----- ----------.

3. SPC is the abbreviation for -------- ---------- .

7. ---------- test is based on the property of the enzyme to liberate phenol from phosphoric phenylester added to a sample of milk.

Choose the correct answer

5. ---------- is also known as bacillary dysentery.

a) salmonellosis b) ketosis
c) shigellosis d) paralysis

6. Foods with PH between 5.3 & 4.5 undergo

a) flat sour b) T A spoilage
c) hydrogen swell d) putrefaction

7. Yeast secrete the enzyme complex called

a) diastase b) isomerase
c) zymase d) phenolase

8. Citric acid is produced by

a) clostridium b) penicillium
c) aspergillus d) mucor

Name the following

9. The time taken to kill a stated number of microbes at a certain temperature under specified conditions.

10. The microorganism commonly known as bread mould.

11. The discoverer of gram's staining.

12. Identical male & female gametes .

State True or false

13. Seafoods get spoiled by autolysis, oxidation & bacterial activity.
14. Cells stained with carbol fuchsin appear green.
15. Rhodotorula are yeasts.

16.Lag phase is called exponential phase.
1x4 =4

Part B
(Short answer type questions, weightage 1 each)

17.Differentiate intoxication and infection.
18.What are indicator organisms?
19.What is parthenogenesis?
20.What are whiskers?
21.What are pili?
22.What is sulphur stinker?
23.What is downy mildew?
24.What is nitrogen fixation?
1x5= 5

Part C
(Short essay type questions, weightage 2 each)

25.Briefly explain ropiness in milk.
26.What are trickling filters?
27.Types of spoilage in meat under aerobic conditions.
28. What is lyophilization?
29. Write about any two factors affecting the growth of microorganisms.
30. How do you prevent the outbreak of Staphylococcal intoxication? 2x4 =8

Part D
(Essay type questions. Weightage 4 each)

31. Give an account of activity of microbes in effluent treatment.
32. Write an essay on canned food spoilage. 4x2=8
33. What is motility in bacteria? Describe reproduction and nutrition in bacteria and yeast.

MAHATMA GANDHI UNIVERSITY

SECOND SEMESTER B.Sc FOOD SCIENCE & QUALITY CONTROL (PROGRAMME) EXAMINATION 2010
MODEL QUESTION PAPER
FQ2B55 - FOOD COMMODITIES

Time: 3 hours ***Max Weightage: 25***

Instructions:

8. Time allotted for the examination is 3 hours.
9. Answer all questions in Part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the answers are correct, B for 3, C for 2, D for 1 and E for 0.
10. Answer any 5 questions from Part B, any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions, weightage one for each bunch)

Name the following:

1. Father of White revolution
2. Removal of seed coat of pulses
3. The membrane surrounding egg yolk
4. Limiting aminoacid in cereals

Choose the correct answer

5. The process of conversion of large fat globules in milk to smaller size is called
   a) Saponification b) Curing c) Homogenization d) Pasteurization
6. The unavailable sugars in pulses which are known for flatulence production is
   a) Maltose b) Raffinose c) Sucrose d) Galactose
7. The enzyme responsible for the sticky consistency of rice after cooking is
   a) α amylase b) Peroxidase c) Phenolase d) Lipase
8. The enzyme present in the raw papaya`
   a) Papain b) Bromelin c) Citric acid d) Tocopherol

Fill up the following:

9. The egg yolk is connected to albumin by -------
10. The water phase/serum obtained after the separation of butter from curd is known as ---------
11. The protein which is the major constituent of thick muscle filament is -----
12. The very strong flavour of onion and garlic are due to -----

State true or false

13. Fish oil is rich in vitamine A and C
14. Invert sugar contains glucose and galactose
15. Micro organism used in the preparation of tempe is Rhizopus Oxyzae.
16. Gin is a distilled spirit flavoured with juniper berries

1x4 = 4

Part B
(Short answer type questions, weightage 1 each)
Answer any five out of the following:

17. What is yolk index
18. What is meant by double toned milk?
19. What are leavening agents?
20. Differentiate between green tea and black tea
21. List out any four permitted synthetic food colours
22. What are the changes occurring in fruits during ripening?
23. What are the changes occurring in myoglobin during processing?
24. Write a note on germination.

1x5 = 5

Part C
(Short essay type questions, weightage 2 each)

Answer any four out of the following:

25. Briefly explain the term pasteurization. What are different types of pasteurization?
26. Write a note on parboiling of rice
27. Write a note on spoilage of fish
28. List the different methods of meat tenderisation.
29. How can you minimize the loss of nutrients in vegetables during processing?
30. Briefly explain the toxic principles present in pulses and how can they be removed?

2 x 4 = 8

Part D
(Essay type questions. Weightage 4 each)

Answer any 2 questions from the following:

31. Explain the term ‘neutraceuticals’. What are the various food ingredients of typical neutraceutical diet

32. Describe the processing of fats and oils

33. Write a note on spices with antioxidant and antimicrobial properties.

4x2 = 8

MAHATMA GANDHI UNIVERSITY
SECOND SEMESTER B.Sc FOOD SCIENCE & QUALITY CONTROL (PROGRAMME) EXAMINATION 2010
MODEL QUESTION PAPER
FQ2B56 - FOOD PRESERVATION TECHNOLOGY

Time: 3 hours Max Weightage: 25

Instructions:

1. Time allotted for the examination is 3 hours.
2. Answer all questions in Part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the answers are correct, B for 3, C for 2, D for 1 and E for 0.
3. Answer any 5 questions from Part B, any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions, weightage one for each bunch)

Name the following:

1. Unit of radiation
2. Exudation of water from the gel
3. The common name of Mono sodium glutamate is known as -----
4. The common form in which SO_2 is used as preservative

Choose the correct answer:

5. F.P.O is
a) Fruit products order b) Food product order
c) Fruit preservation order d) Food preservation order

6. Freeze drying involves
a) Evaporation b) Sublimation
c) condensation d) Osmosis

7. Canning was discovered by
a) Jenner b) Roentgen c) Louis Pasteur d) Nicholas Appert

8. Which one is class II preservative according to 52 of PFA rule?
a) Sodium chloride b) Sucrose c) Edible vegetable oil d) Sorbic acid

Fill up the following:

9. Complete destruction of micro organism is called-----
10. Process of removing air from the cans is called ----
11. Putrefaction means the breakdown of -------
12. According to FPO Jam should contain ----- percentage total soluble solids.

True or false

13. Over ripen fruit is suitable for jelly preparation.
14. Pasteurised milk is safe for consumption
15. Beer is considered as an distilled liquor
16. Blanching is usually done in vegetables for the inactivation of enzymes

1 x 4 = 4

Part B

(Short answer type questions, weightage 1 each)

Answer any five out of the following:

17. What do you understand by Intermediate moisture foods?
18. Differentiate between pasteurization and sterilization
19. Enlist the causes of food spoilage
20. Write the factors affecting drying characteristics of foods
21. What is the role of salt in pickle making?
22. What is the mechanism of microwave heating?
23. What do you mean by Hurdle technology?
24. Write in brief about freeze drying?

