

Punyashlok Ahilyadevi Holkar Solapur University, Solapur



SYLLABUS

FOR

**Three year B.Voc Integrated Course in Food Processing
and Management**

(Semester III, IV, V & VI)

Choice Based Credit System (CBCS)

WITH EFFECT FROM ACADEMIC YEAR 2018-19

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Syllabi of three Year Integrated B.Voc Course in Food Processing and Management (Choice Based Credit System)

- 1) **Title of the course:** B.Voc Food Processing and Management
- 2) **Duration of course:** Three years.
- 3) **Pattern:** Semester and Credit system.
- 4) **Eligibility:** For three Year Integrated B.Voc Food Processing and Management following candidates are eligible.
 - 10+2 passed.

5) Strength of the Students: 50

Three years Integrated Course B.Voc Food Processing and Management

Three Year Integrated B.Voc Food Processing and Management Course

Semester	No. of Papers/ Practical's / Seminar	Marks	Credits
Semester I			
• Theory Papers	04	400	12
• Practical Paper	03	450	18
• Seminar/Tutorial/Home Assignment /Field Tour/ Industrial Visit	00	00	00
Semester II			
• Theory Papers	04	400	12
• Practical Paper	03	450	18
• Seminar/ Tutorial/Home Assignment /Field Tour/ Industrial Visit	01	100	01
Total marks and credits for Course		1800	61

First Year syllabus (according to the Semester Pattern Examination) to be effective from the Academic Year 2019-20

Semester	Code	Title of the Paper	Semester Examination			L	T	P	Credits
			Theory	IA	Total				
Sem-III		Hard Core							
	BVOC3.1	Fundamental of financial accounting	70	30	100	3	--		3
	BVOC3.2	Milk and milk product	70	30	100	3	--	--	3
	BVOC3.3	Food quality and waste management	70	30	100	3	--	--	3
	BVOC3.4	Food chemistry	70	30	100	3	--	--	3
	BVP3.2	Practical-I	100	50	150		--	06	06
	BVP3.3	Practical-II	100	50	150	--	--	06	06
	BVP3.4	Practical-III	100	50	150	--	--	06	06
		Total for Semester-I	580	270	850	--	--	--	30
Sem-IV		Hard Core							
	BVOC4.1	Business Management	70	30	100	3	--	--	3
	BVOC4.2	Legal frame work for food industry	70	30	100	3	--	--	3
	BVOC4.3	Meat , fish and poultry processing	70	30	100	3	--	--	3
	BVOC4.4	Beverages processing	70	30	100	3	--	--	3
	BVP 4.2	Practical-I	100	50	150		--	06	06
	BVP4.3	Practical-II	100	50	150	--	--	06	06
	BVP 4.4	Practical-III	100	50	150	--	--	06	06
	BVP 4.5	Seminar/ Field Tour/ Industrial Visit	50	50	100	--	--	01	02
		Total for Semester-II	630	320	950	--	--	--	31

L=Lecture T=Tutorials

P=Practical IA=Internal Assessment

BVOC= Theory

BVP= Practical

Evaluation Scheme:

Each theory paper will have 100 marks out of which 70 marks will be for Term End examination and 30 marks for Internal Assessment. Each practical paper will have 150 marks out of which 100 marks will be for Term End examination and 50 marks for Internal Assessment. The candidate has to appear for internal evaluation of 30 marks and external evaluation (University Examination) of 70 marks for each **theory** paper. The candidate also has to appear for internal evaluation of 50 marks and external evaluation (University Examination) of 100marks for each **practical** paper.

Internal Evaluation:

- In case of theory papers internal examinations will be conducted by school.
- In case of practical paper 05 marks shall be for day-to-day journal and internal examination of 10 marks will be conducted by the school.

