



Progressive Education Society's

**Modern College Of Arts, Science and
Commerce, Ganeshkhind, Pune - 411 016
(NEP 2024-25)**

Syllabus for
**F.Y.B.Voc (Food Processing
Technology)**

INTRODUCTION

The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college education, leading to Bachelor of Vocation (B. Voc.) degree with multiple exits such as Diploma/Advanced Diploma under the National Skill Qualification framework (NSQF). The B. Voc. Programme is focused on providing undergraduate studies which would also incorporate specific jobs and their NOSs (National Occupational standards) along with broad based general education. This would enable the graduates completing B. Voc. to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

Under National Skills Development Corporation, many Sector Skill Council representing respective industries have/are being established. One of the mandates of Sector Skill Councils is to develop National Occupational Standards (NOSs) for various jobs in their respective industries. It is important to embed the competencies required for specific jobs roles in the higher education system for creating employable graduates.

This course will identify and fill the skill gaps. The mandate of this program is to create a course with industry-academia collaboration that will produce skilled workforce satisfying specific needs of the industry. This course will offer multiple needs of the industry. The structure will allow offer multiple needs of the industry. The structure will allow students to have thorough theoretical knowledge coupled with rigorous hands on training in both laboratory and industry.

Unique Features of the Course:

- The skill development component is to equip students with appropriate knowledge, practice and attitude, so they are ready to work.
- The skill development components will be relevant to the industries as per their requirements.
- The curriculum is embed with National Occupational Standards (NOSs) of specific job roles within the industry sector(s).
- The overall design of the skill development component along with technologies in food process engineering.
- The curriculum should also focus on work-readiness skills in each of the three years. Curriculum should also focus on work-readiness skills in each of the three years. Curriculum is designed to match industrial needs with greater emphasis on practical work, on the job

training and industrial internship.

Program Objectives:

- To provide judicious mix of skills relating to a profession and appropriate content of General Education.
- To ensure that the students have adequate knowledge and skills, so that they are ready to work at each exit point of the programme.
- To provide flexibility to the students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.

Suggested internal assessment tools for courses:

The concerned teacher shall announce the units for which internal assessment will take place. A teacher may choose one of the methods given below for the assessment.

1. Library notes
2. Students Seminar
3. Short Quizzes / MCQ Test
4. Home Assignments
5. Tutorials/ Practical
6. Oral test
7. Research Project
8. Group Discussion
9. Open Book Test
10. Written Test
11. PPT presentation
12. Industrial Visit
13. Viva

Teaching Methodology:

1. Classroom Teaching
2. Guest Lectures
3. Group Discussions
4. Surveys
5. Power Point Presentations
6. Visit to Industries
7. Research Papers & Projects
8. E-content

Eligibility for Admission:

- Higher Secondary School Certificate (10+2) or its equivalent Examination from Arts, Science, Commerce, MCVC.
- Admissions will be given as per the selection procedure / policies adopted by the respective college keeping in accordance with conditions laid down by the Savitribai Phule Pune University.
- Reservation and relaxation will be as per the Government rules.
- Medium of Instruction: English

Subject List

F.Y.B.Voc (Food Processing Technology) SEMESTER I						
	Subject Code	Subject Name	Credits		Evaluation	
			Th	Pr	CIE	SEE
Major	24BVO11101	Food Science	2	-	20	30
	24BVO11102	Practical on Food Science	-	2	20	30
	24BVO11103	Food Processing and Engineering	2	-	20	30
	24BVO11104	Practical on Food Processing Engineering	-	2	20	30
	24BVO11105	Food Biochemistry	2	-	20	30
	24BVO11106	Practical on Food Biochemistry	-	2	20	30
OE (OFFERED BY B.VOC)	24BVO11307	Human Nutrition (2) T	2	-	20	30
SEC	24BVO11408	Techniques on Food Preservation	-	2	20	30
IKS	24IKS11501	Foundation Course on Indian Knowledge system	2	-	20	30
AEC	24ENG11408	Developing Communicative Competence	2	-	20	30
VEC	24VEC11501	Environmental Sustainability Principles and Values	2	-	20	30

F.Y.B.Voc (Food Processing Technology) SEMESTER II						
	Subject Code	Subject Name	Credits		Evaluation	
			Th	Pr	CIE	SEE
Major	24BVO12101	Food Processing Operations	2	-	20	30
	24BVO12102	Practical on Food Processing Operations	-	2	20	30
	24BVO12103	Food Microbiology	2	-	20	30
	24BVO12104	Practical on Food Microbiology	-	2	20	30
	24BVO12105	Food Safety	2	-	20	30
	24BVO12106	Practical on Food Safety	-	2	20	30
OE (OFFERED BY B.VOC)	24BVO12307	Processing of Dehydrated Products	2	-	20	30
SEC	24BVO12408	Business Trends in Food Industry	-	2	20	30
AEC	24ENG12506	Mastering English for Professional Purposes	2	-	20	30
VEC	24VEC12502	India's Constitution, Democracy, Elections and Governance	2	-	20	30
CC		CC				

Credit Allocation: - CC-Core Course, EC-Elective Course, PR-Practical, PJ-Project, AECC-Ability Enhancement Compulsory Courses, SEC-Skill Enhancement Courses.

