SHIVAJI UNIVERSITY, KOLHAPUR

Accredited By NAAC with 'A' Grade

Faculty of Interdisciplinary Studies
Structure, Scheme and Syllabus for
Bachelor of Vocation (B. Voc.)

Food Processing Technology

Part III-Sem. V & VI

CBCS PATTERN
Syllabus to be implemented from

(Subject to the modifications that will be made from time to time)
Syllabus to be implemented from June, 2022 onwards.

SHIVAJI UNIVERSITY, KOLHAPUR
STRUCTURE AND SYLLABUS OF B.VOC.

Bachelor of Vocation (B.Voc.) – Food Processing Technology

TITLE : B.Voc. (Food Processing Technology)
Syllabus (Semester Pattern)
Under Faculty of Interdisciplinary Studies

YEAR OF IMPLEMENTATION : Syllabus will be implemented from August, 2020

DURATION : B. Voc. Part I, II and III (Three Years)
B. Voc. Part I - Diploma (One Year)
B. Voc. Part II - Advanced Diploma (Second Year)
B. Voc. Part III – Degree (Third Year)

PATTERN OF EXAMINATIOM : Semester Pattern

- **Theory Examination** - At the end of semester as per Shivaji University Rules
- **Practical Examination** - i) In the1st, 3rdand 5thsemester of B.Voc. there will be internal assessment of practical record, related report submission and project reports at the end of semester
  ii) In the second semester of B. Voc. I, there will be internal practical examination at the end of semester
  iii) In the 4th and 6th semester of B. Voc. there will be external practical examination at the end of semester

MEDIUM OF INSTRUCTION : English/ Marathi.

STRUCTURE OF COURSE : B. Voc. Part – I, II and III.
Two Semester per Year, Two General Papers per year / semester three Vocational Papers per Year / Semester three Practical papers per Year / Semester.

SCHEME OF EXAMINATION:

A) THEORY-

- The theory examination shall be at the end of the each semester.
- All the general theory papers shall carry 40marks and all vocational theory papers shall carry 50marks.
- Evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above.
- Question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.
- **Nature of question paper for Theory examination** (Excluding Business Communication Paper)

  i) There will be seven questions carrying equal marks.

  ii) Students will have to solve any five questions

Que. No. 1 Short answer type question with internal choice (Two out of three)

Que. No. 2 Question No. 6: Long answer type questions.

Que. No. 7 Short Notes with internal choice (Two out of three)

B) PRACTICALS:

Evaluation of the performance of the students in practical shall be on the basis of semester examination. Internal assessment at the end of Semester I, II and III and V and external examination at the end of Semester IV and VI as mentioned separately in each paper

Standard of Passing:

As per the guidelines and rules for B. Voc. (Attached Separately – Annexure I)

Eligibility Criteria:

1. The Eligibility for admission is 10+2 or equivalent, in any stream (Arts/Commerce/Science) from any recognized board or University.
2. The candidates after with 10+2 year ITI course/ in any branch/trade also eligible for course.
3. The candidates graduate from any faculty or engineering degree/diploma holders are also eligible.

Structure of the Course:

B. Voc. –III Semester –V

Sr. No.	Paper No.	Title	Theory/ Practical /Project	Marks (Total)	Distribution of Marks	
					Theory	Practical
1	XXXVII	Food Biotechnology	Theory/ Practical	50	40	10
2	XXXVIII	Unit Operations in Food Processing	Theory/ Practical	50	40	10
3	XXXIX	Bakery and Confectionary	Theory	50	50	--
4	XXXX	Meat, Fish, poultry Technology	Theory	50	50	--
5	XXXXI	Fermentation Technology	Theory	50	50	--
6	XXXXII	Laboratory Work-Bakery and Confectionary	Practical	50	--	50
7	XXXXIII	Laboratory Work-Meat, Fish, poultry Technology	Practical	50	--	50
8	XXXXIV	Laboratory Work-Fermentation Technology	Practical	50	--	50
9	XXXXV	Internship		50	--	50

B. Voc. –III Semester –VI

Sr. No.	Paper No.	Title	Theory/ Practical /Project	Marks (Total)	Distribution of Marks	
					Theory	Practical
1	XXXXVI	Technology of Beverages	Theory/ Practical	50	40	10
2	XXXXVII	Food Extrusion Technology	Theory/ Practical	50	40	10
3	XXXXVIII	Food Laws and Regulations	Theory	50	50	--
4	XXXXIX	Food Packaging Technology	Theory	50	50	--
5	XXXXX	Food Quality & Waste Management	Theory	50	50	--
6	XXXXXI	Laboratory Work-Food Laws and Regulations	Practical	50	--	50
7	XXXXXII	Laboratory Work-Food Packaging Technology	Practical	50	--	50
8	XXXXXIII	Laboratory Work-Food Quality & Waste Management	Practical	50	--	50
9	XXXXXIV	Project		50	--	50