External Evaluation (End of Term University Examination):**I) Nature of Theory question paper:**

- Q.1 Multiple Choice Questions 14
- Q.2 A) Answer the following (Any Four) 08
1. 02
 2. 02
 3. 02
 4. 02
 5. 02
- B) Write Notes on (Any Two) 06
1. 03
 2. 03
 3. 03
- Q.3 A) Answer the following (Any two) 08
1. 04
 2. 04
 3. 04
- B) Answer the following (Any One) 06
1. 06
 2. 06
- Q.4 A) Answer the following (Any Two) 10
1. 05
 2. 05
 3. 05
- B) Answer the following (Any One) 04
1. 04
 2. 04
- Q.5 Answer the following (Any two) 14
1. 07
 2. 07
 3. 07

II) Nature of Practical Question paper: Practical examination will be of 3 hours duration carrying 100 marks. There shall be 7 questions each of 14 marks, of which student has to attempt any 5 questions. VIVA and JOURNAL will be for 30 marks. Internal practical examination of 50 marks.

Paper No. IX
Paper Code: BVOC 3.1

1. Fundamentals of Financial Accounting

Marks: Theory: 70 + Internal: 30 = Total 100

Unit I: Introduction to Accounting

- Meaning, Nature and Advantages of Accounting, Branches of Accounting,
- Accounting Concepts and Conventions, Types of Accounts, Rules of journalizing,
- Source Documents – Cash Voucher, Petty Cash Voucher, Cash Memo – Receipts,
- Debit Notes, Credit Note, Paying Slips, Withdrawals, Cheque.

Unit II: Journal and Ledger

- Preparation of Journal entries and Ledger accounts – Subsidiary Books – Purchase Book, Purchase Return Book, Sales Book, Sales Return Book, Cash Book, Bills
- Receivable Book, Bills Payable Book, Journal Proper

Unit III: Depreciation

- Meaning, Methods – Straight Line Method – Reducing Balance Method, Change in Depreciation Method.

Unit IV: Final Accounts

- Preparation of Trial Balance, Preparation of Final Accounts of Sole Traders and Partnership firms

Unit V: Computerized Accounting System

- Introduction – Concept – Components – Features – Importance and Utilization of Computerized Accounting System.

Unit VI Computer Application through Accounting Package Tally

- Creation of Company, Group, Ledger Accounts, Feeding of Accounting Data
- Receipts, Payments, Purchase, Sale, Contra, Journal, Credit Note and Debit Note
- Inventory Information – Groups, Items and Valuation
Generation of various Accounting Reports

Unit VII Accounts of Professionals

- Preparation of Receipts and Payment Account – Income and Expenditure Account and Balance Sheets of Non-Profit Organization.

Unit VIII: Single Entry System

- Conversion of Single Entry System into Double Entry System.

Paper No. X

Paper Code: BVOC3.2

2. Milk & Milk Products

Marks: Theory: 70 + Internal: 30 = Total 100

Unit – I – Introduction to Milk and milk products

- Definition, Production and processing status of milk.
- Types of Milk Products.
- Equipments used in dairy industry.

Unit – II – Composition of milk

- Physico-chemical properties.
- Composition and Nutritive value.
- Factors affecting composition of milk.
- Effect of heat, acid and microorganism on milk.

Unit – III – Processing of milk and Special Milks

- Processing of milk
 - Pasteurization.
 - Sterilization.
 - Dehydration.
- Special Milks
 - Re-constituted or Re-hydrated milk.
 - Condensed milk, toned milk and Flavored milk.
 - UHT Milk.

Unit – IV – Butter, Butter oil and Cheese

- Definition and composition.
- Process of manufacture.
- Uses.

Unit – V – Ice-cream

- Definition & Composition.
- Ingredients & their role.
- Process of manufacture.

Unit – VI- Indigenous Milk Products

- Dahi/Curds, Lassi,
- Channa/ Paneer, Rasgulla.
- Khoa, Gulabjamun.
- Chakka, Shrikhand.

Reference:

- 1) Dey S., 1994, Outlines of Dairy Technology, Oxford Univ. Press, New Delhi.
- 2) Rosenthal I., 1991, Milk and Milk Products, VCH, New York.
- 3) Robinson R. K., (2 vol. set), 1986, Modern Dairy Technology, Elsevier Applied Science, UK.
- 4) Warnar J. M., 1976, Principles of Dairy Processing, Wiley Eastern Ltd, New Delhi

Paper No. XI

Paper Code: BVOC3.3

3. Food Quality & Waste Management

Marks: Theory: 70 + Internal: 30 = Total 100

Unit - I - Introduction to Quality Control in the food industry

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

Unit - II - Sampling of Food

- Sample Selection and Sampling Plans.
- Preparation and storage of Laboratory Samples.
- Sampling Methods.

