SHIVAJI UNIVERSITY, KOHLAPUR



SYLLABUS

FOR

B.Sc. Food Processing and Packaging (Entire) First Year

SEMESTER SYSTEM

I / II SEMESTERS

Effective from Academic Year 2016-17 onwards

Syllabus for Bachelor of Science Part I: Food Processing and Packaging (Entire)

1. TITLE: Food Processing and Packaging (Entire)

2. YEAR OF IMPLEMENTATION: Syllabus will be implemented from June, 2016 onwards.

3. PREAMBLE:

This syllabus is framed to accommodate the widening horizons of the discipline of food processing and packaging. They reflect the current changing needs of the students.

Students learn Food Processing and Packaging as a separate subject from B.Sc.I, which increase the employability of students in food processing sector of Indian economy which now a days given priority in policy making. The exposure of students to the subject will enable them of indipendant handeling of food processing and packaging unit.

The syllabus is based on basic and applied approach with vigor and depth. At the same time precaution is taken to make the syllabus comparable to the syllabi of other universities and the needs of industries and research. The units of the syllabus are well defined, taking into consideration the level and capacity of students.

4. GENERAL OBJECTIVES OF THE COURSE:

- 1) To impart knowledge of various areas related to food processing and packaging.
- 2) To enable the students to understand food composition and its physic chemical, nutritional, microbiological and sensory aspects.
- 3) To familiarize the students about the processing and preservation techniques of variety of foods.
- 4) To emphasize the importance of food safety, food quality, food laws and regulations
- 5) To expose the students to different food processes used in industries and in research field.
- 6) To prepare the students to accept the challenges in life sciences.
- 7) To develop skills required in various industries, research labs and in the field of agriculture, food, human health.
- 8) To enable the students to understand packaging materials and effective packaging processes.

5. ELIGIBILITY:

HSC or std. 12th Science of Maharashtra State Board or any other equivalent with Science

6. DURATION: The course shall be a full time of 3 years duration with 2 semesters per year

7. EXAMINATION PATTERN:

Theory – Semester Wise Practical – Annual

8. MEDIUM OF INSTRUCTION: The medium of instruction shall be in English.

9. PASSING MARKS FOR B. SC.FOOD PROCESSING AND PACKAGING:

A minimum of 35% marks in both theory and practical is required for passing.

Note : Other rules and regulation are applicable as per the General B. Sc. Course of Shivaji University, Kolhapur.

10. COURSE STRUCTURE

S	PAPER		MAI	RKS	LECTURES
R. N O.	NO.	SUBJECTS	THEORY	INTERNAL	/WEEK
1		English for Communication - I	50	_	03
2	BFPP 101	Introduction to Computer and Data Processing - I	50	-	03
3	BFPP 102	Principles of food processing and packaging - I	50	_	03
4	BFPP 103	Food Chemistry - I	50	-	03
5	BFPP 104	Food Microbiology - I	50	_	03
6	BFPP 105	Food Preservation - I	50	_	03
7	BFPP 106	Analytical Techniques - I	50	_	03
8	BFPP 107	Agribusiness Management - I	50	-	03
9	BFPP 108	Nutritional science	50	-	03
		Total	450	-	27

BFPP - I (SEMESTER-I)

Note: Practical Examination will be conducted annually.

SUBJECTS SR. PAPER MARKS LECTURE S/WEEK NO. NO. THEORY INTERNAL English For Communication - II 50 03 1 — Introduction to Computer and 50 **BFPP 201** 03 _ 2 Data Processing - II Principles of food processing and **BFPP 202** 50 03 _ 3 packaging - II BFPP 203 Food Chemistry - II 50 03 4 _ Food Microbiology -II BFPP 204 50 5 03 _ Food Preservation - II 50 BFPP 205 03 6 _ Analytical Techniques - II **BFPP 206** 50 03 7 _ Agribusiness Management - II BFPP 207 50 03 8 _ Food Additives, Contaminants and BFPP 208 Toxicology 50 9 Total 450 27

BFPP - I (SEMESTER-II)

Note: Practical Examination will be conducted annually

Details of Practicals:

SR.	SUBJECTS	MARKS	Work load
NO.			/WEEK
1	Practical -I	50	04
2	Practical-II	50	04
3	Practical-III	50	04
4	Practical-IV	50	04
	Total	200	16

BACHELOR OF FOOD PROCESSING AND PACKAGING

FIRST YEAR (SEMESTER-I)