Scheme of Teaching: B.Voc.– Part III Semester–V

Sr. No.	Paper No.	Title	Distribution ofworkload (Per Week)		
			Theory	Practical	Total
1	XXXVII	Food Biotechnology	4	2	6
2	XXXVIII	Unit Operations in Food Processing	4	2	6
3	XXXIX	Bakery and Confectionary	4	-	4
4	XXXX	Meat, Fish, poultry Technology	4	-	4
5	XXXXI	Fermentation Technology	4	-	4
6	XXXXII	Laboratory Work- Bakery and Confectionary	-	4	4
7	XXXXIII	Laboratory Work- Meat, Fish, poultry Technology	-	4	4
8	XXXXIV	Laboratory Work - Fermentation Technology	-	4	4
9	XXXXV	Internship	-	-	-
			20	16	36

Scheme of Teaching :B.Voc.–Part III–VI

Sr. No.	Paper No.	Title	Distribution ofworkload (Per Week)		
			Theory	Practical	Total
1	XXXXVI	Technology of Beverages	4	2	6
2	XXXXVII	Food Extrusion Technology	4	2	6
3	XXXXVIII	Food Laws and Regulations	4	-	4
4	XXXXIX	Food Packaging Technology	4	-	4
5	XXXXX	Food Quality & Waste Management	4	-	4
6	XXXXXI	Laboratory Work- Food Laws and Regulations	-	4	4
7	XXXXXII	Laboratory Work- Food Packaging Technology	-	4	4
8	XXXXXIII	Laboratory Work -Food Quality & Waste Management	-	4	-
9	XXXXXIV	Project	-	-	-
			20	16	32

Eligibility for Admission **:** 10 + 2 from any faculty or equivalent Diploma /Advanced Diploma in any related stream

Eligibility for Faculty **:** M. Sc. (Food Science and Nutrition / Food Processing/Food Science and Technology/Home-Science/ Food Science and Quality Control with NET / SET M. Tech. (Food Tech. /Food processing)
M. A (English) with NET/SET for Business Communication

Eligibility for Laboratory Assistant: B. Tech (Food Tech. / Food processing)/B. Sc. (Food Science and Nutrition / Food Processing/ Food Science and Technology/Home-Science/ Food Science and Quality Control)/ B.A. Home Science.

Staffing Pattern **:** In 1st Year of B. Voc. - 1 Full Time and 1 Part Time Lecturer and 1 CHB Lecturer for Business Communication

Laboratory Assistant **:** For 1st Year of B. Voc. - 1 Part-time

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SHIVAJI UNIVERSITY, KOLHAPUR

B. Voc. Part – III, Semester –V

Food Processing Technology

Paper – XXXVII Food Biotechnology

Distribution of Workload: **Total Marks**: 50 Marks

Theory : 04 lectures per week Theory 40M

Practical : 02 lectures per week per batch Practical 10M

Total Workload: 06 lectures per week of 60min.

Objectives:

- To study applications of Biotechnology in food production and processing
- To study genetic engineering, enzymes in food production and processing

Unit–I:Biotechnology

Scope & Importance Definition Traditional & Modern biotechnology, Biotechnology of India & Global trends Prevention of misuse of biotechnology, Potential of biotechnology.

Unit – II Tools of genetic engineering

Basic requirement Cutting & Joining of DNA Cloning vectors Techniques of genetic engineering, cloningmethods & DNA analysis genetically modified food.

Unit – III – Single cell protein & mushroom cultivation

Microorganisms used in SCP. Substrates used nutritional value cultivation & uses Historical Background & present status of Mushroom cultivation

Unit – IV Enzyme Biotechnology

Definition & Properties of enzymesFactors affecting activation & inhibition of enzymes, Isolation of enzymes producing microorganisms, strain development Formulation & inoculums preparation.

Purification of enzymes & their immobilization – Different type, Advantages & Disadvantages

Industrial production of protease, amylase & cellulose

Reference Books:

1. Knorr, D, 1982. Food biotechnology, Masel Dekker
2. Joshi V. K. & Pandey, A. Ed 1999 Biotechnology, Food Fermentation
3. Crueger, W& Crueger A 1984 Biotechnology - A Text book of Industrial Microbiology
4. Banis W. 1993 Biotechnology from A to Z Oxford Univer. Press. Oxford

Food Biotechnology

Laboratory work

Total Marks: 10

1) Study of lab instruments
2) Mushroom Cultivation
3) Isolation of DNA
4) Study of SPC
5) Study the Gel Filtration Technique
6) Study the TLC Method.
7) Visit to Biotechnology Institute

Scheme of Internal Practical Evaluation	**10 marks**
1) Submission of Record book	5 marks
2) Viva – Voce	5 marks

Pattern of a Question paper

Food Biotechnology

B. Voc. Part – III, Semester – V

Time: 2 hours		**Total Marks: 40**
Q.1 Multiple type Question		08
Q.2 Long answer Question(Any 2 out3)		16
Q.3 2 Long answer Question	08	
Q.4 Short Type Questions (any 2 out of 3)		08

Practical Evaluation:

Oral and presentation based on units prescribed **10 Marks**

SHIVAJI UNIVERSITY, KOLHAPUR

B. Voc. Part – III, Semester – V

Food Processing Technology

Paper –XXXVIII Unit Operations in Food Processing

Distribution of Workload: **Total Marks**: 50 Marks

Theory	: 04 lectures perweek	Theory 40M
Practical	: 02 lectures per week per batch	Practical 10M

Total Workload: 06 lectures per week of 60min.