Unit - III - Standard tests for quality assessment

- Physical Tests.
- Chemical tests.
- Microbiological tests.

Unit - IV - Instrumental analysis of food

- Viscosity analysis.
- Consistency analysis.
- Texture analysis.
- Color analysis.

Unit - V- Sensory evaluation

- Importance of sensory evaluation.
- Practical requirements for conducting sensory tests: Testing area, testing set up, lighting, testing schedule, preparation of samples, sample coding, evaluation card preparation.
- Selection of Panel members.

Unit - VI - Sensory testing of foods

- Difference tests.
- Rating tests.
- Sensitivity tests.
- Descriptive flavor profile.

Unit - VII - Waste Management in Food Industry

- Types of waste generated: non-degradable & biodegradable wastes.
- Methods of utilizing wastes to make value added products.

Unit - VIII - Waste storage and disposal methods

- Storage and disposal of liquid and gaseous waste- land-filling, Burial, incineration, recycling, biological treatment of food Industry wastes.
- Storage and disposal of liquid and gaseous waste.
- Environment management systems (ISO 14000) and its Application in food industry.

References:

1. Philip,A.C. Reconceptualizing quality. New Age International Publishers,Banglore. 2001.
2. Bhatia,R. and Ichhpujan,R.L. Quality assurance in Microbiology. CBS Publishers and Distributors, New Delhi. 2004.
3. Kher, C.P. Quality control for the food industry. ITC Publishers, Geneva. 2000.
4. Robert R. Zall (2004), Managing Food Industry Waste: Common sense methods for Food Processors, Blackwell Publishing.
1. Loannis S. and Arvanitoyannis (2008). Waste Management in Food Industry, Academic Press
3. VassoOreopoulou and Winfried Russ (2007).
6. Utilization of byproducts and treatments of waste in Food Industry, Springer publication.

Paper No. XII
Paper Code: BVOC3.4

4. Food Chemistry

Marks: Theory: 70 + Internal: 30 = Total 100

Unit - I - Introduction to Food Chemistry

- Definition and importance.
- Water in food- types.
- Carbohydrates-
 - Classification, Structure.
 - Physical and Chemical Properties.
 - Digestion and Absorption.

Unit - II - Fats and Proteins

- Classification, Structure.
- Physical and Chemical Properties.
- Digestion and Absorption.

Unit - III - Vitamins and Minerals

- Classification.
- Physical and Chemical Properties.
- Digestion and Absorption.

Unit - IV - Food Flavors, Color and Toxicants

- Types of flavors and colors.
- Applications of flavors and colors.
- Toxicants in food.
- Browning reactions – Enzymatic browning and non-enzymatic browning.

References:

1. Fennema, O. R., 1976, Principles of Food Science: Part I- Food Chemistry, Marcel Dekker, New York.
2. Meyer L. H., 1973, Food Chemistry, East-West Press Pvt. Ltd., New Delhi.
3. Potter, N. N. 1978, Food Science, 3rd edition, AVI, Wesport
4. ShakuntalaManay Food Facts and principle

Practical Paper-VII

Paper Code: BVP3.2

PRACTICAL –I

1. Milk & Milk Products

Marks: External: 100 + Internal: 50 = Total 150

1. Physical examination of milk.
2. Determination of Fat content of milk.
3. Estimation of milk acidity.
4. Estimation of Specific Gravity of milk.
5. Platform tests of milk.
6. Preparation of Flavored milk.
7. Preparation of condensed milk.
8. Introduction and nutritive value observation of milk products.
9. Preparation of Curds.
10. Preparation of Shrikhand.
11. Preparation of Khoa.
12. Preparation of Gulabjamun.
13. Preparation of Paneer.
14. Preparation of Rasgulla.
15. Preparation of Ice-cream and Kulfi.
16. Use of fruit juice/ pulp in milk product.
17. Preparation of lassi.
18. Preparation of product from Whey.
19. Detection of adulterants in milk and milk product.
20. Visit to Dairy Industry.