Total - Credits for First years Programme.

F.Y.B.Voc (Food Processing Technology)

24BVO11101: Food Science (2 Credits)

Total lectures: 30

Total Credits: 2

Course Outcome:-

CO1: Students will understand the basic concepts in food science and will get knowledge of the different food preparation methods.

CO2: They will understand the requirement of food with respect to energy, food and consumer safety, nutrients and their impact on health.

CO3: They will get the knowledge of nutritive value of cereals, pulses, nuts, fruits and vegetables, and nutritional factors, germination of pulses, factors affecting cooking,

CO4: They will understand the processing of oilseeds, protein isolates, Texturized vegetable protein

CO5: Students will acquire the knowledge of structure and nutritive value and chemical composition of eggs, fish and meat.

Chapter No	Content	Lectures (30L)
1.	<p>Introduction of Food Science</p> <p>Introduction & Definition Of Food Science; Factors Affecting Food Consumption And Taste, Energy Requirement In Human Body, Five Food Groups And Food Guide, Functions Of Food, Classification Of Nutrients, Food Constituents - Carbohydrates, Protein, Fat, Vitamins and minerals.</p> <p>Food Preparation- Reasons For Cooking, Pre-Preparation Of Foods, Methods Of Cooking, Medium Of Cooking, Changes During Cooking.</p>	8
2.	<p>Composition And Nutritive Value Of Plant Foods</p> <p>Cereals And Pulses: Structure, Composition, Nutritive Value, Sources</p> <p>Fruits And Vegetables: Composition, Nutritive Value, Fruit Ripening, Climacteric And Non - Climacteric Fruits, Sources</p> <p>Oilseeds: Composition, Nutritive Value, Sources</p> <p>Spices: Definition, Classification, Applications</p>	8
3.	<p>Composition And Nutritive Value Of Animal Foods</p> <p>Eggs: Structure, Composition, Nutritive Value, Grading Changes During Storage, Quality Of Eggs</p>	8

	Fish: Composition, Nutritive Value	
	Meat: Structure, Classification, Composition, Nutritive Value	
	Milk : Composition, Nutritive Value, Properties	
4.	Color, Flavor And Additives	
	Natural Food Flavours, Pigments In Food And Their Industrial Applications. Color And Flavor Additives And Application In Food	3
5.	Health Foods	
	Probiotics, Prebiotics, Synbiotics, GM Foods, Nutraceuticals, Functional Foods,	3

REFERENCES BOOKS

1. Potter, N. N. And Joseph, H. Hotchkiss, "Food Science", CBS Publishers And Distributors, New, Delhi, 1996.
2. Fox, B. A. And Cameron, A.G., "Food Science, Nutrition And Health", 5th Ed., Edward
3. Arnold, London, Charley, H., Food Science, John Wiley And Sons Inc., New York, 1982.
4. Foods: Facts And Principles - N Shakuntalamanay M Shadakshara Swamy
5. Food Science - B Srilakshmi
6. Food Science, Chemistry & Experimental Foods - M Swaminathan, Kukude, S And Others.
7. Food Science, Sheth Publications.
8. Mudambi And Sheela Rao: Food Science
9. Srilaxmi: Food Science, New Age International
10. Shakuntala Manay: Foods Facts And Principles, Wiley Eastern
11. Food Chemistry. Meyer, L.H. 1973East-West Press Pvt. Ltd., New Delhi

F.Y.B.Voc (Food Processing Technology)

24BVO11102: Practical on Food Science (2 Credits)

Course Outcome:-

CO1 : Students will understand the structure of starches, gelatinization of starches.

CO2: They will understand the processes like roasting, tenderization, caremalisation, inversion.

CO3: They will acquire the knowledge about handling different instruments used in food.

CO4: They will understand different changes occurred during frying of oil and smoke point of oil.

CO5: They will understand the importance of egg white foam and their different stages used in food industry.