Objectives:

• To study applications of Size reduction equipmentmixing equipmentAgitators, powder Liquids and pastes.

• To study theory centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers,desludging machines

Unit–I: Size reduction

Benefits, classification, sieve/screen analysis, principle and mechanisms of combinationof food

Unit – II Size reduction equipment

Principal types, hammer mills and impacts, attrition mills, buhr mill, tumbling mills, Tumbling mills, colloid mill, cutting machines (slicing, dicing, shredding, pulping)

Unit – III Mixing:

Theory of solids mixing, criteria of mixer effectiveness and mixing indices, rate of mixing, Theory of liquid mixing, power requirement for liquids mixing.

Mixing equipment: Mixers for low- or medium-viscosity liquids (paddle agitators, impeller Agitators, powder-liquid contacting devices, and other mixers), Mixers for high viscosity Liquids and pastes, mixers for dry powders and particulate solids;

Unit – IV Mechanical Separations

Theory, centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers, desludging machines

Filtration: theory of filtration, rate of filtration, pressure drop during filtration, applications Filtration equipment; plate and frame filter press, rotary filters, centrifugal filters and air Filters, filter aids.

Reference Books:

1. Unit Operations of Chemical Engineering Warren LM, Julian Smith, Peter Harriott 7 th Ed.

McGraw-Hill, Inc., NY, USA. 2004

2. Transport Processes and Separation Process Principles Christie John Geankoplis 4 th Ed.

Prentice-Hall, NY, USA. 2003

3. Handbook of Food Processing Equipment Saravacos GD and Athanasios EK Springer ScienceBusiness Media, New York, USA. 2002

UNIT OPERATIONS IN FOOD PROCESSING

Laboratory work

Total Marks: 10

1. Study of Principle, working and demonstration of hammer mill and crushing.
2. Study of Principle, working and demonstration of attrition mill.
3. Study of different disintegration operations (slicing, dicing, shredding and pulping).
4. Study of centrifugal separation (centrifugal cream separation, centrifugal machine).
5. Study on osmosis of fruit.
6. Study of principle and working of roller dryer, cabinet dryer

Scheme of Internal Practical Evaluation	**10 marks**
1) Submission of Record book	5 marks
2) Viva – Voce	5 marks

Pattern of a Question paper

UNIT OPERATIONS IN FOOD PROCESSING

B. Voc. Part – III, Semester – V

Time: 2 hours	**Total Marks: 40**
Q.1 Multiple type Question	08
Q.2 Long answer Question(Any 2 out3)	16
Q.3 2 Long answer Question	08
Q.4 Short Type Questions (any 2 out of 3)	08

Practical Evaluation:

Oral and presentation based on units prescribed **10 Marks**

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester -V
Food Processing Technology
Paper –XXXIX Bakery and Confectionary

Distribution of Workload: **Total Marks**: 50 Marks
Theory : 04 lectures per week
Total Workload **:** 04 lectures per week

Objectives:
- To study the different bakery product.
- To study role of ingredients and processing technology of confectionery products.

Unit – I Introduction of Bakery raw material

Essential & optional ingredients Role of ingredient Baking principle -Caramelisation, Millard browning, Introduction of bakery products &equipment

Unit - II Processing of Bakery Products

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

Unit – III Confectionary products
Introduction to Confectionary Ingredients
Sugar boiled Confectionary – a) Crystalline b) Amorphous
Indian Confectionary

Unit – IV – Processing Confectionary Products

Chocolate based confectionery: History and development, cocoa processes, cocoa butter, emulsifiers used in chocolate confectionery coatings and cocoa, chocolate manufacture, chocolate bars and covered confectionery

Indian Confectionary: Burfi, Pedha preparation

Recommended Books -

- Technology of Confectionary, Chocolate, Toffee, Candy, Chewing gum, Lollipop, Jelly production
- Food production operation - Ravindra Bali
- International Cuisine and Food Production management – Parvindarbali
- Bakery Science & Cereal technology - Neelam khetorpaul, Raj Grewal Sudesh wood
- The Complete technique book on bakery production by Niir Board

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III, Semester – V
Food Processing Technology
Paper – XXXX Meat, Fish, Poultry Technology

Distribution of Workload: **Total Marks**: 50 Marks

Theory : 04 lectures perweek Theory 40M

Practical : 02 lectures per week per batch Practical 10M

Total Workload: 06 lectures per week of 60min.