SUBJECT- ENGLISH FOR COMMUNICATION - I

Communication process, barriers changing dimensions	(10 Lectures)
Report writing,, types, formats & methods	(10 Lectures)
I: Technology based communication -email –web-mobile- telephones	(10 Lectures)
: Internet, Netiquettes, Social networks Net behavior	(10 Lectures)
Recommended Readings	
Write better, speak better (Reader's digest Publication) Building your Vocabulary – John G. Gilmartin Instant Vocabulary – Gopal K. Puri. Contemporary English Grammer, Structure &Composition. Dav (Macmillan & Co Ltd.) Tiger's Eye – Alan Mc Connell Duff. (Oxford University Press) J. D. O. Connor UBS Better English Pronunciation. Dianna Booher – Ewriting - 21 st century Tools for affactive communication pocket books	vi Gre
 Sinon &Schuster inc. JSBN – O 7434- 1258-3 Ashi Hi Ingragi (Marathi) Prof. N. D. Apte Rajhans Prakashan Pune. Osborn Michael/ Osborn Suzane. Public Speaking, Biztantra, New Delh Durodula Sahrolyn P. Learn Reading- Anmol Publications Pvt. Ltd., New Narula Uma, Business Communication Practices- Modern Trends, Atlan Publishing House, Mumbai. Kumar Keval. J, MassCommunication In India, Jaico Publishing House Information andCommunication Technology by Abdul Mannan Himala 	i. w Delhi. ntic , Mumbai. ya
	Communication process, barriers changing dimensions : Report writing,, types, formats & methods I: Technology based communication -email –web-mobile- telephones /: Internet, Netiquettes, Social networks Net behavior Recommended Readings Write better, speak better (Reader's digest Publication) Building your Vocabulary – John G. Gilmartin Instant Vocabulary – Gopal K. Puri. Contemporary English Grammer, Structure &Composition. Dav (Macmillan & Co Ltd.) Tiger's Eye – Alan Mc Connell Duff. (Oxford University Press) J. D. O. Connor UBS Better English Pronunciation. Dianna Booher - Ewriting - 21 st century Tools for effective communication pocket books. Sinon &Schuster inc. JSBN – O 7434- 1258-3 Ashi Hi Ingragi (Marathi) Prof. N. D. Apte Rajhans Prakashan Pune. Osborn Michael/ Osborn Suzane. Public Speaking, Biztantra, New Delh Durodula Sahrolyn P. Learn Reading- Anmol Publications Pvt. Ltd., Ne Narula Uma, Business Communication In India, Jaico Publishing House Information andCommunication Technology by Abdul Mannan Himala

BFPP 101: INTRODUCTION TO COMPUTER AND DATA PROCESSING - I

Unit I: Introduction to Computer and Basic Organization (10 Lectures) Definition of computer, characteristics, limitations, concepts of h/w and s/w, • applications of computers in various fields,. Block diagram - Input Unit, Memory Unit, Output unit, Central processing unit • (ALU, Control unit) Unit II: Input, Output Devices and Concept of Memory (10 Lectures) Input devices: - Keyboard, Mouse, Light pen, Joystick, Touch screen, ٠ Digitizer, Scanner, MICR, OMR, Barcode reader. • Output devices: - VDU, Printers - Dot-matrix, Inkjet, Laser, Line, Plotters (10 Lectures) **Unit III: Operating System concepts** • Definition and Functions of O.S. Types of O.S. – Single user, Multi-user. • Process Management-Multiprogramming, Multitasking, Multiprocessing, Time sharing. Disk Operating System (DOS), DOS internal and external commands, ٠ concept of directory and file.

Unit IV: Operating System Case Study Windows O.S.

- Windows Operating system : Features of Windows O.S., GUI Modules of Windows Windows Explorer, Control panel, Printer Manager.
- Windows accessories Paintbrush, Notepad.

Recommended Readings:

- 1) Computer Today, Basandara
- 2) Introduction to Computer and Data Processing, Pawar (Wiley-Dreamtech)
- 3) Computer Fundamentals, P.K. Sinha
- 4) Fundamental of computers, V. Rajaraman.

(10 Lectures)

BFPP 102: PRINCIPLES OF FOOD PROCESSING AND PACKAGING - I

Unit I : Processing Industry	(10 Lectures)
Scope of food processing industry	
Imprtance Enture Processes	
 Sectors of food processing industry 	
• Classification of food – perishable and semi perishable food	
Unit II : Principle of plant food processing	(10 lectures)
Classification of plant food processing	
Fruit and vegetable processing	
Cereal and legume processing	
Oil seeds processing	
Unit III : Principle of animal food processing	(10 lectures)
Classification of animal food processing	
Milk processing	
Meat processing	
Fish processing	
Poultry processing	
Unit IV : Introduction to Food Packaging	(10 lectures)
 Objectives and functions of food packaging, 	
 Requirements for effective food packaging 	
 Types of packaging Materials 	
General properties of packaging material	
Recommended Readings	
1. Coles R, McDowell D and Kirwan MJ, Food Packaging Technology, CRC	Press, 2003
2. De S, Outlines of Dairy Technology Oxford Publishers, 1980	
3. Deman JM, Principles of Food Chemistry, 2 ed. Van Nostrand Reinhold, NY 1990	alle: 2004