Sr. No.	Practical of Food Science (2 Credits)	Lectures (10L)
1.	Gelatinization Properties of Food Starches	1
2.	Determination of Relative Density of Milk at Different Temperatures	1
3.	Effect of Salt, Acid, Sugar and Fat on the Stability of Egg White Foam	1
4.	Effect of Preparation Techniques on Meat Tenderization	1
5.	Effect of Roasting on Nuts And Oilseeds	1
6.	Inversion, Melting and Caramalization of Sugar	1
7.	Determination of Smoking Point, Absorption of Oil and Changes in Physical Parameters of Fats and Oils	1
8.	Preparation of Brix/ Brine Solution and Checking by Hand Refractometer/ Salinometer	1
9.	Determination of Gluten Content	1
10.	Determination of Moisture Using Hot Air Oven / IR	1
11.	Study of Different Types of Blanching	1

F.Y.B.Voc (Food Processing Technology)
24BVO11103: Food Processing and Engineering

Total lectures: 30

Total Credits: 2

Course Outcomes:

1. Students will understand the basic concepts in food processing and engineering and will get knowledge of the different instruments used in food processing and engineering.
2. They will understand the basic of heat transfer and energy requirement in food industry, physical properties of water, water activity.
3. They will understand different preservation methods used in food processing
4. They will learn different drying method and types of dryers.
5. They will acquire knowledge about freezing theory, different food freezers and quality of frozen food.

Sr. No	Title	Lectures
1	<p>Introduction and Processing methods</p> <p>Basic Principles of food processing, Dimensions and units, Dimensional Consistency, Conservation of mass and energy.</p> <p>Heating, Blanching and Pasteurization. Freezing, Dehydration, canning, additives, fermentation, extrusion cooking, hydrostatic pressure cooking</p>	5
2	<p>Drying</p> <p>Moisture content, definition, methods of determination, Direct and indirect methods. Equilibrium moisture content, properties of air, water, vapour mixer.</p> <p>Drying, mechanisms, constant rate period and falling rate period, methods and equipment used, factors affecting rate of drying.</p>	5
3	<p>Food Preservation by Cooling</p> <p>Refrigeration, Freezing, freezing time, methods of freezing, freezing equipment, freeze drying, freeze concentration, thawing, effect of low temperature on food.</p>	5
4	<p>Vessels& Agitators</p> <p>Brief design and drawing of enclosures, supports and standard flanges</p> <p>Brief design and drawing of various types of agitators used in Food process equipment.</p>	5
5	<p>Heat Exchangers& Evaporators</p> <p>Brief design and drawing of various types of heat exchangers & Evaporators employed in Food process operation.</p>	5
6	<p>Dryers</p> <p>Brief design and drawing of dryers used in Food process operation.</p>	5

References:

1. Introduction to food engineering. R. Paul Singh. 2000. Academic Press. B.
2. P.Fellows.1988. Food Processing Technology.Principles and practice.Ellis Horwood International publishers, Chichester, England.
3. Sinnott, R.K., Coulson & Richardson's "Chemical Engineering", Volume 6, 3rd Edn., Butterworth Heinemann, New Delhi, 1999.
4. Food Process Engineering by Dennis,R.H.
5. Engineering properties of foods by Rao, M.A. and Rizvi, S.S.H.40 FP – 07,08 – SRM – E&T
6. Perry, R.H., et al., Perry's "Chemical Engineers Handbook", 7th Edn., McGraw Hill, NewYork, 1997.
7. Joshi, M.V., and Mahajani, V.V., "Process Equipment Design", 3rd Edn., Macmillan India Limited, NewDelhi, 1996.
8. Bownell, L.E., and Young, E.M., "Process Equipment Design", Wiley Eastern, 1968.

F.Y.B.Voc (Food Processing Technology)
24BVO11104: Practical on Food Processing and Engineering

S.No	Title	Practical
1	Determination of physical properties of foods.	1
2	Determination of mechanical properties of foods.	1
3	Determination of texture properties of foods	1
4	Experiments on centrifugal separation (cream separator)	1
5	Experiments on oil extraction by soxhlet apparatus	2
6	Experiments of microwave heating of food materials	2
7	Experiments on hygroscopic properties of food materials	1
8	Experiments on biochemical properties of foods.	1
9	Experiments on determination of drying rate of given food materials	1
10	Experiments on microwave cooking	1
11	Experiments on freezing of foods	1
12	Experiments on determination of firmness of foods	1

REFERENCE BOOKS

1. Earle R.L., "Unit operations in Food Processing", Pergamon Press.
2. Unit Operations in food engineering. Gustavo.V. 2003. CRC Press
3. McCabe, W.L. and Smith.J.C. "Unit Operations of Chemical Engineering", McGraw-Hill, 1976.
4. Magnard Joslyn, "Food Processing Operations", AVI Publishing Company.Food Process Design. Zacharias.B. 2003. CRC Press.