Practical Paper-VIII

Paper Code: BVP3.2

PRACTICAL –II

2. Food Chemistry

Marks: External: 100 + Internal: 50 = Total 150

1. Identification of Unknown Carbohydrate in sample.
2. Identification of Unknown Protein in sample.
3. Estimation of iodine value of fat/oil.
4. Estimation of Saponification number of fat/oil.
5. Estimation of Acid value of fat/oil.
6. Estimation of Vitamin C content of sample.
7. Estimation of hardness of water.
8. Determination of chlorophyll content of given sample.
9. Isolation of starch of given sample.
10. Determination of total carotenoids.
11. Determination of crude fiber content of food.
12. Visit to food testing lab.

Practical Paper-IX

Paper Code: BVP3.3

PRACTICAL –III

3. Food Quality & Waste Management

Marks: External: 100 + Internal: 50 = Total 150

1. Determination of viscosity by Brookfield viscometer.
2. Texture Profile Analysis by texture analyzer.
3. Color analysis by Tintometer.
4. Determination of o Brix by Refractometer.
5. Sensory analysis of food products.
6. Study of solid waste disposal methods.
7. Study of liquid waste disposal methods.
8. Visit to waste disposal section in food industry.
9. Determination of Moisture content of food.
10. Determination of Fat content of food.
11. Determination of protein content of food.
13. Determination of ash content of food.
14. Determination of Total Plate Count.
15. Determination of Yeast and Mould Count.
16. Visit to quality control laboratory.

SEMESTER IVth

Paper No. XIII

Paper Code: BVOC4.1

1. Business Management

Marks: Theory: 70 + Internal: 30 = Total 100

Unit - I - Introduction to Management

- Meaning-Definition-characteristics-Significance of management- Levels of Management
- Characteristics and Need of professional management.
- Principles of management by Henry Fayol.

Unit - II - Planning and Decision making

- Planning- Meaning, importance and Process of planning- Types of planning-Advantages and limitations of planning.
- Decision making- Meaning-Definitions-Process and Techniques of decision making.

Unit - III - Organizing and Controlling

- Meaning and importance of organizing- Steps on organizing- Types of Organization- Line and Staff, Functional and Committee Type
- Controlling- Meaning – Significance-Control Process-Techniques of Control

Unit - IV - Co-ordination and motivation

- Co-ordination-Meaning-Need-Techniques of Co-ordination.
- Motivation-Definition-Characteristics of Motivation-Means of Effective Motivation

References:

- 1) Principles of Management- L. M. Prasad
- 2) Principles of Management- DinkarPagare
- 3) Principles of Management- George R. Terry
- 4) Principles of Management- Koonts, O'Donnell
- 5) Management Theory and Practice- Gupta C. B.
- 6) The Management Process- Davar R. S.
- 7) Principles of Management- Tripathy and Reddt
- 8) Management- Peter Drucker

Paper No. XIV

Paper Code: BVOC4.2

2. Legal Frame Work for Food Industry

Marks: Theory: 70 + Internal: 30 = Total 100

Unit I - Food laws and standards

- Importance of standards.
- Types of standards.
- Standards for raw material.

Unit II - International Agencies

- Introduction, objectives and applications of ISO and CAC.
- Introduction, objectives and applications of WHO and FAO.
- Introduction, objectives and applications of WTO and FDA.

Unit III - Domestic/ Indian standards

- Introduction, objectives and applications of the following.
- Food Safety and Standards Act 2006.
- ECA, AGMARK.
- MPEDA, BIS.

Unit IV - Food Adulteration and food safety

- Common adulterants, methods of detection.
- Safety Assurance System (SAS) – HACCP and GMP.
- Nutrition Labeling and Education Act 1990.