Part C

(Short essay type questions, weightage 2 each)

Answer any four out of the following

25. Write down the role of F.D valve in pasteurization plant.
26. Explain the process of refrigeration
27. What are the basic principles of food preservation?
28. Advantages of quick freezing over slow freezing.
29. With the help of a flow diagram explain the manufacture of jelly. Also write is FPO specification.
30. Explain the difference between fermentation and putrefaction. Name two micro organisms used in fermentation technology.

2x4 = 8

Part D

(Essay type questions. weightage 4 each)

Answer any two questions from the following:

31. What do you understand by concentration of foods. Explain different methods of
concentration and discuss its significance in Indian Food Industry.

32. Explain the types of spoilage occurring in canned foods.

33. Give an account of the advantages and disadvantages of food irradiation and also
write on photo electric effect. Mention its any two application in Indian food industry.

4x2 = 8

FQ3B57 POST HARVEST TECHNOLOGY

Credits:4 90 Hrs

OBJECTIVES : To enable the students

1. to understand the importance and methods of post harvest conservation of foods.
2. to gain knowledge in food processing.

UNIT I Physical principles underlying food processing operations such as

- Thermal processing**09 Hrs**
- Refrigeration
- Freezing
- Dehydration
- Ionizing radiation.

UNIT II Chemical changes in food that affect the **07 Hrs**

- Texture
- Colour
- Flavour
- Odour
- Stability and nutritive quality during processing and storage.

UNIT III Processing technology of

- Cereals, legumes and oilseeds. **12Hrs**

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.

Legumes- processing.

Oilseeds -extraction, refining, hardening of fat-hydrogenation and inter esterification.

- Fruits and vegetables. **09 Hrs**

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.

(Visit to an agro based industry)

- Milk & Milk products **21 Hrs**

Pasteurized Milk- General steps involved in Processing , calculation of standardization of milk- application of Pearson Square method,
Method of manufacture of sterilized milk, tonned milk.

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.
(Visit to dairy industry).

- Meat, fish, poultry and eggs **16 Hrs**

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.

UNIT IV **05 Hrs**

- Extrusion technology

Single screw extruder, Advantages of extrusion cooking

UNIT V

- Fermentation technology**�� 11 Hrs**

Microbes involved, common cultures of importance in food industry, fermentation in a food industry.

- High Protein food technology

Biomass, SCP, protein isolates, nutrient supplements and health drinks.

REFERENCES

1. Kent, J.A. Riegel's 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.

FQ3B58������������������������������ ANALYTICAL INSTRUMENTATION

�**

Credits:4**��**
90 Hrs

Objectives:

Inorder to enable students:

-**����** to be familiar with different methods of investigation used in the analysis of**��**
������������ foods**��** and biochemical assay.
-��� to gain knowledge about different instruments used in food analysis.
-��� to know the principles and applications of different techniques used in food and
�***** nutrition research.

I. Basic principles of chromatography.**������������������������������������ 8Hrs**

II. Paper Chromatography Introduction, general principles, procedure, types of paper chromatography, applications**.������������������������������������ 02 Hrs.**

III. Thin layer chromatography – Introduction, principle, procedure, general application.**02 Hrs.**

IV. Column – liquid chromatography – General procedure, qualitative analysis, separation and resolution, quantitative analysis.**01 Hr.**

V HPLC (High performance liquid chromatography).**14 Hrs.**

- Introduction, principle of separation, components of an HPLC system.
- Pump, injector, column (column hardware and column packing materials in brief) detector and different types of detectors, recorder, Application of HPLC.

VI 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 Hrs.**

VII Spectrophotometry – introduction and principles.**11 Hrs.**

VIII Ultra violet and visible absorption spectroscopy – basis of absorption spectroscopy, deviations from Beer's law, procedural consideration, calibration curves. Instrumentation and instrument design, application.**16 Hrs.**

IX Fluorimetry – introduction, principle and techniques, instrumentation and application.**08 Hrs.**

X. Radiotracer techniques – radioactive counters, solid, gas and liquid scintillation.**08 Hrs.**

XI. Measurement of enzyme activity.**04 Hrs.**

XII. Electrophoresis – definition , types of electrophoretic methods, free solution electrophoresis, tisetius method, paper or agar gel electrophoresis, PAGE.

04 Hrs.

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.

FQ3B59 FOOD PACKAGING MATERIALS AND TESTING

Credits

:4

90 Hrs

OBJECTIVES

To enable students

(i) to be familiar with different methods and materials used for packaging.

(ii) to understand the technology behind packaging.

(iii) to understand interaction of food with packaging & to do shelf life testing.

I Introduction to food packaging 03 Hrs

Definition, functions and requirements for effective packaging.

II Classification of packaging 06Hrs

(a) Primary, secondary and tertiary packaging.

(b) Flexible, rigid and Semi- rigid packaging.

III Materials for food packaging types, various uses, merits & drawbacks.

- Paper
- Glass **17 Hrs**
- Tin
- Aluminum
- Plastic

IV Different forms of food containers. 08 Hrs

Boxes, jars, cans, bottles.

V Modern concepts of packaging technology. 14 Hrs

- Aseptic packaging
- Form Fill Seal packaging
- Edible Films
- Retort pouches
- Easy - Open End, Boil In- bags
- Closures.

VI Food packaging Laws & Specifications 07 Hrs

VII Quality testing of packaging materials 12 Hrs

(a) Physical Test

(b) Chemical Test

(c) Transportation hazards and testing

VIII Shelf life testing of different packaged foods. 13 Hrs

- Tin

- Plastic

- Oxygen interactions, moisture interchanges and aroma permeability.

IX Interaction of packages with foods. 10 Hrs

- global migration of plastics
- tin can corrosion

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, New 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-III

MAHATMA GANDHI UNIVERSITY
B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME
MODEL QUESTION PAPER

FQ3B57 **POST HARVEST TECHNOLOGY**

Time:3hrs **Max Weightage:25**

Instructions:

1. Time allotted for the examination is 3 hrs.
2. Answer all questions in part A.This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
3. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

PART A

(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer

1. Browning reactions are caused by enzymatic oxidation of

a) alcohol b) acid
c) polyphenol d) indol.

2. Dried whole milk contains ------ of solids.

a) 92% b) 88%
c) 99.8% d) 97%.

3. A tenderizer used in bread.

a) egg b) yeast
c) shortening d) flour.

4. The processing technology which uses carbon dioxide at high pressure to separate food components.

a) hydrostatic pressure b) heat exchangers
c) extrusion d) supercritical fluid extraction.

Fill up the following.

5. The temperature maintained in the ice cream hardening room is -------- .
6. The pre cooling treatment to remove fat crystals is called ---------- .
7. Hanging the carcass in a cold room of temperature 2 degree celcius for 1 4 weeks is called ---------- .
8. Quick heating of fruit products to inactivate enzyme liberated from broken cells is called ---------- .