- 4. FrazierWC and Westhoff DC, Food Microbiology, TMH Publication, New Delhi, 2004
- 5. JenkinsWAandHarringtonJP,PackagingFoodswithPlastics,TechnomicPublishing Company Inc., USA, 1991
- 6. ManayNSandShadaksharaswamyM,Food-FactsandPrinciples,NewAgeInternational (P) Ltd. Publishers, New Delhi, 1987
- 7. Meyer LH, Food Chemistry, CBS Publication, New Delhi, 1987
- 8. Potter NH, Food Science, CBS Publication, New Delhi, 1998
- 9. RamaswamyHandMarcottM,FoodProcessing PrinciplesandApplicationsCRCPress, 2006

nd

10. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable, Products, 2 ed.

BFPP 103: FOOD CHEMISTRY - I

Unit I : Introduction to Food Chemistry and water	(10 Lecture)
• Definition of food, food science, food chemistry	
Composition food	
• Importance of food chemistry	
• Water	
• Structure of water and ice	
• Phase diagram of water	
• Types of water	
• Sorption isotherms	
• Moisture content and Water activity	
Unit II : Carbohydrates	(10 Lectures)
Definition of carbohydrates	
• Nomenclature	
Classification of Carbohydrates	
Structure of carbohydrates	
 Chemical reactions of carbohydrates – oxidation, reduction, cry 	stallization.
Unit III : Proteins	(10 lectures)
• Definition of proteins	
 Chemical composition of proteins 	
• Nomenclature	
 Protein classification and structure 	
• Plant proteins and animal proteins	
Unit IV: Lipids	(10 Lectures)
• Definition of fats and oils	

- Chemical composition of fats and oils
- Classification of lipids
- Nomenclature
- Physical properties of fats and oils
- Chemical properties of fats and oils

Recommended Readings:

- 1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
- 2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
- 3.Wong,DominicWS,FoodEnzymes, Chapman and Hall, New York, 1995
- 4. Potter, N.N. and Hotchkiss, J.H, Food Science, 5th Ed., Chapman & Hall, 1995
- 5. DeMan, J.M., Principles of Food Chemistry, AVI, NewYork, 1980.

BFPP 104: FOOD MICROBIOLOGY I

Unit I: History and Scope of Microbiology

- Important contributions of various scientists,
- Scope of microbiology, ٠
- Introduction to microorganisms - bacteria, algae, fungi, protozoa and viruses.
- Importance of bacteria, yeast, and moulds in foods •

Unit II : General Characteristics of Microorganisms

- Structure of Procaryotic and Eucaryotic cell
- Morphology of bacteria: Size, Shape and Arrangements ٠
- Cytology of bacteria structure & functions of cell wall, cell membrane, • capsules & slime layer, flagella, Pilli, nuclear material, mesosome, ribosome and spores.

Unit III : Cultivation of Micro-organisms

- Pure culture technique
- Methods of isolation and cultivation
- Enumeration of Microorganisms- qualitative and quantitative

Unit IV: Control of Microorganisms

- Definitions of Sterilization, Disinfection, Antiseptic, Germicide, • Microbiostasis, Antisepsis, Sanitization.
- Mode of action, application and advantages of: Physical agents, Chemical Agents, Gaseous Agents •

Recommended Readings

- 1.PrescottDunn,"IndustrialMicrobiology"CBSPublisher
- 2. Purohits. S. "Microbiologyfundamentalsandapplications" Edition, 6. Publisher, Agrobios, 2003.
- 3. Doyle, Beuchatand Montville "Food Microbiology", ASM press Washington.
- 4.Frazier, W.C., and Westhoff, D.C. 1988.Food Microbiology, 4thed. McGraw-Hill, New York.
- 5.Jay, J.M.2000.ModernFoodMicrobiology.6thed.Chapman&Hall.NewYork, N.Y.
- 6.Mossel, D.A.A., Corry, J. E. L., Struijk, C. B., and Baird, R. M. 1995. Essentials of the MicrobiologyofFoods.JohnWiley&Sons.NewYork,NY.