Objectives:

- To study structure , composition and slaughtering operations of meat, poultry
- To study Postmortem changes and major quality attributes
- Processing of meat, fish and poultry products

Unit – I Importance of meat products

Introduction & Importance of meat products in India, Chemical Composition & microscopic structure of meat Pre-slaughter inspection of animal, Transportation, feeding of animal before slaughtering

Unit – II Stunning & slaughter operations

Slaughtering of animal, Bones & cuts of Carcass, Quality and grading of meat, Post Mortom inspections Meat tenderization, aging curring & rigour mortis, preservation of meat &Poultry products. Meat plant sanitation & safety

Unit –III Egg & Egg

Structure, composition, Nutritive value & functional properties of egg

Processing of Egg, Quality of egg & Egg Products

Effects of heat on egg proteins

Unit – IV- Seafood

Classification of Seafood, Types of fish, Composition and structure of Fish, Postmortem changes in Fish, Canning, smoking freezing & dehydration of fish

Recommended Books –

1. Technology of Meat Fish & Poultry products
2. Lawrie, R. A. 1975 meat science 2nd ed
3. Lavie. a. 1980 Meat handbook 4th edition AVI west port
4. Portsmouth J.I. 1979 Commercial Rabit meat production by Saiga Survey England
5. Stadelmen W.J Cotterill O.1977. Egg Science &Technology

SHIVAJI UNIVERSITY, KOLHAPUR

B. Voc. Part –III Semester V

Food Processing Technology

Paper-XXXXI Fermentation Technology

Distribution of Workload: **Total Marks**: 50 Marks

Theory : 04 lectures per week

Total Workload **:** 04 lectures per week

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Objective:

- To study Fermentation- bacterial, yeast and fungal
- To study biochemistry of fermentation
- To Study Fermented products.

Unit - I Basic of Fermentation

Introduction to Fermentation, Basic Structure of Fermentation

Fermentation media – a) Constituents b) Design of fermentation

Types of Fermentation process – Batch, Continuous & Dual

Factors affecting Fermentation process, Control of contamination in Fermentation

Unit – II Beneficial aspects for Fermentation

Benefits of Fermentation, Microorganism involved in Fermentation, Microbial activities with specific role in Fermentation. Significance of Fermentation food in Indian diet Factors influence growth & Metabolic activities of microbes in food Fermentation Purity & Nature of food Fermentation.

Unit – III Fermented Foods

Fermented Milk – Curd, Yoghurt, Buttermilk

Fermented Cereals – Idli, Dhokla, Bread, Soyasause, Miso,Tempeh

Fermented Beverages - Wine, Beer, Sake, Distilled Liquors

Fermented Vegetables – Sauerkraut, Pickles, Green Olives

Fermentation of Cocoa, Tea, Coffee

Fermentation of Acetic acid, Vitamin B12 & Glutamic acid

Unit – IV – Down Stream Processing

Introduction to downstream processes

Criteria of selection of recovery process

Removal of Microbial cells – a) Foam Separation b) Precipitation, Filtration &Centrifugation

Cell Distruption – a) Physic mechanicalb) Chemical method

Extraction & Drying

Recommended Books:-

- Biotechnology – Food Fermentation - Dr. S. K. Singh
- Industrial Biotechnology - M. S. Rangannath & Shriram Shridhin
- Food Microbiology - William Frazier, Dannise Westhoff
- Food Biotechnology –S.N. Tripathy

B. Voc. Part – III Semester -V

Food Processing Technology

Paper-XXXXII Bakery and Confectionary

Laboratory work

Total Workload: 04 **Total Marks:** 50 Marks

Practical - 04 lectures/week/ Batch

Objectives:

- To study the different bakery product.
- To study role of ingredients and processing technology of confectionery products.

Practical:

1) Preparations of Biscuits
2) Preparation of Cake
3) Preparation of Cherry
4) Preparation of Chocolate
5) Preparation of Chikki
6) Preparation of Amla Candy
7) Preparation of Cookies
8) Visit to Bakery Industry

Scheme of practical evaluation

Internal practical examination	**50 marks**
i)Preparation of any product	15 marks
ii) Submission of practical record book	15 marks
iii) Submission of visit report	10 marks
iv) Viva – Voce	10 marks

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B. Voc. Part – III Semester -V

Food Processing Technology

Paper-XXXXIII Meat, Poultry and Fish Technology

Laboratory work

Total Workload: 04 **Total Marks:** 50 Marks

Practical - 04 lectures/week/ Batch

Objectives:

- To study structure , composition and slaughtering operations af meat, poultry
- To study Postmortem changes and major quality attributes
- Processing of meat, fish and poultry products

Practical:

1) Determination of pH if meat, poultry and fish
2) Slaughtering of meat.
3) Identification of physical characteristics of meat.
4) Determination of MSC of meat.
5) Identification of meat, poultry cuts.
6) Qualitative identification of fish.
7) Curing of Fish.
8) Evaluation of Egg quality.