Name the following

9. The optimum condition when colour , flavour and texture of a fruit have developed to the peak.
10. Sausages with their casings removed, then sliced and packaged .
11. Soggy texture that results when cell wall breaks and the cell loses water.
12. The principal functional protein of wheat flour.

State whether the following statements are True or False

11. Air freezing is a kind of immersion freezing.
12. Surimi is a high quality food product made from minced meat.

13. Judgments about flavour are often influenced by colour and texture.
14. FPC can contain 85-92% of high quality protein.

PART B

(Short answer type questions.�� Weightage 01 each)

Answer any five questions

Short notes on:

15. Cryogenic liquids.
16. Bloom Gelometer.
17. Nitrosohemochrome.
18. IQF tunnels.
19. Sulphur dioxide dip.
20. Chemically leavened foods.

PART C

(Short answer type questions. Weightage 02 each)

Answer any four questions

21. How do you determine the consistency of a food?
22. What is ice crystal damage?
23. What do you understand by biomass?
24. Freezing is superior to canning for preserving the firmness of fruits. Comment.
25. What is scalding? Mention the time- temperature combinations used.
26. Why is phosphatase test considered as a quality test for milk?

PART D

(Essay type questions. Weightage 04 each)

Answer any two questions

27. Give an account of meat pigments and colour changes in meat during processing.
28. Comment on the safety and wholesomeness of irradiated foods. According to you, what is the future of irradiation as a food preservation technique?
29. What is baking? Detail out the role of gluten and baking powder in baking.

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MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ3B58 ANALYTICAL INSTRUMENTATION

Time:3hrs **Max Weightage:25**

Instructions:

30. Time allotted for the examination is 3 hrs.
31. Answer all questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
32. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

Part A

(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer.

1. The elution technique in which the pH and or strength of the mobile phase is varied is

a) Gradient elution b) isocratic elution

c) biospecific elution d) non-specific elution.

2. The UV-visible portion of the spectrum ranges in wavelength approximately from

a) 200-350 nm b) 250-850 nm

c) 250-550 nm d) 200-700 nm.

3. What is the concentration of the compound of a solution if the solution has an absorbance of 0.855 in a glass cuvette with a path length 0.2 cm? (Absorptivity is 54.2)

a) 0.078 b) 0.5 c) 1.252 d) 0.012.

4. In general the electrophoretic mobility of a molecule depends upon

a) Viscosity of the medium b) molecular size and shape

c) Charge on molecule d) all of these .

Fill up the following.

5. Half life of the nuclide t ½ is ---------- .
6. --------- is the most common radiation source used in visible spectrophotometer.
7. For the analysis of antioxidants by GC, -------- detector can be used.
8. In the estimation of Vitamin C by colorimetry ascorbic acid is treated with ---------- to form osazone.

Name the following.

9. Time required for each analyte peak to elute from the analytical column.
10. Unit of radiation.
11. Ratio of the concentration of solute in the mobile phase to that in the stationary phase.
12. Most common detector used in AAS.

True or false.

13. Relaxation involves the emission of energy by an excited state atom.
14. Photo ioinisation detector can be used for the detection and analysis of pesticides by GC.
15. In native eletrophoresis, the molecules are separated only based on the size.
16. An atom possesses electronic, vibrational and rotational energy levels.

Part B

(Short answer type questions. Weightage 1 each)

Answer any five out of the following

. **Define.**

25. R f value..
26. Molar absorptivity.
27. Immobilized enzyme.
28. Scintillation.
29. Van-Deemeter's equation.
30. Spectroflurometer.
31. Fluorescence.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.
24. What do you mean by the half life of a nuclide? By the emission of x-ray what change would occur to a nuclide ?

25. What do you mean by quenching in fluorescence ? Mention the common radiation sources that can be used in UV visible absorption spectroscopy.

26. Briefly explain moving boundary electrophresis.

27. Describe the procedure involved in the colorimetric determination of vitamin C.

28. What are the common detectors used in GC? Explain.

29. Explain paper chromatography.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

30. Explain the major components of HPLC system.

31. Explain the components and functioning of flame atomic absorption spectrophotometer.

32. Write notes on:

a) Determination of starch content and malic acid content of apple by enzymatic assay.
b) Isotopic dilution technique.

MAHATMA GANDHI UNIVERSITY
B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME
MODEL QUESTION PAPER

FQ3B59 FOOD PACKAGING MATERIALS AND TESTING

Time:3hrs **Max Weightage:25**

Instructions:
33. Time allotted for the examination is 3 hrs.
34. Answer all questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
35. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer.
2. is a physical test.

a. GTR b. tear strength
c. WVTR d. odour permeability.

2.������������������������ are characterized by the presence of a three membered cyclic ether ���� ��group.����������������������������

�������� a. epoxy resins������������ b. vinyl resins
�������� c. polyster lacquer������ d.� phenolic resins.

������ 3.� The first rigid plastic containers used for packaging food products were made of

������������ a. lead acetate������������ b. carbon monochloride
������������ c. copper sulphate������ d.� cellulose acetate.

36. ������������������������������ is a destructive test.

� a. lubricity test������������������ b. thermal shock test
� c. dimensional accuracy��� d.� verticality test.

Fill up the following.

6. ----------- are used in food cans to prevent interaction between the contents and containers.

6.�� Low density poly ethylene is more commonly known as ---------- .

7. ----------�� ----------- technique consists of clamping a plastic sheet in a
�� frame and heating until rubbery and a vacuum is drawn between the sheet and the
�� mould.

���� 8. IQF is the abbreviation of ---------- ----------�� ---------- .

���� Name the following.

9. The expansion for BOPP.

10. The test involving storage of food cans under controlled storage conditions and
������ accounting the time required for 25% of the cans to develop swells.

������ 11. The thick-walled tube formed when plastic is moulded within injection moulding
������������ machine.

������ 12. The art, science and technology of preparing goods for transport and sale.

True or false.

13. Phosphorus is a constituent of steel.
14. Batch number is the same as lot number.
15. Food packaging and food packing are two different concepts.
16. Ecofriendly packages are biodegradable.

������������������������������ ������������������������Part B
������������ (Short answer type questions. Weightage 1 each)
������������
������������ Answer any five out of the following

. **Define.**
32. Calendering.
33. Orientation.
34. Retort pouch packaging.
35. Laminate.
36. Unit sale price.
37. Lot number.
38. Co-extrusion.
39. E-O-E.

������������������������������ Part C
������������ (Short essay type questions. Weightage 2 each.)

������ ������Answer any four out of the following.
25.�� What are the drawbacks of plastic oriented films?

������ 26.�� What are wax papers?

������ 27.� What do you mean by base plate?

������ 28.�� What is ink adhesion test?

29. Differentiate between consumer package and industrial package.

30. Give a note on corrugated fibre boards.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

31. Explain the metallization process of plastics. What are thermoplastics?

32. Give an account of destructive and non destructive tests.
33. Which are the food packaging laws and standards in India? Mention the
packaging materials suitable for edible oil packing and spice powders.