(10 Lectures)

(10 Lectures)

(10 Lectures)

(10 Lectures)

BFPP 105: FOOD PRESERVATION - I

Unit I : Introduction of food preservation	(10 lectures)
 Definition and scope of food preservation Principles of preservation Preservatives and its types Shelf life of food products Unit II: Food Preservation by high temperature	(10 lectures)
 Sterilization Pasteurization Blanching Canning 	
Unit III: Food Preservation by Drying and dehydration	(10 lectures)
 Definition, drying as a means of preservation Differences between sundrying and dehydration (i.e.Mechanical drying) Factors affecting rate of drying, normal drying curve Names of types of driers used in the food industry 	ing)
Unit IV: Food Preservation by Low temperature	(10 lectures)
• Introduction to refrigeration, cool storage and freezing, definition	
• Principle of freezing, freezing curve	
Changes occurring during freezing	
• Types of freezing i.e.slow freezing, quick freezing, freeze drying	
• Introduction to thawing, changes during thawing and its effect on food	

Recommended Readings

- 1. B. Srilakshmi, Food science, New Age Publishers, 2002
- 2. Meyer, Food Chemistry, New Age,2004
- 3. Bawa. A.S, O.P Chauhan etal. Food Science. New India Publishing agency, 2013
- 4. FrazierWC andWesthoffDC,FoodMicrobiology, TMH Publication, New Delhi, 2004

BFPP 106: ANALYTICALTECHNIQUES –I

Unit I : Proximate analysis of food	(10 lecture)
• Preparation of sample	
• Methods for estimation of moisture, protein, fat, fibre, ash and carbo	hydrate
Unit II: Types of Solution	(10 lectures)
Molar Solution	
Normal solution	
Colloidal solutions	
• Buffer solutions	
• Measurement of pH	
Unit III : Colorimetry and spectrophotometry	(10 lectures)
• Principle	
• Beer's - Lambert's law	
Construction	
• Working	
Care of colorimeter	
Standard solutions	
Blank solutions	
Unit IV : .Atomic absorption spectroscopy	(10 lectures)
Principles	
• Instrumentation	
• Applications	
Recommended Readings	

- 1. Morris B. Jacobs The chemical analysis of foods and food products, IIIEdition, CBS Publishers and distributors New Delhi.
- 2. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
- 3. D.T.Plummer An introduction to practical biochemistry, III Ed. Tata McGraw Hill Publishing Co. New Delhi.
- 4. Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis : Theory and practice, 3 Edn. IS: 6273 (Part-1&Part-2). Chapman and Hall.

BFPP 107: AGRIBUSINESS MANAGEMENT – I

Unit I: Agribusiness (10 lectures) • Scope, Nature and significance of agriculture business • National Agriculture Policy, Food Processing Policy, • Agro industries project and Government Policy. **Unit II: Fundamentals of Farm Management** (10 lectures) • Scope of Modern Agriculture, • Special features of Agricultural and Industrial production, • Difference between farm and non-farm business management **Unit III: Farm Production System** (10 lectures) • Scientific Farming, Co-operative farming, • Contract farming, corporate farming • Production of hi-tech agricultural crops **Unit IV: Farm Technology** (10 lectures) • Effects of New Technology, Management & Technology, • Gains from technological improvements to producers and consumers mechanism and automation, green houses, • Role of biotechnology in Agriculture, Commercialization of agriculture, Tissue culture, Green house operations & genetically modified crops. **Recommended Readings**

- 1) Indian Agriculture Agarwal A.M.
- 2) Fundamentals of Modern Agriculture Blake D.
- 3) AvIntroductiontoAgriculturalproductionEconomics&Farm Management– Robertson Tata McGraw-Hill.
- Tata McGraw-Hill.
- 4) Elementsoffarmmanagement-SharmaA.M.&SharmaV.K.
- 5) CFN 3 Economics of food IGNOU

BFPP 108 : NUTRITIONAL SCIENCE

Unit I: Nutrition	(10 lectures)
• Introduction	
 Fundamentals of the nutrition & nutritional properties 	
• Importance of carbohydrates, proteins, fats, vitamins & minerals	
Unit II: Energy value	(10 lectures)
• Introduction	
Recommended dietary allowance	
• Energy value of food	
• Daily BMR activities	
Biological value of food	
Unit III: Nutritional aspects & composition of cereal &pulses	(10 lectures)
• Nutritional aspects & composition of fruits & vegetables	
• Nutritional aspects & composition of milk & milk products	
• Nutritional aspects & composition fish, meat &poultry	
• Nutritional aspects & composition sugar & sugar products	
Unit IV: Balanced diet & interrelationship between nutrients	(10 lectures)
• Balanced diet- introduction, menu planning, planning of balanced	meal
• Special nutritional requirements,	
• Effect of cooking & processing on nutrients	
• Inter- relationship between vitamin & nutrients	
• Effect of carbohydrate, fat & protein on vitamin requirement	
Recommended Readings	
1. Food Science and Nutrition II Edition. Supetra Roday, Oxford publicat	ion
2. Advanced text book on Food and Nutrition. Vol.I and II. Secon	d
Edition. Dr. M. Swaminathan (2006), BAPPCO Publication	
3. Essentials of Human Nutrition, Third Edition: Jim Mann and A.	Stewart Truswell
(2010), Oxford publication	
4. Introduction to Human Nutrition, First Indian Reprint. Michel J. Gibne	ey,

BFPP - I (SEMESTER – II)

SUBJECT- ENGLISH FOR COMMUNICATION -II

Unit I: Professional correspondence various drafts ofletters, applications & requests	(10 Lectures)
Unit II: Oral communication speech seminar, group discussion, web cas	(10 Lectures)
Unit III: Public communication, speech, presentation, video-conferencing	(10 Lectures)
Unit IV: Ethical communication, counseling communication, diet counselling	(10 Lectures)

Recommended Readings

Write better, speak better (Reader's digest Publication) Building your Vocabulary – John G. Gilmartin Instant Vocabulary – Gopal K. Puri.