F.Y.B.Voc (Food Processing Technology)**24BVO111035: Food Biochemistry****Total lectures: 30****Total Credits: 2****Course Outcome:**

CO1: Students will get knowledge of functional carbohydrates:

CO2: They will get knowledge regarding properties of fats and oil:

CO3: They will understand the concept of rancidity of oils and its importance in food industry,

CO4: They will be acquire knowledge of important protein sources in food:

CO5: Students will get knowledge regarding role of fibers in disease prevention:

CO6: They will have knowledge about different test used for estimation of protein in food industry

Chapter No	Content	Lectures (30L)
1.	Carbohydrates: Monosaccharides: Classification and properties - Glucose, Fructose, ribulose, ribose Disaccharides: Maltose, Lactose, Sucrose Polysaccharides: Starch, Cellulose, Glycogen, Gums, Pectin Dietary fiber Dietary sources – Functional properties of dietary carbohydrates	6
2.	Amino acids and Protein Amino acids - Classification , properties and identification techniques, Formation of peptide linkages, biological activity Protein: Classification and Structure of protein Functions of proteins in foods – physical and chemical properties of proteins. Important protein sources– Milk, Meat, Fish, Egg and Cereal proteins Qualitative analysis of protein, Protein estimation-Kjeldahl's method	8
4.	Lipids: Definition and classification –biological role and uses of lipids, Fat group. classification – Dietary sources Fatty acids in foods nomenclature – Triglycerides – composition and functions. Physical properties of triglycerides – Polymorphism of triglycerides. Properties of fats – Rancidity and reversion of fats. Effect of frying on fats, Technology of edible fats and oils- Refining, Hydrogenation and Interesterification	8
5.	Vitamins: Definition –Classification, general sources, properties, functions and dietary requirements Deficiency symptoms of vitamins A,D,E,K,C thiamins, riboflavin, niacin and biotin. Minerals:	8

	Definition –Classification, general sources, properties, functions and dietary requirements Role of minerals in nutrition Vitamins and minerals general causes of loss in food. Fortifications, Enrichment and Restoration	
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References:

1. Food and Nutrition M. Swaminathan
2. Fundamentals of Food & Nutrition S R. Mudambi, M.V. Rajagopal
3. A text book of foods, Nutrition and Dietetics M. Raheena Begum
4. Handbook of Food and Nutrition M Swaminathan
5. Food Chemistry O R. Fennema
6. Food Chemistry L H Meyer
7. Foods Facts and Principles N. Shakuntalamanay & M. Shadaksharaswamy
8. Food Science Norman N. Potter
9. Hand book of Analysis and Quality Control of Fruits & Vegetable Products S. Ranganna
10. Fats in Food Technology K K Rajah

F.Y.B.Voc (Food Processing Technology)
24BVO11106: Practical on Food Biochemistry

Course Outcomes:

CO1: Students will get introduction different types of chemical reactions used for identification of carbohydrates

CO2. They will be able to estimate FFA content in given oil sample.

CO3. They will be able to perform estimation of ascorbic acid, protein and reducing sugar from food sample.

CO4. Students will learn how to write prepare different types of solutions.

CO5. Students learn about different methods of protein estimation.

CO6. Students learn about different methods of carbohydrate estimation.

CO7. They will learn different types of adulteration test used for fats and oils

Sr. No.	Practical on Food Biochemistry (2 Credits)	Practical
1.	Preparation Of Solutions - Normal, Molar And Per Cent Solutions And Preparation Of Buffers	1
2.	Qualitative and Quantitative Tests For Protein	1
3.	Qualitative and Quantitative For Carbohydrates	1
4.	Determination Of pH And Acidity	1
5.	Estimation Of Ash Content In Food	1
6.	Estimation Of Iodine Value, Acid Value, Saponification Value Of Oils	1
7.	Study Of Enzymatic Browning In Fruits And Vegetables	1
8.	Estimation Of Fibre Content In Food	1
9.	Detection Of Adulteration In Fats And Oils	1
10.	Measurement Of Food Color By Spectrophotometer/ Tintometer	1

F.Y.B.Voc (Food Processing Technology)
24BVO11408: Techniques in Food Preservation

Course Outcome:

1. Students will understand the drying of fruit and vegetables.
2. They will acquire the knowledge of different parameters during rice processing.
3. They will understand the preservation of fruits and vegetable by pickling.
4. They will learn to preserve the fruit by sugar by preparing squash.
5. They will study to identify different types of packaging material used in the food industry.
6. They will acquire about fermentation, blanching and examination of canned pineapple.