SEMESTER-IV

FQ4B60 FOOD SAFETY AND QUALITY ASSURANCE

Credits:4

108 Hrs

Objectives:

- to provide a basic understanding of quality concepts and practice in food companies.
- to provide approaches to the planning and organization of a quality control system.
- to provide a basic acquaintance with standards and specifications.

I Quality Control concepts as applied to the food industry. **08Hrs.**

- General concepts of quality and quality control.
- Major quality control functions

II Standard tests for quality assessment. **16 Hrs.**

- Standard tests for quality assessment
- Microanalytical tests
- Microbiological tests
- Histological tests
- Standard test methods

III Standards and specifications. **25 Hrs.**

- Voluntary and compulsory standards
- Packaging and labeling standards
- Specifications- consumer, company, in-process, finished products
- Development of specification-a sample study
  - ISO AND HACCP

IV Quality control in food industry. **08 Hrs.**

- methods of evaluation and control of the various aspects of quality of raw materials manufacturing process and testing of finished products.

V Quality Assurance and total Quality Control. **12Hrs.**

- Nature of TQC

- Approaches to TQC
- Role of Management

VI Statistical Quality Control. **12 Hrs.**

- Definition
- How to determine the need for SQC
- The control chart definition, uses, process control.

VII Quality Improvement Techniques. **07 Hrs.**

- Quality improvement plans (QIP)
- Quality control circles (QCC)

VIII External Quality Control Activities. **20 Hrs.**

- 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.

REFERENCES :

2. Philip,A.C. Reconceptualizing quality. New Age International Publishers,Banglore. 2001.
3. Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi. 2004.
4. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.

FQ4B61 SENSORY EVALUATION

Credits-
3
72hours

OBJECTIVES

To enable the students

- to understand different aspects of sensory science and its application.
- to be able to use sensory evaluation as an analytical tool.

1. Definition of sensory evaluation , Importance of sensory evaluation ,
Practical requirements for conducting sensory tests ,limitations of sensory
evaluation.

2. General testing conditions---Testing area ,testing set up ,lighting, testing schedule,
preparation of samples, sample coding ,evaluation card preparation. **2Hrs**

3. Sensory assessment of food quality. **30Hrs**

a) Taste 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.

b) Odour and Smell Anatomy of nose ,Smelling techniques, ,Vonskramlk
Test,Theories of olfaction.

c)Texture Definition of texture, Classification of textural characteristics ,glossary
of textural terms ,Definition for mechanical properties ,Texture measurement.

d)Colour vision and appearance measurement-Structure of eye, Visual perception
and colour of foods.

e)Flavour and aroma ---Demonstration of the physiology of aroma perception ,
Definition of flavour , Flavour profile methods ,Flavour compounds.

f)Temperature sensation , pain sensation , touch sensation ,kinesthetic sensations, and
sound sensations.

4. Sensory testing of foods- **10Hrs**

a)Threshold tests
b)Difference tests
c) Ranking tests
d)Hedonic tests
e)Acceptance and preference tests
f)Scoring test
g)Sensitivity tests

5. Application of sensory analysis to food industry problems, Number of panel members
and samples required for sensory analysis. **2Hrs**

6. Data analysis-importance of data analysis, tests of significance ,null hypothesis ,mean,
median ,variance, standard deviation, t-test ,chi-square test **15Hrs**

7.Sensory evaluation of products-baked products ,milk, spices, fruits and vegetables
10Hrs

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.

FQ4B62������ ��MANAGEMENT IN FOOD INDUSTRY

Credits:
4��
72 Hrs.

Objectives :-*.3

To enable students

to develop new food products which are marketable and nutritionally and economically viable.

to understand the implementation of management principles ��in food industries.

1. Management ◆ characteristics, objectives, principles, challenges, importance, levels of management, ◆Food industry and management ◆planning flow of work in the industry, work simplification techniques.◆◆◆

9. Sales promotion **&#65533;** meaning , types,**&#65533;** promotional mix, role of advertising and after sales service**.&#65533;&#65533;&#65533;

a. colour b. quantity
c. texture d. tenderness.

3. A hidden quality attribute.

a. nutritive value b. flavour
c. viscosity d. mouth feel.

40. Paired comparison test is ---------- test.

a. acceptance b. hedonic
c. preference d. triangle..

Fill up the following.

7. The essence of ---------- ---------- ---------- is the encouragement of the workers participation through proper motivation and the sharing of responsibilities and success.

6. ---------- test involves presentation to a trained laboratory panel of three coded samples, two of which are identical .

7. The ability of a sampling plan to differentiate between good and bad lots is shown by its ----------- ----------- curve..

8. Food is incinerated in a ----------- to obtain incombustible residue for determination of mineral content .

Name the following.

9. The hedonic scaling meant for respondents who can neither read nor write nor use the right words to describe their feelings..

10. The chemical index which measures the ratio of a product of nucleotide breakdown to total nucleotides and is a reliable measure of freshness of marine products..

11. A measure of the density of a substance relative to the density of a given standard.

12. The maintenance of specified finished product characteristics everytime it is manufactured.

True or false.

13. Ishikawa is a cause- and -effect diagram.
14. In process tests are routine tests for operational requirements that need constant assessment.
15. It is possible to follow a process and describe graphically how it varies with time using inherent variability.
16. Trouble shooting is necessary when consumer complaints are reported by the sales group..

Part B
(Short answer type questions. Weightage 1 each)
Answer any five out of the following

. **Define.**
40. TQM.
41. Refractometer.
42. Control chart.
43. Standardization.
44. Histological test.
45. Defect.
46. Quality.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.
24. What do you understand by SQC?

25. What are compulsory standards?

26. How can you utilize micro analytical test for quality assessment?

27. With a suitable example , classify the defects according to their effect on processing operations.

28. What are the physical tests used for colour measurement in a food industry?

29. Disadvantages of descriptive hedonic scaling.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

30. How do you measure consumer reactions? Explain in the context of sensory evaluation.

31. How do you do process control using control charts?

32. What are the principles involved in standardization? What is the difference between consumer specifications and company specifications?

MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ4B61 SENSORY EVALUATION

Time:3hrs Max Weightage:25

Instructions:

41. Time allotted for the examination is 3 hrs.
42. Answer all questions in part A.This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
43. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions. Weightage 1 for each bunch)

Name the following.

1. Example. for basic taste.
2. Example for astringent food.
3. MSG means
4. The texture of meat is expressed in terms of

Choose the correct answer

5.Consistency of ghee and butter depends on---

(temperature, colour, texture, appearance)

6.Ripeness of fruites can be assessed by----

(colour, flavour, texture, all the above)

7.Taste buds near the tip of the tongue are sensitive to

(sweet &salt ,salt&bitter, bitter&sour, sour&sweet)

8.Example for difference test
(paired comparison test, ranking test, rating test, ranking test, all the above)

Fill up the following

9.The flavour compounds present in citrus fruit is -----
10.Texture of cooked rice is due to ------
11.An instrument used for measuring the texture baked product is ----
12.------ is an example for scoring test.