Contemporary English Grammer, Structure & Composition. David Green (Macmillan & Co Ltd.) Tiger's Eye – Alan Mc Connell Duff. (Oxford University Press) J. D. O. Connor UBS Better English Pronunciation.

Dianna Booher – Ewriting - 21 century

Tools for effective communication pocket books. Sinon &Schuster inc. JSBN – O 7434- 1258-3 Ashi Hi Ingragi (Marathi) Prof. N. D. Apte Rajhans Prakashan Pune.

Osborn Michael/ Osborn Suzane. Public Speaking, Biztantra, New Delhi. Durodula Sahrolyn P. Learn Reading - Anmol Publications Pvt. Ltd., New Delhi. Narula Uma, Business Communication Practices-Modern Trends, Atlantic Publishing House, Mumbai.

Kumar Keval. J, Mass Communication InIndia, Jaico Publishing House,

Mumbai. Information and Communication Technology by Abdul Mannan

Himalaya Publishing House, Mumbai.

BFPP 201: INTRODUCTION TO COMPUTER AND DATA PROCESSING – II

Unit I : Computer Network Basic Concepts

- Basic elements of a communication system sender, receiver and medium
- Data Transmission modes Simplex, Half Duplex, Full Duplex
- Data Transmission Media wire pairs, Co-axial cable, Microwave System,
- Communication Satellite, Optical fiber,
- Definition of networking
- Types of networking LAN, MAN, WAN Network Topologies BUS, Ring, Star, Mesh and Hybrid

Unit II : MS-Word

- Features of MS-Word, Components of MS-Word, Menus in MSWord File, Edit, View, Insert, Format, and Table, Mail-merge utility,
- Introduction to Internet, Browsing and Mailing.

Unit III : MS-Excel

- Components of MS-Excel, Formatting options, sorting and Filtering of data,
- Some commonly used functions SUM, MAX, MIN, AVERAGE, COUNT.
- Generating various charts using data.

Unit IV : MS-PowerPoint

- Introduction, Creating presentation, Formatting options, use of animation, slide transition,
- Use of hyperlink, Introduction to Internet, Browsing and Mailing.

Recommended Readings

- 1) Computer Today --Basandara
- 2) Introduction to Computer and Data Processing- Pawar (Wiley- Dreamtech)
- 3) Computer Fundamentals -- P.K. Sinha
- 4) Fundamental of computers --V. Rajaraman.

(10 Lectures)

(10 Lectures)

(10 Lectures)

(IN LECTURES

(10 Lectures)

BFPP 202: PRINCIPLES OF FOOD PROCESSING AND PACKAGING - II

Unit I : Primary processing (10 lectures) • Cleaning Sorting • Grading • Cutting • Seeding • Bleaching • Chilling and freezing **Unit II : Secondary processing** (10 lectures) Slicing • • Pulping • Paste • Frying • Chilling and freezing • Milling **Unit III : Common food processing** (10 lectures) Cooking • Baking • Frying • Roasting • Toasting • Grilling Blanching •

• Extrusion

Unit IV : Packaging of Foods

- Packaging Rules
- Labling
- Packaging Techniques
- Bar coding

Recommended Readings:

1. Paine FA and Paine HY, 1992 A Handbook of Food Packaging, Blackie Academic Professional

- 2. Rao CG. 2006, Essentials of food process engineering. B S publications
- 3. Rao DG, 2010, Fundamentals of food engineering. PHI learning private Ltd.
- 4. Robertson GL, 2012, Food Packaging Principles and Practice, CRC Press TaylorandFrancis, Group
- 5. Singh RP and Heldman DR, 1993, 2003, 2009, 2nd, 3rd and 4th Ed., Introduction to food engineering. Academic press.