References:

- Krammer, A. and Twigg, B.A. 1950. "Quality Control for the Food Industry". 3rd Edition. AVI, Westport.
- Pattee, H.E. Ed. 1985. "Evaluation of Quality of Fruits and Vegetables". AVI, Westport.
- Ranganna, S. 1986. "Handbook of Analysis and Quality Control for Fruits and Vegetable"
- Tannenbaum, S.R. Ed. 1979. "Nutritional and Safety Aspects of Food Processing", marcel
- NIIR Board: The complete technology book on bakery products
- W.P. Edwards: Science of Bakery Products
- Emmanuel Obene: Chocolate science and Technology

Paper No. XV

Paper Code: BVOC4.3

3. Meat, Fish & Poultry Processing

Marks: Theory: 70 + Internal: 30 = Total 100

Unit I. -Meat Product Processing

- Introduction & importance of meat products in India.
- Pre-slaughter inspection of Slaughtering animal.
- Chemical composition & microscopic Structure and types of meat.
- Methods of stunning & slaughtering, post-mortem changes in animal, Quality & Grading of meat.
- Meat tenderization, ageing, preservation of meat.

Unit II. - Poultry Product Processing

- Introduction & importance of poultry products in India.
- Pre-slaughter inspection of poultry animal for Slaughtering.
- Types and classification of poultry, Bones & cuts of poultry, Poultry inspection.
- Preservation of poultry Products.

Unit III. - Egg & egg Product Processing

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

Unit IV. -Fish and Fish Product Processing

- Classification of seafood.
- Types of Fish.
- Composition & structure of Fish.
- Post-mortem changes in fish.
- Canning, smoking, freezing & dehydration of fish.

References

- 1) Lawrie,R.A,Meat science
- 2) Lavie.a, Meat handbook
- 3) Portsmouth.J.I, Commercial Rabbit meat production
- 4) Stadelmen w. J. Cotterill O. j, Egg Science & Technology
- 5) FSSAI schedule 4.

Paper No. XVI

Paper Code: Bvoc3.4

4. Beverage Processing

Marks: Theory: 70 + Internal: 30 = Total 100

Unit – I - Introduction to Beverage Industry

- Definition, Types, importance of beverages.
- Scope and status of beverage industry in India.
- Water for beverages- Water treatment- Alkalinity reduction, filtration of water, Water softening.
- Quality Specification for beverage water.

Unit – II - Fermented beverages

- Grain based.
- Fruits based.

Unit – III - Carbonated Beverages

- History and types of soft drinks.
- Role of various ingredients in soft drinks.
- Carbonation of soft drinks.
- Packaging aspects in soft drink.
- Quality control in soft drink –Chemical and sensory Quality of soft drink – Microbiological quality.

Unit – IV - Packaged drinking water

- Definition, types,
- Manufacturing processes.
- Quality evaluation of raw and processed water, BIS quality standards of Bottled water; Mineral water, Natural spring water, Flavoured water, Carbonated water.

References:

1. Hardwick WA. 1995. Handbook of Brewing. Marcel Dekker
2. Hui YH et al 2004, Handbook of Food and Beverage Fermentation Technology. Marcel,Dekker.
3. Priest FG & Stewart GG. 2006. Handbook of Brewing. 2nd Ed. CRC.
4. Richard PV. 1981.Commercial Wine Making - Processing and Controls.AVI Publ.
5. Varnam AH & Sutherland JP. 1994. Beverages: Technology, Chemistry and Microbiology.
6. Chapman &Hall.Woodroof JG & Phillips GF.1974. Beverages: Carbonated and NonCarbonated. AVI Publ.

Practical Paper-X

Paper Code: BVP4.2

1. Legal Frame Work for Food Industry

Marks: External: 100 + Internal: 50 = Total 150

1. Quality evaluation of raw materials.
2. Analysis of canned product sample.
3. Adulteration test for food product. (Any Fives)
4. Testing of market sample as per FSSAI.
5. Study of nutritional labeling as per Act.
6. Visit to food industry.