State true or false

13. Triangle test is a rating test.
14. Caffeine is an alkalized substance producing the stimulating property.
15. Phenolic compounds like tannin and flavonoid compounds contribute to bitterness & astringency.
16. Allium & Brassica family contain sulphur groups.

Part B
(Short answer type questions. Weightage 1 each)
Answer any five of the following

Define

17. Median.
18. Flavour.
19. Standard deviation.
20. Consistency.
21. Sensory evaluation.
22. Panelists.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.

23. What is the difference between duo-trio test & triangle test.
24. What is shortometer? Describe its principle with examples.
25. What important parameters are taken for the texture quality of tomatoes for quality assessment.
26. Differentiate between black tea and green tea. What parameters would you consider for the sensory evaluation of these two.
27. Explain the terms ranking & scoring with reference to sensory evaluation of food.
28. Explain the sensory character changes brought about by roasting cocoa.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

29.What is the importance of sensory assessment of food compared to that with instrumental methods ?Discuss the various parameters of sensory assessment like preparation of material for examination techniques odour & flavour assessment and precautions to be taken etc.

30. Discuss the importance of data analysis in sensory evaluation .Give one example.

31. Explain the different tests employed in sensory evaluation.

MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ4B62 MANAGEMENT IN FOOD INDUSTRY

Time: 3hrs Max Weightage:25

Instructions:

44. Time allotted for the examination is 3 hrs.

45. Answer all questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
46. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

Part A (Objective type questions. Weightage 1 for each bunch)

Choose the correct answer.

1. The complex pattern of communications and other relations in a group of human beings.

a. planning b. management
c. organization d. motivation.

2. Advertising is any form of paid non personal presentation of ideas, goods or services for the purpose of inducing people to buy.

a. Weeler b. Stanton
c. Couch d. Stephenson.

3. The activities which are undertaken to promote the sales of products ultimately.

a. promotional mix b. sales promotion
c. personal selling d. direct marketing.

47. Example for convenience food.

a. RTS b.dosa
c. semolina d. pudding.

Fill up the following.

8. ---------- is the art of securing maximum prosperity with a minimum of effort.
6. ---------- is the obligation of the individual to carry out assigned activities to best of his ability. .
7. ---------- ---------- involves the study of the path covered by the worker, in the under- taking and completion of a task.

8. ---------- is the pivot, around which the entire system of marketing revolves .

Name the following.

9. The common terminology used for product line expansion .

10. The pricing done by adopting low prices in the initial stages .

11. The careful and systematic investigation of the consumers attitudes, actions, preferences and other reactions to the particular problem under survey .

12. The condition when an establishments total cost is equal to total sales.

True or false.

13. Rice flour fryums is a traditional food product.
14. Nutraceuticals are the same as pharmaceuticals.
15. Obrey is an alcoholic beverage.
16. Popped rice is obtained by dried puffing of paddy.

Part B (Short answer type questions. Weightage 1 each)

Answer any five out of the following

. **Define.**
47. Delegation.
48. Pull mix.
49. Functional food.
50. Modified starch.
51. Organic food.
52. Penetration pricing.
53. Value addition.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.
24. Describe the current trends of food habits among working groups.

25. What are convenience foods? Name few convenience foods made commercially.

26. List out four principles of organization.

28. What do you mean by product development?

28. Classify equipments and write a brief note on their importance.

29. What are the sales promotion activities that can be done for a food product.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

30. Explain how to implement pest control in a dairy plant.

31. Describe the factors affecting the selection a suitable plant location for a food industry.

32. Write an essay on nutraceuticals with special reference to their commercial viability.Comment on the merits and demerits of the same.

SEMESTER-V

FQ5B64 FOOD ANALYSIS AND ADULTERATION TESTING (T&P) I

Credit
4
108 Hrs

Objectives

To enable the students

- to understand different sampling techniques employed in chemical analysis of foods.
- to learn various chemical methods of food analysis.
- to be familiar with food standards available.
- to be familiar with tests used for quality control.
- to do the proximate analysis.
- to test adulteration in food samples.

THEORY

I Introduction to food analysis proximate principles, population and sampling, importance of sampling, official methods of analysis. **06 Hrs.**

II Sampling techniques types of sampling, sampling plan, preparation of samples, problems in sampling. **08 Hrs.**

III Chemical methods of analysis of foods moisture assay oven drying methods, Distillation methods, Karl Fischer titration (chemical method) and physical methods. Total carbohydrate, starch , crude fibre. Protein analysis. **20 Hrs.**

IV Food adulteration - definition, classification intentional & incidental, health hazards caused by various adulterants and the critical level of metals in various foods.

10 Hrs.

V Food laws voluntary, mandatory, national and international.**12 Hrs.**

VI Role of voluntary agencies legal aspects of consumer protection. **06 Hrs.**

VII Food standards - national and international.**16 Hrs.**

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. 2000.

5. PFA ACT.

PRACTICAL

1. Introduction to laboratory equipment and apparatus. Introduction to investigative techniques- qualitative and quantitative analyses**.02 Hrs.**
2. Analysis of squash sugars, acidity, ascorbic acid, preservatives (SO2 and benzoic acid), qualitative test for preservatives and test for synthetic colours**. 06 Hrs.**
3. Analysis of milk - milk solids, ash, fat, protein, lactose, acidity, qualitative tests. Basic tests for milk analysis taste, flavour and appearance, alcohol test. **05 Hrs.**
4. Analysis of condensed milk total milk solids, fat, acidity, sugars and qualitative tests.**05 Hrs.**
5. Analysis of vinegar total solids, acidity and specific gravity**. 03 Hrs.**
6. Analysis of honey moisture, sugars and qualitative tests**. 04 Hrs.**
7. Detection of adulteration in various foods milk, condensed milk, honey, squash, sugar and salt. **Hrs.**

Reference:

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

FQ5B65 BASIC MICROBIOLOGY PRACTICALS

Credits 3 90 Hrs

Objectives

- to study the different laboratory equipments in the microbiology lab.

- to understand the preparation of media.
- to get thorough with various staining techniques, isolation and enumeration of microbes.

��������

1. Study of compound microscope.**������������������������������ 02Hrs.**
2. Working and handling of common microbiological laboratory equipments and materials.**04Hrs.**
3. Preparation of microscopic examination.**������������������ 02Hrs.**
4. Monochrome staining.**�� 05 Hrs.**
5. Differential staining.**05 Hrs.**
6. Capsule staining.**05 Hrs.**
7. Spore staining.**05 Hrs.**
8. Microscopic examination of living organisms- Hanging Drop Mount method ****** for the demonstration of bacterial motility.**06 Hrs.**
9. Negative staining of bacteria.**05 Hrs.**
10. Composition ,preparation and sterilization of media nutrient agar, potato dextrose agar, Mc Conkey agar, EMB agar.**14 Hrs.**
11. Isolation, enumeration and characteristics of micro organisms. **14 Hrs.**
12. Microbiology of air and surface isolation of micro organism from air by settle plate method.**23Hrs.**

REFERENCE:

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

FQ5B66 FOOD CHEMISTRY(P)

Credits : 2 72 Hrs.