(10 lectures)

BFPP 203 : FOOD CHEMISTRY II

Unit I : Vitamins (10 Lectures) Classification • • Structure • Water soluble vitamins • Fat solublevitamins • Effect of processing on vitamins **Unit II : Minerals** (10 Lectures) • Major Minerals: Calcium, Iron, Phosphurus etc. • Minor Minerals: Zinc, Magnesium, Mangenees etc. Effect of processing on minerals • **Unit III : Food Colours and Food Flavours** (10 lectures) • Food Colours Types, Structure, Effect of processing on colour • Food Flavour Natural flavour- Types, Structure Artificial flavour- Types, Structure Effect of processing on flavour Unit IV : Enzymes (10 Lectures) • Introduction

- Classification
- General characteristics
- Enzymes in food processing
- Industrial Uses of Enzymes ٠

Recommended Readings

- 1. DeMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999
- 2. Desrosier, Norman W.and Desrosier., James N., The technology of food preservation, 4th Ed., Westport, Conn. : AVI Pub. Co., 1977.
- 3. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
- 4. Fuller, Gordon W, New Product Development FromConcept to Marketplace, CRC Press, 2004.
- 5. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002

BFPP 204: FOOD MICROBIOLOGY II

Unit I: Microbial contamination of food and spoilage Contamination	(10 Lectures)
 Contamination from air, water, soil, sewage 	
 Techniques for evaluation of contamination 	
Spoilage of Specific Food Products	
• Food poisoning	
• Intoxication, Food born illness	(10 L optumos)
Classification of stains- acidic, basic & neutral	(10 Lectures)
Principles, Procedures, mechanisms & applications of staining procedures	5
• Simple staining	
• Negative staining	
• Gram staining	
• Differential staining	
Unit III : Approaches to the isolation and identification of bacteria.	(10 Lectures)
Methods for isolation of pure culture.	(,
• Maintenance of stock cultures - Agar slants and Agar stabs	
• Systematic study of pure cultures :	
i. Morphological characteristics.	
ii. Cultural characteristics -	
iii. Biochemical Characteristics -	
a. Sugar fermentation	
b. Production of metabolites - H_2S gas	
c. Production of enzymes - Amylase, Caseinase & Catalase	
iv. Serological and genetic characteristic	
Unit IV : Microbial nutrition And Culture Media	(10 Lectures)
• Microbial Nutrition	
Nutritional requirements of microorganisms	
Nutritional types of microorganism based on carbon and energy sources	
• Culture media : Common components of media and their functions	
• Types of media : Living Media and Non living media	
Recommended Readings:	
1. Microbiology by Pelczar, M.J.Jr., Chan E.C.S., Krieq, N.R. 5 th edition, 1986 (Mc	Graw Hills Pub.)
2. Fundamental principles of bacteriology by A. J.Salle, Tata Mcgraw hill.	
3. Fundamentals of microbiology by Frobisher, Hindsdill, Crabtree, Good heart,	
W.B.Saunders Company, 7 th edition.	
4. General microbiology by Stanier R.Y.V th edition, Macmilan, London.	
5. Medical bacteriology by Dey and Dey- Allied agency, Calcutta.	
6. Food microbiology by W.C. Frazier.	
7. Introduction to Microbial Techniques by Gunasekaran.	

BFPP205: FOOD PRESERVATION II

Unit I : Food preservation by Radiation	(10 lectures)
 Introduction & units of irradiation, Mechanism of action of radiation, Radiation process Effect of radiation on food, Effect of radiation on microorganisms 	
Unit II : Non-thermal preservation of food	(10 lectures)
 Pulsed electric field processing Ohmic heating Dielectric heating Microwave processing Unit III : Other methods non-thermal food preservation	(10 lectures)
• Infrared heating	
• High pressure processing,	
Processing using ultrasound	
Unit IV : Recent methods of food preservation	(10 lectures)
• Plasma	

- Bio preservation
- Hurdle technology

Recommended Readings:

1. Potter NH,1998, Food Science, CBS Publication, New Delhi

- 2. Ramaswamy H and Marcotte M,2009, Food Processing Principles and Applications CRC Press
- 3. Deman JM,2007, Principles of Food Chemistry, 3rd Ed.Springer
- 4. Manay NS and Shadaksharaswamy M,1987, Food-Facts and Principles, New

Age International (P) Ltd. Publishers, New Delhi

BFPP206: ANALYTICALTECHNIQUES –II

U	nit I: Electrophoresis	(10 lectures)
	 Principle, Types of electrophoresis Moving boundary electrophoresis, Zone electrocphoresis Isoelectric focusing, Factors affecting electrophoresis, Applications 	
U	nit II : Flame photometer	(10 lectures)
	Principle, ConstructionWorkingApplications	
U	nit III: Fluorimetry	(10 lectures)
	PrincipleWorking, ApplicationsFluorimetric determination of thiamin & Riboflavin	
Uı	nit IV : Chromatographic Techniques	(10 lectures)
	 Principle, Classification Partition chromatography, Adsorption chromatography Gel chromatography, Ion exchange chromatography Affinity chromatography, Paper chromatography, Column chromatography, 	HPLC
Re	ecommended Readings	
1. 2. 3.	Morris B. Jacobs The chemical analysis of foods and food products, IIIEditio CBS Publishers and distributors New Delhi. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable McGraw Hill Publishing Co. New Delhi. D.T.Plummer An introduction to practical biochemistry. III Ed. Tata McG	n, e products, II Ed., Tata Graw
2.	Hill Publishing Co. New Delhi.	rd

- 4. Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis : Theory and practice, 3 Edn. IS: 6273 (Part1&Part-2). Chapman and Hall.
- 5. Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi.
- 6. Maynard 1970. Methods in food analysis. Academic Press Inc. U.S.