Practical Paper-XI

Paper Code: BVP4.3

2. Meat, Fish & Poultry Processing

Marks: External: 100 + Internal: 50 = Total 150

1. Study of Pre-slaughter operations of meat animals and poultry birds.
2. Study of slaughtering and dressing method of meat.
3. Study of preservation of meat by different methods.
4. Study of quality evaluation of meat, poultry and fish products.
5. Study of Quality evaluation of egg.
6. Preparation of product from slaughtered animal meat.
 - a. Steaming b. Pickle c. Roasting d. Curry e. Frying.
7. Preparation of product from slaughtered bird.
 - a. Steaming b. Pickle c. Roasting d. Curry e. Frying.
8. Preparation of product from egg.
 - a. Steaming b. Pickle c. Roasting d. Curry e. Frying.
9. Preparation of product from fish.
 - a. Steaming b. Pickle c. Roasting d. Curry e. Frying.
10. Visit to meat and poultry processing industry.

Practical Paper-XII

Paper Code: BVP 4.4

3. Beverage Processing

Marks: External: 100 + Internal: 50 = Total 150

- 1) Examination of physical impurities of water.
- 2) Determination of brix: acid ratio of the beverage.
- 3) Determination of SO₂ content of soft drink.
- 4) Preparation of grape wine.
- 5) Determination of saccharin.
- 6) Determination of total CO₂ of water.
- 7) Determination of free CO₂ of water.
- 8) Determination of total sulphates in water.
- 9) Determination of total alkalinity of water.
- 10) Preparation of carbonated beverages.
- 11) Preparation of RTS beverage.
- 12) Specification for different fruit beverage.
- 13) Preparation of beverage using artificial sweetener.
- 14) Test for chicory in coffee.
- 15) Visit to beverage processing unit and carbonation unit.

Semester	Code	Title of the Paper	Semester Examination			L	T	P	Credits	
			Theory	IA	Total					
Sem-V		Hard Core								
	BVOC5.1	Food hygiene and sanitation	70	30	100	3	-		3	
	BVOC5.2	Food microbiology	70	30	100	3	-	--	3	
	BVOC5.3	Food packaging	70	30	100	3	-	--	3	
	BVOC5.4	Extrusion Technology	70	30	100	3	-	--	3	
	BVP5.2	Practical-I	100	50	150		-	06	06	
	BVP5.3	Practical-II	100	50	150	--	-	06	06	
	BVP5.4	Practical-III	100	50	150	--	-	06	06	
	Total for Semester-I			580	270	850	--	-	--	30
Sem-VI		Hard Core	Internal (Institute)	External (Industry)						
	BVOC2.1	Initiative , confidence and skill acquisition	50	200	250	-	-	18	18	
	BVOC2.2	Regularity , sincerity and devotion	100	100	200	3	-		3	
	BVOC2.3	Project and report	50	50	100	3	-		3	
	BVOC2.4	presentation	100	-	100	3	-		3	
	BVOC2.5	Viva	100	-	100	3			3	
	Total for Semester-II			400	350	750	--	-	--	30

Paper No. XVII

Paper Code: BVOC5.1

1. Food Hygiene & Sanitation

Marks: Theory: 70 + Internal: 30 = Total 100

Unit I - Introduction to food hygiene and sanitation

- Importance of food hygiene and sanitation
- General principles of food hygiene
- Food handling habits and personal hygiene

Unit II - Water

- Sources, impurities and hardness of water
- Purification of water
- Storage of water

Unit III - Sanitation

- Definition
- Cleaning agents - Classification and properties
- Disinfectant, sanitizer - Classification and properties
- Advantages and disadvantages of sanitizers

Unit IV - Plant and equipments design

- Layout of plant sanitation
- Construction and design of plant
- Machinery design and installation
- Laws related to food hygiene and sanitation

References

1. Hygiene in food manufacturing and handling –Barry Graham- Rack and Raymond Bmsted
2. Guide to improving food hygiene Ed. Gatson and Tiffney
3. Food Poisoning and Food Hygiene (3rd Edition) – Betty C Hobbs
4. Principles of food sanitation – Marriott Norman G.

Paper No. XVIII
Paper Code: BVOC5.2
2. Food Microbiology

Marks: Theory: 70 + Internal: 30 = Total 100

UNIT I -Introduction to microbiology

- Concept of general Microbiology.
- Morphological characteristics and reproduction of bacteria, yeasts, fungi.
- Physical & Chemical factors affecting growth and destruction of micro- organisms.