Objectives

-to standardize reagents.
- to test the presence of carbohydrates and proteins in food samples.
-to estimate the nutrients in different food samples.

1. Qualitative tests for carbohydrates. 6 Hrs.
2. Qualitative tests for proteins. 7 Hrs.
3. Standardisation of Sodium hydroxide. 3 Hrs.
4. Standardisation of Hydrochloric acid. 3 Hrs.
5. Standardisation of Sodium thiosulphate. 3 Hrs.
6. Standardisation of Potassium permanganate. 3 Hrs.
7. Standardisation of EDTA solution. 3 Hrs.
8. Standardisation of Fehling s solution. 3 Hrs.
9. Estimation of Glucose by Lane and Eynon s method. 4Hrs.
10. Estimation of Sucrose by Lane and Eynon s method. 6 Hrs.
11. Estimation of Aldose by Willstatter s Iodometric titration. 6 Hrs.
12. Moisture assay by oven drying method. 6 Hrs.
13. Estimation of Starch. 6 Hrs.
14. Estimation of Crude fiber. 6 Hrs.

15. Paper chromatography. 7Hrs.

REFERENCE:

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

FQ5D67 OPEN COURSE

Credits: 4 72 Hrs.

INDUSTRIAL TRAINING 2 CREDITS

MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ5B64 FOOD ANALYSIS AND ADULTERATION TESTING (T& P) I

THEORY

Time:3hrs

Ma

Weightage:25

Instructions:

48. Time allotted for the examination is 3 hrs.
49. Answer all questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
50. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

Part A

(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer.

1. FPO was promulgated by Govt. of India in

a. 1946 b. 1945
c. 1956 d. 1954.

2. The organization which publishes approved laboratory methods, most applicable to cereal products.

a. AOAC b. AACC
c. AOCS d. FCC .

3. The only inorganic colouring matter which is permitted by PFA for use in certain specified food items such as chewing gum is

a. sudan red b. erythrosine
c. titanium dioxide d. magnesium dioxide.

51. A probability sampling.

a. convenience b. haphazard
c. quota d. systematic .

Fill up the following.

5. Carbohydrates that reduce ----------reagent are known as reducing sugars.
6. The act that consolidates laws relating to food which got President's assent on August 2006 is ----------.
7. ----------distillation uses either a solvent less dense than water or a solvent more dense than water.

8. Central Fruit Products Advisory Committee is under the Chairmanship of --------- .

Name the following.

9. The analysis method based on the principle that when Coomassie B rilliant Blue G-250 binds to protein, the dye changes colour.

10. As per FPO, license for the manufacture of fruit & vegetable products is issued by

11. The number equivalents per litre or milli equivalents per milli litre.

12. The Ministry which is responsible for making laws pertaining to PFA Act.

True or false.

13. MMPO is a voluntary act.
14. HPLC is capable of generating high column efficiencies.
15. Lowry's method is a dye binding method.
16. Adulterants that enter into food accidentally are called intentional additives.

Part B
(Short answer type questions. Weightage 1 each)
Answer any five out of the following

.
17. Adulteration , Eg.
18. Central Food Testing Laboratory.
19. Arsenomolybdate reagent.
20. AGMARK.
21. Sand Pan Technique.
22. Cluster sampling.
23. Biuret method.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.
24. Briefly explain Food Safety and Standards Act.

25. Give names of two monosaccharides and disaccharides. How do monosaccharides react in acid and alkaline solution?

26. What do you mean by CAC? Explain.

27. How do you estimate the glucose and sucrose content of a fruit juice sample?

28. Write the powers of a food inspector.

29. Explain a method for determination of crude fibre.

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

30. Discuss the spread of adulteration in Indian market along with the health hazards caused by various adulterants.

31. Explain with principles and neat diagram, the determination of protein in foods by Kjeldahl's method.

32. Explain any three methods of moisture analysis with their merits and drawbacks.

BSc. FOOD SCIENCE AND QUALITY CONTROL

PRACTICAL EXAMINATION

FQ5B64 SEMESTER 5

FOOD ANALYSIS AND ADULTERATION TESTING

TIME: 3 HRS **WEIGHTAGE**: 25

CREDIT: 4

CERTIFIED RECORD-WEIGHTAGE: 4

I. Estimate the acidity of the given sample (A) WEIGHTAGE: 8

A. ESTIMATION WEIGHTAGE: 4

B. TABULATION WEIGHTAGE: 1

C. CALCULATION WEIGHTAGE: 3

II. Estimate the Vitamin C content of the given sample of squash (B) WEIGHTAGE: 5

A. ESTIMATION WEIGHTAGE: 3

B. TABULATION WEIGHTAGE: 1

C. CALCULATION WEIGHTAGE: 1

III. Answer the following (WEIGHTAGE: 2 EACH)

1. Detect whether given sample of milk is adulterated (with sugar, urea, starch) or not.
2. Write the principle involved in the estimation of protein by Sorenson's formol titration.
3. What is Fiehe's test? Write the principle and procedure.
4. Write the principle involved in the estimation of reducing sugar by Lane and Eynon's method. (2 x 4)

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B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ5B65 BASIC MICROBIOLOGY PRACTICALS

Time:3hrs
Max Weightage:25

Certified Record - Weightage 4

1. Identify and characterize the given bacterial culture by GRAM STAINING. Show the slide to the examiner.

a) principle weightage 2
b) method - weightage 4

c) result����- weightage 2

2. Enumerate the micro organisms of the sample given by MONOCHROME OR NEGATIVE STAINING.

a) method - weightage 2
b) result - weightage 1

3. Answer the following. (Weightage 2 each)

a) Differentiate between gram positive and gram negative staining procedure.
b) Write down the microbiological significance of specimen NO:1 to 5.
c) What is the principle of autoclaving and dry heating?
d) What is the use of quebec colony counter?
e) Give the composition of EMB agar. What is the need of fixation and how is it done?

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B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ5B66 FOOD CHEMISTRY PRACTICALS

Time:3hrs Max Weightage:25

Certified Record - Weightage 4

1. Give the principle for Wtge : 2 each

a) crude fibre estimation
b) moisture assay by oven drying.

2. Estimate the starch content in the given sample. Wtge : 8

a) estimation wtge :4
b) tabulation wtge :1
c) calculation wtge :3

3. Standardize the given acid. Wtge :4

a) standardization wtge :2
b) tabulation wtge :1
c) calculation wtge :1

4. Identify the given sample as carbohydrate or protein. Wtge : 5

a) identification wtge: 2
b) confirmation wtge:2
c) result wtge:1

SEMESTER-VI

FQ6B68 ENTREPRENEURSHIP DEVELOPMENT

Credits :

4

90 Hrs

OBJECTIVES :

To help students to

a) understand the significance of entrepreneurs in the development of a country

b) familiarise with procedures and legal issues involved in setting up an enterprise.

c) get motivated to become an entrepreneur.