BFPP 207: AGRIBUSINESS MANAGEMENT PAPER-II

Unit I: Farm Economics and cost of farm products

- Economicsof Food-Factors influencing food expenditure
- Food Prize & Quantity.
- Demand for the agricultural products, production and supplyoffarm products.
- Estimation of cost of production for farm products ,problems in cost estimation.

Unit II :Marketing of Agricultural produce/products

- Meaning, classification & Agricultural markets, structure of Agriculture market.
- Regulated markets, marketing of co-operatives
- Product decisions-conceptofproduct, brand, packaging, standardizationGradinginIndia,
- Grade determination techniques, AGMARK, BIS, Transportation, storage & ware house.

Unit III : Pricing and promotion & Distribution of Agricultural commodities (10 lectures)

- Pricing Factors influencingpricingdecision.
- Determination of Agricultural prices & marketing margins ,pricing in competitive environment,
- Promotion of Agricultural product, -Concept of promotion Mix. Advertising, Sales
- PersonalSelling&Publicity.
- Promotion according to segmentation.
- Problems of promoting Agricultural products.

Unit IV: International Market for Agricultural products (10 lectures)

- MeaningofInternationalMarket
- Difference in Domesticand International Market
- Grades and standards prevailing in other countries
- Qualify Standards of Agricultural commodities Domestic & Export markets

Recommended Readings

- 1. Indian Agricultural Economics Myths & Realities.
- 2. Export Management Prof. Laxmi Narayan
- 3. Agricultural Marketing in India S.S.Acharya & M.L.Agarwal.
- 4. Indian Agriculture Agarwal A.M.
- 5. Changing Prospective in Indian Agriculture Bhanushali S.G. & Pujar A.G. CFN 3 Economics of food IGNOU
- 6. International Marketing Francis cherunilam

(10 lectures)

(10 lectures)

BFPP 208: FOOD ADDITIVES, CONTAMINANTS AND TOXICOLOGY

Unit I:Introduction of food additives

- Definition, Significance and Importance of Food Additives
- Types of Food Additives
- Safety and quality evaluation of additives

Unit II : Direct food additives

- Preservatives, Antioxidants, Acidulants Their Chemistry, Types and Functions
- Emulsifiers, Stabilizers, Sequesterants, Humectants Their Chemistry, Types and Functions

Unit III : Indirect food additives

- Colors, Flavors, Sweeteners Their Chemistry, Types and Functions
- Indirect food additives
- Analytical Methods for Detection of Food Additives

Unit IV : Contaminants and Toxicology

- Food Contaminants Definition, Types and Significance
- Food Toxicants Definition, Types and Significance
- Terminologies in Toxicology
- Acute and Chronic studies, LD50 Value

Recommended Readings

- 1. Fennema, O.R. Ed. 1976. Principles of Food Science: Part-I Food Chemistry. Marcel Dekker, New York.
- 2. Potter, N.N. 1978. Food Science. 3rd Ed. AVI, Westport.
- 3. Branen A.L. and Davidson, P.M. 1983. Antimicrobials in Foods. Marcel Dekker, New York.
- 4. Furia, T.E. 1980. Handbook of food additives. Vol I and Vol II

(10 lectures)

(10 lectures)

(10 lectures)

(10 lectures)

FOOD PROCESSING AND PACKAGING

Practical-I

- 1. To study gelatinization behaviour of various starches.
- 2. Detection of gluten in various flours.
- 3. To study malting and germination.
- 4. To study dextrinization in foods.
- 5. Identification of pigments infruits and vegetables and influence of pH on them.
- 6. Comparison of conventional and microwave processing of food.
- 7. Drying of food using Tray dryer/other dryers.
- 8. Study the dehydration processes(Osmotic dehydration).
- 9. Cut-out analysis of canned food.
- 10. Creating and saving the workbook.
- 11. Calculating the student result.
- 12. Inserting and formatting the various charts.
- 13. Sorting and Filtering the data.
- 14. Creating and saving the simple presentation.
- 15. Use of animations, slide transition and timing in presentation.
- 16. Writing and sending e-mails.