Unit II -Food Contamination

- Introduction of sources of contamination.
- Classification of food according to ease which it spoils.(Fresh, dry and preserved)
- Bacterial & viral food intoxications.
- Naturally occurring toxicants in food, toxic metals & chemicals.

Unit III -Spoilage of Food

- Introduction of microbial spoilage.
- Cereals & cereal products spoilage.
- Milk & milk products spoilage.
- Fruit & Vegetable products spoilage.
- Meat, poultry egg & fish products spoilage.

Unit IV -Food Born Disease

- Introduction of food born disease
- Mode of transmission of disease
- Food borne illness
- Control of food borne illness

References

1. W.C. Frazier and D.C, 1978, 3rd edition, Food Microbiology.
2. James M. Jay 1927. 6th edition, Modern Food Microbiology.
3. G.J.Banwart, Basic Food Microbiology.
4. Singh B.D., Nallari P., Kavikishore P and Singh R.P Applied Microbiology.

Paper No. XIX
Paper Code: BVOC5.3
3. Food Packaging

Marks: Theory: 70 + Internal: 30 = Total 100

Unit - I - Introduction to Food Packaging

- Definition, Functions
- Parts of package
- Characteristics of ideal packaging material
- Selection criteria for Package

Unit - II - Food Packaging Materials

- Wood and clay-Properties, Applications, Advantages and Disadvantages.
- Glass- Properties, Applications, Advantages and Disadvantages.
- Metal- Properties, Applications, Advantages and Disadvantages.
- Paper- Types, Properties, Applications, Advantages and Disadvantages.
- Plastic and laminates - Types, Properties, Applications, Advantages and Disadvantages.

Unit - III - Packaging of Specific Foods

- Cereal, Pulses based food products.
- Fruits and Vegetables based food products.
- Milk based food products.
- Animal origin food products.

Unit - IV - Modern Techniques of Packaging

- Aseptic packaging.
- Active and Intelligent Packaging.
- Edible Packaging.
- Retortable Packaging.
- Controlled and Modified Atmosphere Packaging.

References:

1. Gorden, L. Robertson, 2006, Food Packaging: Principles and Practices, 2nd edition
2. Painy, F. A. and Painy, H. Y., 1983, Handbook of Food Packaging, Leonard Hill, Glasgow,UK.
3. Potter, N. N. 1978, Food Science, 3rd edition, AVI, Wesport
4. ShakuntalaManay Food Facts and principles

Paper No. XX
Paper Code: BVOC5.4
4. Extrusion technology

Marks: Theory: 70 + Internal: 30 = Total 100

Unit I: Introduction:

- Extrusion: definition, introduction to extruders, principles and types

Unit II -Uses of extruders in the food industry

Unit III: Types of extruder

- Single screw extruder: principle of working, factors affecting extrusion process
- Twin screw extruder: principle of working, factors affecting extrusion process

Unit IV: Pretreatments for extrusion:

- Pre-conditioning of raw materials used in extrusion process
- Use of extruders in extrusion.

Unit V: Processed food by extrusion:

- Raw materials, process and quality testing of vermicelli and spaghetti

Unit VI: Processed food by extrusion

- Raw materials, process and quality testing of pasta and macaroni products

REFERENCE BOOKS

1. Maskan and Altan, CRC Press, 2000: Advances in Food Extrusion Technology
2. Harper JM , CRC Press, 1981 : Extrusion of Foods
3. Berk Z., Academic Press, 2013: Food Process Engineering and Technology
4. A.L. Altschul., Academic Press, 1985 : New Protein Foods, vol. I, and II L
5. Matza S., Springer, 2000 : Extruded foods
6. N.D. Frame, Springer, 2012 : Technology of Extrusion Cooking
7. Riaz M.N., CRC Press, 2000 : Extruders in Food Application

Practical Paper-XIII

Paper Code: BVP 5.2

1. Food Microbiology

Marks: External: 100 + Internal: 50 = Total 150

- 1) Study of instruments used for microbiology, cleaning and sterilization of glassware.
- 2) Preparation of media, techniques of incubation
- 3) Staining methods (monochrome staining, gram staining, flagella staining,)
- 4) Pure culture techniques (streak plate/pour plate).
- 5) Isolation of microorganism from foods, microbial examination of cereal and cereal products.
- 6) Microbial examination of fruits and vegetables.
- 7) Microbial examination of milk and milk products.
- 8) Microbial examination of meat and meat products.
- 9) Microbial examination of egg and poultry