UNIT I��������Concept of entrepreneurship, essential attributes of an entrepreneur, women entrepreneurs, intrapreneurs, entrepreneurs and economic development.**08 Hrs.**

UNIT II��������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 Hrs.**

UNIT III��������Project formulation- various approaches principles of product selection and development techno-economic feasibility of the project, structure of project report.**18 Hrs.**

UNIT IV��������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 Hrs.**

UNIT V��������Resource management – management of men, machine and materials. CPM and PERT as planning tools for establishing SSIs.**06 Hrs.**

UNIT VI������Problem solving skills and SWOT techniques.**06 Hrs.**

UNIT VII�������Marketing management – Marketing for small business, strategies for sales promotion, pricing policy and its implications on sale, after sales service.**08 Hrs.**

UNIT VIII����Management of SSI s.

- Sickness in SSI s and their remedial measures
- Coping with uncertainities
- Stress management
- Social responsibility and business ethics.**08Hrs.**

UNIT IX�������Legal issues .

- Complications
- Registration and licensing
- Income tax, sales tax and excise rules.
- Pollution control.**08Hrs.**

REFERENCES :

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

FQ6B69��� FOOD ANALYSIS AND ADULTERATION TESTING (T&P) II

Credit 4
108 Hrs

Objectives

OBJECTIVE

To enable the students

- to learn various physical methods of food analysis.
- to be familiar with quality criteria for different food products.
- to be familiar with tests used for quality control.
- to test adulteration in food samples.

THEORY

I. 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. **08 Hrs.**

II. 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 Hrs.**

III 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 Hrs.**

IV. Composition and quality criteria for
a) milk & milk products
b) oils & fats
c) spices & condiments
d) food grains
e) flavours
f) canned foods
g) fruits & vegetable products
h) flesh foods
i) sugars & preserves
j) beverages - alcoholic(wine, beer, rum, brandy) & non alcoholic (tea, coffee, soft drinks). **42 Hrs.**

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. 2000.

5. PFA ACT.

6. Elsevier, E. Handbook of analysis and quality control for fruit and vegetable products. ABC Publishers, Bangalore.2002.

PRACTICAL

8. Analysis of jam- total solids, acidity, pectin, sugars, fruit content and test for synthetic colour. **05 Hrs.**

9. Analysis of wheat flour - gluten, maltose figure, moisture, acidity, crude fibre, sedimentation value. **05 Hrs.**

10. Analysis of coffee/tea - extractives, chicory, caffeine and qualitative tests.

03 Hrs.

4. Analysis of spices moisture, total ash, acid insoluble ash and volatile oils.
Hrs.
5. Analysis of vinegar total solids, acidity and specific gravity. **03 Hrs.**

6. Analysis of butter/ghee fat and qualitative tests. **04 Hrs.**

7.Detection of adulteration in various foods jam, food flours, coffee, tea, spices and
 powdered spices, fats and oils.
05 Hrs.
Reference:

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

FQ6B70 FOOD MICROBIOLOGY PRACTICALS

Credits 3
90 Hrs

Objectives

- to study the standard plate count method.
- to identify micro organisms based on their enzymatic activities.
- to evaluate micro flora of various food samples.
- to assess sanitary quality of water.

1. Microbiology of milk. **30Hrs**
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.

2. Microbiological analyses of food products. **25 Hrs.**
a) Meat
b) Fish
c) Sauce.

3. Microbiology of water. **20 Hrs.**

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

4. Biochemical testing. **15 Hrs.**

a) triple sugar iron agar test
b) indole production test
c) methyl red test
d) Voges Proskauer test
e) Citrate utilization test.

REFERENCE:

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

FQ6B71 ADVANCED FOOD CHEMISTRY (P)

Credits: 2
72 Hrs.

Objectives:

-to quantitatively analyze the nutrients of food.
- to test the quality of food.

1. Estimation of alpha-amino nitrogen by Sorenson's Formaldehyde titration. 3 Hrs.
2. Estimation of protein – Kjeldahl's method. 7 Hrs.
3. Estimation of Saponification value. 4 Hrs.
4. Estimation of Acid value. 3 Hrs.
5. Estimation of Iodine value. 5 Hrs.
6. Estimation of Peroxide value. 5 Hrs.
7. Estimation of Chlorophyll and Carotenoids. 7 Hrs.
8. Estimation of Sulphur dioxide. 5 Hrs.
9. Estimation of Benzoic acid. 5 Hrs.
10. Estimation of Vitamin C. 5 Hrs.
11. Estimation of Protein- Biuret method. 3 Hrs.
12. Estimation of Protein by Lowry's method. 6 Hrs.
13. Estimation of Sugar by phenol- sulphuric acid method. 4 Hrs.
14. Estimation of Sugar by Resorcinol method. 2 Hrs.
15. Estimation of Calcium. 5Hrs.
16. Estimation of Iron. 3 Hrs.

REFERENCE:

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

2. Winton, A.L and Winton, K.B. Techniques of food analysis. Allied Scientific Publishers, New Delhi. 1999.

FQ6B72 CHOICE BASED COURSE

Credits :3 90 Hrs.

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********** FQ6B73********** PROJECT/DISSERTATION

********** Credits : 3

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********** **MODEL QUESTION PAPER**

FQ6B68******** ENTREPRENEURSHIP DEVELOPMENT**

Time:3hrs********
Max Weightage:25

Instructions:

52. Time allotted for the examination is 3 hrs.
53. Answer all questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
54. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

**

Part A
(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer.

1. Development phase of EDP is also called as

a. training phase b. follow up phase
c. initial phase d. post training phase.

2. The network analysis which aims to find out whether the job could be finished by a date.

a. LOB b. CPM
c. PERT d. GERT.

3. Which is not a trait of an entrepreneur?

a. persistence b. pessimism
c. self confidence d. motivation.

55. A grant given to an entrepreneur to enable him to take up some scheme of work.

a. subsidy b. loan
c. concession d. bounty.

Fill up the following.

6. ---------- is an agent of socio- economic development.

6. ---------- is an appraisal for investment with the definite aim of producing a flow of output over a specified period of time. .
7. The main objective of KFC is to encourage, aid and promote the --------- of Kerala.

8. ---------- analysis is concerned with the identification of demand potential of a project and the selection of optimal technology for achieving project objectives.

Name the following.

9. A complaint to a superior court of an injustice, done by an inferior one.

10. The tax imposed at all stages of the sale of a commodity.

11. The analysis which determines the resource requirements of a project.

12. The entrepreneurs who carry on their business as a joint venture.

True or false.

13. PERT is a deterministic model.
14. Finance is the life blood of every business.
15. EPZ is Entrepreneur Promotion Zone.
16. Sales tax exemption is granted for SSI units.

Part B
(Short answer type questions. Weightage 1 each)
Answer any five out of the following
. **Define.**
24. VAT.
25. Incentive.
26. Partnership Act.
27. SWOT.
28. Opportunity.
29. DIC.
30. Balance sheet.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.