Scheme of practical evaluation

Internal practical examination	**50 marks**
i)Preparation of any product	15 marks
ii) Submission of practical record book	15 marks
iii) Submission of visit report	10 marks
iv) Viva – Voce	10 marks

B. Voc. Part – III Semester -V

Food Processing Technology

Paper-XXXXIV Fermentation Technology

Laboratory work

Total Workload: 04 **Total Marks:** 50 Marks

Practical - 04 lectures/week/ Batch

Objectives:

- To Study Fermented products

Practical

1) Preparation of Dahi
2) Preparation of Lassi
3) Preparation of Butter milk
4) Preparation of Dhokala
5) Preparation of Idli
6) Preparation of Sauerkraut
7) Preparation of Grape Wine
8) Visit to Wine Industry

Scheme of practical evaluation

Internal practical examination	**50 marks**
i)Preparation of any product	15 marks
ii) Submission of practical record book	15 marks
iii) Submission of visit report	10 marks
iv) Viva – Voce	10 marks

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B. Voc. Part – III Semester -V

Food Processing Technology

Paper-XXXXV: Internship

Total Marks: 50 Marks.

Total Marks: 50 Marks.

Preamble:

Exposure of students to a particular job and a profession or industry is the major need ofthis internship. While they might have an idea about what a job is like, they won't know until theyactually perform it, if students gain the training and learn skills to do the job it will benefit them.

The main objectives of this course is to gain practical insight of Industry/ Company/ Boutique/Retail Stores/ Malls The students will be:

- Expose the students to the work environment
- Familiarize and adapt to the workplace
- Understand the methods, techniques and practices followed in the place of training

Course Outcomes: After completion of the course, student will be able to:

i. understand the working structure of the industry/ company
ii. analyze the methods adopted in the training place
iii. correlate to the theoretical knowledge gained in the college
iv. recognize the challenges in the training place
v. discover the nuances of the workplace and appreciate it

Scheme of internship evaluation

Internal internship evaluation	**50 marks**
i) Submission of visit report	30 marks
ii) Viva–Voce	20 marks

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SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester VI
Food Processing Technology
Paper XXXXVI Technology of Beverage

Distribution of Workload: **Total Marks**: 50 Marks

Theory : 04 lectures per week Theory 40M

Practical : 02 lectures per week per batch Practical 10M

Total Workload: 06 lectures per week of 60min.

Objectives:

- The aim of the course is to provide the students with general scientific knowledge.
- To Study processing of alcoholic and non- alcoholic beverages.

Unit I: Introduction to beverages

Types of beverages and their importance, status of beverage industry in India, Manufacturing technology for juice-based beverages, synthetic beverages; technology of still, carbonated, low-calorie and dry beverages, isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks.

Unit II: Manufacturing process of beverages

Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages.

Unit III: Types of coffee and tea

Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea. Types of coffee: Vaccum coffee, drip coffee, iced coffee. Espresso coffee, instant coffee. Decaffeination of Coffee types of decaffeination: Roselius .method, swiss water process, direct and indirect method, triglyceride method, carbon dioxide method.

Unit IV: Alcoholic beverages

Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipment's used for brewing and distillation, wine and related beverages, distilled spirits.

Unit V: Packaged drinking water

Definition, types, manufacturing processes, quality evaluation and raw and processed water,methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavored water, carbonated water.

Reference books:

1. Manay, N.S, Shandaksharaswamy, M., (2004), "Foods- Facts and Principles", New Age
International Publishers, New Delhi,
2. Potter, N.N, Hotchkiss, J.H.(2000), "Food Science". CBS Publishers, New Delhi.
3. Srilakshmi, B. Food Science (3rd Edition) (2003), New Age International (p) Limited Publishers, New Delhi,
4. Nicholas Dege. (2011), "Technology of Bottled water". Blackwell publishing Ltd, UK.

Technology of Beverage

Laboratory work

Total Marks: 10

1) Preparation of Fruit Beverage from Any Fruit
2) Carbonation of Fruit Juice
3) Preparation of tea/coffee/cocoa/spices.
4) Preparation of Dairy-based beverages.
5) Determination of saccharine in beverages
6) Determination of benzoic acid in beverages
7) Determination of brix value, gas content, PH and acidity of beverages

Scheme of Internal Practical Evaluation	**10 marks**
1) Submission of Record book	5 marks
2) Viva – Voce	5 marks

Pattern of a Question paper

Technology of Beverage

B. Voc. Part – III, Semester – VI

Time: 2 hours		**Total Marks: 40**
Q.1 Multiple type Question		08
Q.2 Long answer Question(Any 2 out3)		16
Q.3 2 Long answer Question	08	
Q.4 Short Type Questions (any 2 out of 3)		08

Practical Evaluation:

Oral and presentation based on units prescribed **10 Marks**

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester – VI
Food Processing Technology
Paper XXXXVII Food Extrusion Technology

Distribution of Workload: **Total Marks**: 50 Marks

Theory	: 04 lectures per week	Theory 40M
Practical	: 02 lectures per week per batch	Practical 10M

Total Workload: 06 lectures per week of 60min.