Practical Paper-XIV

Paper Code: BVP 5.3

2. Food Packaging

Marks: External: 100 + Internal: 50 = Total 150

- 1) Identification of parts of food Package
- 2) Study of information on food Package
- 3) Determination of Thickness of paper
- 4) Physical test for plastics films.
- 5) Determination of GSM of Packaging material
- 6) Examination of different types of packages and containers
- 7) Study of edible packaging material
- 8) Cut out examination of can
- 9) Preparation of album of food packaging materials
- 10) Designing of sample labels

Practical Paper-XV**Paper Code: BVP 5.4****3. Product development:**

In this subject, all the students have to select the given module and start production of their respective products. Also they have to start an outlet of their particular products and to sell it by themselves. Main objective of this subject is to promote professional skills and knowledge through meaningful hands on experience

Objectives

- To build confidence and to work in project mode
- To generate trained skill man power for self-employment and entrepreneurship development.
- To earn through value addition technologies available locally through integration of integrated farming, food safety, food market and good food practices.
- To explore wider opportunities and integration of different food on farm practices & devices for revenue generation.
- To integrate education with entrepreneurship for employment generation so that students may become job providers rather than job seekers.

Group of students shall undertake project work related to design and development of food product, its quality evaluation, packaging, labeling and shelf life testing under the supervision of a faculty member. In principle, the project work has to be carried out by the student himself taking advice from his supervisor when problem arises. The work will be allotted at the beginning of fifth semester. At the end of the semester the student will submit a project report on his/her work in typed form. Evaluation shall include oral presentation.

Modules

1. Drying and Dehydrations of fruits and vegetables
2. Fruits and Vegetable Products
3. Beverages and other Innovative Products
4. Spice Products
5. Postharvest management and marketing of Fresh Fruits and Vegetables
6. Egg, Poultry and Meat Processing

7. Bakery Products
8. Grain based Products (Cereal, Legumes/pulses and oilseeds)
9. Chocolate, Confectionary and Snack Products
10. Traditional, Heritage Food Products
11. Milk and Milk products
12. Processing of Fish and Fish Products

Evaluation Criteria:

Sr. No.	Particular	Attendance	Report	Report	Presentation	Viva	Total	
1	Internal Marks	25	25	-	-	-	50	
2	External Marks	-	-	50	40	10	100	
	Total							150

Semester VIth**STUDENTS READY - IN PLANT TRAINING**

In-plant training is meant to correlate theory and actual practices in the industries with the following objectives:

- To expose the students to Industrial environment, which cannot be done in the university
- To familiarize the students with various Materials, Machines, Processes, Products and their applications
- To make the students understand the psychology of the workers and approach to problems along with the practices following at factory
- To make the students understand the scope, functions and job responsibility-ties in various department of an organization
- Exposure to various aspects of entrepreneurship during the program period

In plant Training Procedure:

In plant Training should be arranged in VI Semester of B. Voc Degree program. In plant Training In charge of the college should coordinate and monitor the In plant Training Programed. A student shall be sent to various Food Industries approved by Academic Council.

Generalized lay-out:

Sr. No.	Activities	Number of weeks
1	General orientation and on-campus training by faculty.	02
2	Finalization of industry for attachment In-plant training : Industry attachment	16
3	Project Report Preparation, Presentation and Evaluation	02

Evaluation Criteria:

The evaluation of students should be done both at Industry Level (Marks) and at College/ University level (Marks), as follows:

Sr. No.	Particulars	Marks
1	At Industry Level	350
2	At College Level	400
Total		750

Distribution:

Sr. No.	Particulars	Institute	Industry	Total
1	Regularity, Sincerity and Devotion	100	100	200
2	Initiative, Confidence and Skill acquisition	50	200	250
3	Project Report and	50	50	100
4	Presentation	100	-	100
5	Viva	100	-	100
Total		400	350	750