Practical-II

- 1. Estimation of reducing sugar by Fehling's procedure.
- 2. Estimation of salt content in brine.
- 3. Estimation of salt content in butter.
- 4. Preparation of brix solution and checking by hand Refractometer.
- 5. Application of colloidal chemistry to food preparation.
- 6. Determination of pH of different foods using pH meter.
- 7. Determination of acidity of water and honey sample.
- 8. Determination of alkalinity/ hardness of water.
- 9. Study the freezing characteristics of foods.
- 10. Study quality characteristics of foods preserved by drying/dehydration/ freezing.
- 11. Determination of viscosity of foods.
- 12. Estimation of Fat from food sample by Soxhlet method.
- 13. Demonstration of the Kjeldahl's method for estimation of protein content.
- 14. Testing of Packaging material.
- 15. Identification of packaging materials .

Practical-III

- 1. Preparation of primary and secondary solutions.
- 2. Determination of gelatinization temperature range (GTR) of different starches
- 3. Determination of refractive index and specific gravity of fats and oils.
- 4. Determination of smoke point and percent fat absorption for different fat and oils.
- 5. Determination of percent free fatty acids.
- 6. Estimation of saponification value of fat or oil.
- 7. Estimation of reducing and non-reducing sugars.
- 8. Phenol sulphuric acid test for carbohydrates.
- 9. Estimation of starch by anthrone reagent.
- 10. Estimation of total ash from food sample.
- 11. Estimation of minerals.
- 12. Estimation of iodine value of Oil.
- 13. Estimation of peroxide value of fat or oil.
- 14. Determination of carotenoids with respect to flour pigments.
- 15. Estimation of Moisture from food sample.
- 16. Determination of protein by Biuret method.
- 17. Estimation of Fiber from food sample.

Practical-IV

- 1. Introduction to the BasicMicrobiology Laboratory Practises
- 2. Study of instrumets used for microbiology(Incubator, oven, autoclave, water bath etc.).
- 3. Principle and working of analytical instrument such as colorimeter, balances, muffle furnace, , and centrifuge
- 4. Functioning and use of compound microscope
- 5. Cleaning and sterilization of glassware
- 6. Preparation and sterilization of media(Nutrient broth, Nutrient agar, MacConkeys agar, Sabouraud's agar)
- 7. Preparation of slant, stab and plates using nutrient agar
- 8. Techniques of incubation (aerobic / anaerobic)
- 9. Cultivation and sub-culturing of microbes
- 10. Staining methods

(Monochrome staining, Gram staining, Negative staining,

Flagella staining, Capsule staining and Endospore staining)

- 11. Morphological study of fungi
- 12. Isolation of bacteria by Pure culture techniques (streak plate / pour plate)
- 13. Isolation of molds from foods
- 14. Microbial analysis of different food samples

Pattern of Question Paper (Compulsory English)

SEMESTER I

Total Marks: 50

		Reading Comprehension	Marks
Q1	A	Five multiple choice objective type questions on Reading Skill. (Four choices should be given, out of which one should be the most correct choice	05
	В	Five objective type questions on textual vocabulary on i) Synonyms ii) Antonyms iii) Change the grammatical classes iv) Use of phrases	05
Q2	A	Answer the following questions in two to three sentences each (3 out of 5)	09
	В	Write short note on the following in about 50 to 60 words (2 out of 3)	06
		COMMUNICATION SKILLS	
Q3	А	Unit No.1 Describing Objects/ People	06
	В	Unit No.1 Describing Places	06
Q4	А	Unit No.2 Describing Daily Routine	07
	В	Unit No.3 Narration	06

Pattern of Question Paper (Compulsory English)

SEMESTER: II

Total Marks: 50

		Reading Comprehension	Marks
Q1	A	Five multiple choice objective type questions on Reading Skill. (Four choices should be given ,out of which oneshould be the most correct choice)	05
	В	Five objective type questions on textual vocabulary on i) Synonyms ii) Antonyms iii) Change the grammatical classes iv) Use of phrases	05
Q2	A	Answer the following questions in two to three sentences each (3 out of 5)	09
	В	Write short note on the following in about 50 to 60 words (2 out of 3)	06
		COMINICATION SKILLS	
Q3	A	Unit No. 9 Write a Letter of Application with C.V.	10
Q4	А	Unit No.10 Write News Reports	07
	В	Unit No.11 Make Enquiries and Give Instructions	08

Nature of question paper and distribution of marks Food processing and packaging (Except English)

(Semester I and II)

Theory Examination	Marks
Q.1 Objective type	10
(The multiple choice – 10 questions)	
Q.2 Attempt Any Two	20
(A) Descriptive question	
(B) Descriptive question	
(C) Descriptive question	
Q.3 Attempt Any 4 out of 6 (Short Notes / Answers) 20
	50
Practical Examination	Marks
Q.1 Major Experiment	15
Q.2 Minor Experiment	10
Q.3 Minor Experiment	10
Q.4 Spotting	10
Q.5 Journal	05
	Total marks – 50