Objectives:

- To understand the basic concept of Extrusion
- To Study the various Extrusion Process in food industry

UNIT –I:Extrusion
Definition, introduction to extruders, principles and types
Uses of extruders in the food industry

UNIT –II: Types of Extruders
Single screw extruder: principle of working, net flow, factors affecting extrusion Process
Twin screw extruder: counter rotating and co-rotating twin screw extruder

UNIT –III: Breakfast Cereals
Classification of breakfast cereals
Raw materials, process and quality testing of vermicelli and spaghetti
Raw materials, process and quality testing of pasta and macronic products

UNIT –IV: Texturized vegetable Protein
Definition, processing techniques

Reference Books:

1. Extruded foods Matza S. Springer, 2000
2. Technology of Extrusion Cooking N.D. Frame Springer, 2012
3. Extruders in Food Application Riaz M.N. CRC Press, 2000

Food Extrusion Technology (Practical)
Laboratory work

Marks: 10

1. Physical properties of extruded foods (expansion, density, water absorption index, etc.)
2. Preparation of noodles/ vermicelli
3. Preparation of spaghetti
4. Preparation of weaning foods
5. Determination of water absorption capacity of noodles
6. Visit to extrusion industry

Scheme of Internal Practical Evaluation	**10 marks**
1) Submission of Record book	5 marks
2) Viva – Voce	5 marks

Pattern of a Question paper

Food Extrusion Technology
B. Voc. Part – III, Semester – VI

Time: 2 hours		**Total Marks: 40**
Q.1 Multiple type Question		08
Q.2 Long answer Question(Any 2 out3)		16
Q.3 2 Long answer Question	08	
Q.4 Short Type Questions (any 2 out of 3)		08

Practical Evaluation:

Oral and presentation based on units prescribed **10 Marks**

SHIVAJI UNIVERSITY, KOLHAPUR

B. Voc. Part – I, Semester – II

Food Processing Technology

Paper-XXXXVIII Food Laws and Regulations

Total Workload: 04 **Total Marks:** 50 Marks

Theory - 04 lectures/week/ Batch

Objectives:

- To learn and understand the Role and responsibilities of Quality control department of food industry
- To learn the Food Laws and food standards

Unit-1: Food Quality:

Introduction to food quality management Definition, quality concepts, quality perception, and quality attributes, safety, health, sensory, shelf life, convenience.

Evaluation of Food quality: Definition, Quality attributes of food, Sensory characteristics of Food, Sensory tests, Instruments used for color & texture evaluation, microbial quality of food.

Unit-2: Quality control and Effect of processing and storage on quality of food:

Quality control of food, Role and responsibilities of Quality control department of food industry, Effect of processing on Quality of Food, Effect of storage on Quality of Food.

Unit-3: Food Laws and Standards:

Food Standards and regulations in India, Prevention of Food Adulteration Act, Food Safety Standard Authority of India (FSSAI).

Compulsory National Legislations: Essential Commodities Act, Standards of Weights and Measures, Export (Quality control and Inspection) Act

Voluntary based Product Certifications: Bureau of Indian Standards Act, Agmark Grading and Marketing Act and Rules Nutritional Labeling & Education act

Unit-4: Consumer Protection

Government agencies: Municipal Laboratories, Food and Drug Administration, The central Food Testing Laboratory, Export Inspction Council Laboratory

Voluntary Agencies: Quality control laboratories of companies, Quality control laboratories of Consumer co-operatives, Private testing laboratories, Consumer Guidance Society

International Organizations and Agreements in the area of Food Standardization and quality control: Codex Alimentarius, Codex India, World Health Organization, International Organization for Standardization, Food and Agriculture Organization, Joint FAO/WHO Expert committee on food additives, British Retail Consortium(BRC) standard for Foods

References

1. Quality Control in Food Industry S.N. Herschdogrfer
2. B. Srilakshmi, Food science, New Age Publishers,2002
3. Tannenbaum, S.R. Ed. 1979. “Nutritional and Safety Aspects of Food Processing”, Marcel
4. Pieternel A, Luning, Willem J. Marcelis, Food Quality Management Technological and Managerial principles and practices, Wageningen,2009.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester – VI
Food Processing Technology
Paper XXXXIX Food Packaging Technology

Total Workload: 04 **Total Marks:** 50 Mark
Theory - 04 lectures/week/ Batch

Objectives

- To be familiar with different methods and materials used for packaging.
- To understand the technology behind packaging.