24. Write about any two planning tools for establishing SSI.

25. What is the role of commercial banks in entrepreneurship development?

26. What do you mean by problem solving approach?

28. How does self concept affect the motivating power of an entrepreneur?

28. What are the important provisions of sales tax?

29. What is feasibility study?

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

30. Explain with an example, the process of identification of an opportunity to start a food industry.

31. Which are the different kinds of partners? What is partnership deed? How do you enter into a partnership?

32. Write an essay on financial incentives and organizations which offer them to entrepreneurs.

MAHATMA GANDHI UNIVERSITY

B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME

MODEL QUESTION PAPER

FQ6B69 FOOD ANALYSIS & ADULTERATION TESTING (T&P) II

Time:3hrs **Max Weightage:25**

Instructions:

56. Time allotted for the examination is 3 hrs.
57. Answer all questions in part A. This contains 4 bunches of 4 objective type questions. For each bunch Grade A will be awarded if all the questions are correct, B for 3 ,C for 2,D for 1 and E for 0.
58. Answer any 5 questions from Part B, Any 4 from Part C and any 2 from Part D.

Part A
(Objective type questions. Weightage 1 for each bunch)

Choose the correct answer.

1. The amount of benzoic acid permitted for use in fruit squash by PFA act is

a. 350 ppm b. 250 ppm
c. 600 ppm d. 750 ppm.

2. Mohr titration in butter sample is done to estimate

a. calcium b. salt
c. manganese d. zinc.

3. The preservative that is most commonly used for preserving the red colour of meat

a. sodium tartarate b. sodium nitrate
c. potassium bromate d. potassium chromate.

4. A solvent extraction method

a. Babcock b. Goldfish
c. Gerber d. Nelson-Somogyi.

Fill up the following.

5. The presence of metanil yellow in turmeric can be detected by the addition of ---------- to the sample.

6. Colorimetric method for niacin assay involves reaction between niacin and ----- .
7. Reichert Meissel value is a measure of ---------- in fats/oils.

59. --------- is the temperature at which evolution volatiles proceeds with enough speed to support continuous combustion.

Name the following.

9. The analysis which is based on the fact that the constituent elements in any pure compound are always in the same proportions by weight.

10. Test used for the detection of vanaspathi in ghee.

11. The extraction analysis of fat which uses sulphuric acid and amyl alcohol.

12. The ratio of lactose: protein: ash in milk.

True or false.

13. Iodine value is defined as the grams iodine absorbed per 100grams sample.
14. Sedimentation value of wheat flour gives an idea about the carbohydrate content of the flour.
15. Perchloric acid hoods are used for low temperature plasma ashing.
16. Sunset yellow is permitted by PFA act for use in confectioneries.

Part B
(Short answer type questions. Weightage 1 each)
Answer any five out of the following

.
17. Halphen's test.
18 Smoke point.
19. What is the permissible level of arsenic in fruits and what are the hazards caused by excessive intake of arsenic?
20. Acid value.
21. How can you detect the presence of metanil yellow and lead chromate in pulses?
22. Polarimetry.
23. Give a note on the test that can determine the quality of honey.

Part C
(Short essay type questions. Weightage 2 each.)

Answer any four out of the following.
24. Differentiate dry and wet ashing.

25. How can you determine the quality of fish? What are the chemical parameters to be considered for the same?

26. The densities of milk fat and milk are 0.9 and 1.032 respectively. The fat content of the milk was 3.55% on a volume basis. Calculate the fat content of milk as per cent weight basis.

29. Write a note on the most common adulterants present in milk and explain the procedure involved in their detection.

28. Detail out a method for determination of iron content in food sample.

30. Explain the method involved in the estimation of methyl alcohol content of beer. What is the significance of methyl alcohol test in alcoholic beverages?

Part D
(Essay type questions. Weightage 4 each.)

Answer any two from the following.

30. Describe the principle of Carr-Price method and HPLC method used for the estimation of Vitamin A.

31. Write a note on the common adulterants present in the following food stuffs and their detection methods.
    a. fruits and vegetables
    b. canned foods.

33. How do you estimate calcium in a food sample? Explain the principle, procedure and critical points.

BSc. FOOD SCIENCE AND QUALITY CONTROL
PRACTICAL EXAMINATION

FQ6B69

SEMESTER VI

FOOD ANALYSIS AND ADULTERATION TESTING

TIME: 3 HRS

WEIGHTAGE: 25

CREDIT: 4

CERTIFIED RECORD-WEIGHTAGE: 4

I. Estimate the reducing sugar content of the given sample (A) (solution of jam) WEIGHTAGE:8

   A. ESTIMATION WEIGHTAGE: 4

   B. TABULATION WEIGHTAGE: 1

   C. CALCULATION WEIGHTAGE: 3

II. Estimate the acidity of the given sample of squash (A)

   A. ESTIMATION WEIGHTAGE: 3

   B. TABULATION WEIGHTAGE: 1

   C. CALCULATION WEIGHTAGE: 1

III. Answer the following (WEIGHTAGE: 2 EACH)

1. Detect whether given sample of turmeric powder and wheat flour are adulterated or not.
2. Write the principle involved in the estimation of crude fibre by Weende's method.
3. What do you mean by Krei's test?
4. Write the principle involved in the estimation of fat by Gerber method.

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B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME
MODEL QUESTION PAPER

FQ6B70 FOOD MICROBIOLOGY PRACTICALS

Time:3hrs
Max Weightage:25

Certified Record - Weightage 4

1. Give the procedure for MBRT/ MASTITIS / RESAZURIN TEST and identify the contamination, if any , in the sample.

a) Principle 2 wtge
b) Method 3 wtge
c) Result 1 wtge.

2. Answer the following: (Wtge 2 each)

a) Methyl red test
b) Phosphatase test
c) Name the tests included in IMVIC test.
d) What is the importance of performing presumptive tests on foods?
e) When is the milk said to be of good quality by dye reduction test?
f) Demonstrate the quadrant streak technique. Draw a neat sketch of streak plate method.

3.Perform the bacterial count of the given sample by serial dilution technique.

a) principle 1 wtge
b) method 2 wtge

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B.Sc FOOD SCIENCE & QUALITY CONTROL PROGRAMME
MODEL QUESTION PAPER

FQ6B71 ADVANCED FOOD CHEMISTRY (P)

Time:3hrs Max Weightage:25

Certified Record - Weightage 4

1. Give the principle for Wtge : 2 each

a) estimation of iron
b) saponification value.

2. Estimate the protein content by Lowry's method. Wtge : 8

a) estimation wtge :4
b) tabulation wtge :1
c) calculation wtge :3

3. Estimate the sulphur dioxide content in the sample. Wtge :4

a) estimation wtge :2
b) tabulation wtge :1
c) calculation wtge :1

4. Estimate the chlorophyll content in the sample. Wtge : 5

a) estimation wtge :3
b) tabulation wtge :1
c) calculation wtge :1