Unit I: Introduction to packaging

Definition, Functions of packaging – Containment, Protection, Preservation,Promotion, Convenience, Communication. Requirements of effectivepackage, Typesof food packaging- primary, secondary and tertiary packaging.

Unit II: **Packaging Materials**
Origin of packaging materials, types, properties, advantages & disadvantages of packaging materials&Forms of packaging – box, bottle, tetra, pouch, shrink, vacuum, gas, CAP, MAP, aseptic etc.

Unit III: Packaging Materials and their properties

Rigid containers- Glass, Wooden boxes, metal cans- Aluminum and tin platecontainers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene andPolypropylene Packaging materials for dairy products, bakery and confectionary,granular products, fruits and vegetables.

Unit IV:Brief Introduction about test and Packaging Requirements

Bursting Strength, Tensile Strength, Tearing Strength, Drop Test, Puncture Test, Impact Test etc., Packaging requirements and their selection for raw and processed foodsMeat, fish, poultry, eggs, Milk and dairy products, Fruits and vegetables, Cereal grains and baked food products, Beverages&Snacks.

References

1. Gordon L. Robertson (2012), “Food Packaging: Principles and Practice”, ThirdEdition,
2. Takashi Kadoya (2012), “Food Packaging”, Academic press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), “Food Packaging Technology”.

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester VI
Food Processing Technology
Paper XXXXX Food Quality& Waste Management

Total Workload: 04 **Total Marks:** 50 Marks
Theory - 04 lectures/week/ Batch

Objectives:

- To understand the Quality Evaluation Quality assurance in Food Services System
- To understandWaste Management and Effluent treatment.
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Unit – I Introduction of Quality Control

Definition and importance of Quality control,Principles of Quality Control , Quality attributes of Food – Nutritional quality, Microbial, Sensory Sample & Sampling Method of Quality EvaluationQuality assurance in Food Services System

Unit – II – Sampling & analysis of Foods

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

Unit – III – Food Standard laws and safety management

Waste Management and Effluent treatment of Food industry Introduction to Waste Management, Waste disposal – Types of Waste, Method of Waste disposal – Land filling, anaerobic, recycling digestion Measurement of BOD & COD

Unit –IVEffluent treatment:

Disposal in Sea, river, spray, Irrigation, land filling treatment, Trickling filers, Biological aerated filter, Fluidized bed system, Activated sludge process, aerobic & anaerobic digestion Safe disposal of waste

Recommended Books:-

1. An introduction to Food Science and Technology & Quality management Devendra Bhatt & Priyanka Tomar

2. Food Quality Management - Manoranjan Kalia

3. Hand book of analysis & Quality Control - Rannanganna

SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester VI
Food Processing Technology
Paper-XXXXXI Food Laws and Regulations
Laboratory work

Total Workload: 04 **Total Marks:** 50 Marks
Practical - 04 lectures/week/ Batch

Objectives:
• To learn the Licensing and registration process in food industry.

Practical:

1. Licensing and registration process
2. Examination of Cereals as per specifications
3. Examination of milk and milk products as per specifications
4. Examination of Oil and Oil products as per specifications
5. Examination of fruits and vegetable products as per regulations
6. Visit to FDA department

Scheme of practical evaluation

Internal practical examination	**50 marks**
1. Preparation of any product	15marks
2. Submission of practical record book	15 marks
3. Submission of visit report	10 marks
4. Viva – Voce	10 marks

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SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester VI
Food Processing Technology
Paper-XXXXXII Food Packaging Technology
Laboratory work

Total Workload: 04 **Total Marks:** 50 Mark
Practical - 04 lectures/week/ Batch

Objectives:

- To be familiar with different methods and materials used for packaging.
- To understand the technology behind packaging.

Practicals:

1. Identification of different types of packaging and packaging materials
2. Determination of tensile strength of given material
3. Determination of tearing strength of paper
4. Determination of GSM.
5. Determination of bursting strength of packaging material
6. Determination of drop test of food package
7. Visit to relevant industries

Scheme of practical evaluation

Internal practical examination	**50 marks**
i) Determination& Analysis of packaging Material	15 marks
ii) Submission of practical record book	15 marks
iii) Submission of visit report	10 marks
iv) Viva – Voce	10 marks

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SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part – III Semester -VI
Food Processing Technology
Paper-XXXXXIII Food Quality and Waste Management
Laboratory Work

Total Workload: 04 **Total Marks:50**

Objectives:

- To study the waste Management Methods.
- To understand the technology Quality Control Techniques.

Practicals:

1. Determination of Titrable acidity and pH of milk and milk products
2. Determination of COD
3. Determination of BOD
4. Microbiological Analysis of air and water
5. Test for sanitization of dairy equipment (Swab method)
6. Study of solid waste disposal methods
7. Study of liquid waste disposal methods

Scheme of practical evaluation

Internal practical examination	**50 marks**
i) Determination & Analysis of packaging Material	15 marks
ii) Submission of practical record book	15 marks
iii) Submission of visit report	10 marks
iv) Viva – Voce	10 marks

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SHIVAJI UNIVERSITY, KOLHAPUR
B. Voc. Part –III, Semester -VI
Food Processing Technology
Paper- XXXXXIV Project

Total Marks: 50 Marks.

Paper-XXXXXIV: Project
Total Marks: 50 Marks.

Students shall undertake project work related to development of innovative food product, its quality evaluation, packaging, labeling and shelf life testing under the supervision of a faculty member. In principle, the research /design 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 the fifth semester specifying the different aspects to be carried out by the student. At the end of the semester the student will submit an interim report on his/her work in typed form. Evaluation shall include oral presentation. ….

Annexure I

Standard of Passing:

A. For B.Voc Programme total credits shall be 180 with 30 Credits for each Semester. There shall be 12 Credits for theory and 18 credits for practical per semester.

B. Subject wise credits are mentioned in the concerned syllabus of every B.Voc. Program.

C. The standard of passing shall be 35% where the student will have to score 18 marks out of 50, 14 marks out of 40 and 4 marks out of 10.

D. Rules of ATKT are mentioned below:

I. Internal examination will be compulsory for all students. If the student is absent/ fail in internal examination then he/ she will have to clear the Internal Examination. However, ATKT rules will be followed in respect of theory and practical papers only. Then students is allowed to keep term in the third and fifth semester even if he/ she has failed in the three or less than three heads (i.e. theory and practical) of passing each semester. However he/ she shall have to clear all the papers of semester I & II before taking admission to the fifth semester.

II. In the B.Voc. Part – II, every student has to complete internship of concerned industry.

Award of Degree:

- B.Voc. is a six semester integrated course spread over the period of 3 years. The course of B.Voc. will be 3 years integrated course commencing from the years as mentioned below:
    a) B. Voc. Part – I : Semester I and II - Diploma
    b) B. Voc. Part – II : Semester III and IV - Advanced Diploma
    c) B. Voc. Part – III : Semester V and VI - B. Voc. Degree
- The candidate may take exit after one year of successful completion of the course. After successful completion of one year (Semester I to II) the candidate will get Diploma. After successful completion of two years (Semester III & IV), the candidate will get 'Advanced Diploma', The students those who have completed the entire three years (Semester V & VI) integrated course shall be awarded B.Voc. Degree programme, inclusive of Diploma and Advanced Diploma.
- The candidate admitted for direct 2nd year or 3rd year will got Class (First/ Second/ Pass Class) as per their performance for B.Voc.

Scheme of Mark:

Grading Chart:

A. Grading Chart of 100 points:

Sr. No.	Marks Obtained	Numerical Grade (Grade Point)		CGPA	Letter Grade
1	Absent	0 (Zero)		-	-
2	0 – 34	0 (Zero)		0.0 – 4.99	F (Fail)
3	35 – 44	5		4.50 – 5.49	C (Satisfactory)
4	45 – 54	6		5.50 – 6.49	B (Average)
5	55 – 64	7		6.50 – 7.49	B+ (Good)
6	65 – 74	8		7.50 – 8.49	A (Very Good)
7	75 – 84	9		8.50 – 9.49	A+ (Excellent)
8	85 - 100	10		9.50 – 10.	O (Outstanding)

B. Grading Chart of 50 points:

Sr. No.	Marks Obtained	Numerical Grade (Grade Point)	CGPA	Letter Grade
1	Absent	0 (Zero)	-	-
2	0 – 17	0 (Zero)	0.0 – 4.99	F (Fail)
3	18 – 22	5	4.50 – 5.49	C (Satisfactory)
4	23 – 27	6	5.50 – 6.49	B (Average)
5	28 – 32	7	6.50 – 7.49	B+ (Good)
6	33 – 37	8	7.50 – 8.49	A (Very Good)
7	38 – 42	9	8.50 – 9.49	A+ (Excellent)
8	43 - 50	10	9.50 – 10.	O (Outstanding)

Note:

i. Marks Obtained >= 0.5 shall be rounded off to next higher digit.

ii. The SGPA & CGPA shall be rounded off to 2 decimal points.

iii. Marks obtained in 50 marks or 200 marks paper shall be converted to 100 marks.

<u>Calculation of SGPA & CGPA</u>

1. Semester Grade Point Average **(SGPA)**

$$\textbf{SGPA} = \frac{\sum (\text{Course Credits X Grade Points Obtained}) \text{ of a semester}}{\sum (\text{Course Credits}) \text{ of respective Semester}}$$

2. Cumulative Grade Point Average (CGPA)

$$\textbf{CGPA} = \frac{\sum (\text{Total Credits of a semester X SGPA of a respective semester}) \text{ of all semesters}}{\sum (\text{Total Course Credits}) \text{ of all Semester}}$$