Sr. No.	Topics	Practical
1.	Carry out preservation of certain vegetables by dehydration and Rehydration	2
2.	Freezing of Fruits/Vegetables	2
3.	Carry out the preservation of fruits and vegetables by pickling	1
4.	Preparation of sauce and ketchup	2
5.	Osmotic dehydration of certain fruits and vegetables by sugar and salt solution.	1
6.	Preparation of squash and concentrates to demonstrate the preservation by sugar.	2
7.	Preparation of mixed fruit jam	1
8.	Preparation of jellies	1
9.	Preservation of vegetable with the help of fermentation technique	2
10.	Identification of different types of packaging material used in the food industry.	1

F.Y.B.Voc (Food Processing Technology)
24BVO12101: Food processing operations

Total lectures: 30

Total Credits: 2

Course Outcome:

1. Student will learn about Cold preservation, Freezing: requirements of refrigerated storage, Refrigeration load, factors determining freezing rate-food composition and non-compositional influences.
2. Students will understand freezing- Mechanism and freezers, Freezing methods -direct and indirect.
3. They will be acquire knowledge of dehydration, Food Irradiation and Microwave Heating,
4. Students will understand packaging of foods-Properties of packaging material, factors determining the packaging requirements of various foods and brief description of packaging of frozen products.
5. They will be acquire knowledge of Elementary concept of material handling in food industry.
6. Students will understand thermal processing, classification of Thermal Processes, Principles of thermal processing.

Sr. No.	Food processing operation (3 credits)	Lectures(45L)
1.	Cold preservation: Freezing: requirements of refrigerated storage - controlled low temperature, air circulation and humidity, changes in food during refrigerated storage, progressive freezing, changes during freezing –concentration effect and ice crystal damage, freezer burn. Refrigeration load, factors determining freezing rate-food composition and non-compositional influences	4
2.	Freezing- Mechanism and freezers: Freezing methods -direct and indirect, still air sharp freezer, blast freezer, fluidized freezer, plate freezer, spiral freezer and cryogenic freezing.	5
3.	Dehydration : Normal drying curve , effect of food properties on dehydration , change in food during drying ,drying methods and equipments air convection dryer, tray dryer, tunnel dryer continuous belt dryer , fluidized bed dryer, dryer, drum dryer, vacuum dryer ,freeze drying ,foam mat drying.	5
4.	Food Irradiation and Microwave Heating: Ionizing radiation and sources, unit of radiations, direct and indirect radiation effects, safety and wholesomeness of irradiated food. Microwave heating and application.	6
5.	Material handling: Elementary concept of material handling in food industry, equipment and functioning of belt conveyor, screw conveyor, bucket elevator and pneumatic conveyor	2
6.	Thermal processing: Introduction, classification of Thermal Processes, Principles of thermal processing, Thermal resistance of microorganisms, Thermal Death Time, Lethality concept, characterization of heat penetration data, Thermal process Calculations	5
7.	Separation processes: Principles and methods of: distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation	3

Reference

1. Desrosier NW and Desrosier JN, The Technology of Food Preservation, CBS Publication, New Delhi, 1998
2. Paine FA and Paine HY, Handbook of Food Packaging, Thomson Press India PvtLtd, New Delhi- 1992
3. Potter NH, Food Science, CBS Publication, New Delhi, 1998
4. Ramaswamy H and Marcott M, Food Processing Principles and ApplicationsCRC Press, 2006
5. Rao PG, Fundamentals of Food Engineering, PHI Learning Pvt Ltd, New Delhi,2010
6. Toledo Romeo T, Fundamentals of Food Process Engineering, AspenPublishers, 1999

F.Y.B.Voc (Food Processing Technology)
24BVO12102: Practical on Food processing operations

Course Outcomes:

1. Students learn about preservation of food by the process of freezing
2. They will learn comparison of conventional and microwave processing of food
3. Students will learn preservation of food by canning (Fruit/Vegetable/meat), Cut-out analysis of canned food.
4. They will get knowledge thermal processing thermal process Calculations
5. They will learn separation processes principles and methods of distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation

Sr. No.	Practical on Food processing operations	Practical
1.	Preservation of food by the process of freezing	1
2.	Comparison of conventional and microwave processing of food	2
3.	Preservation of food by canning(Fruit/Vegetable/meat)	1
4.	Cut-out analysis of canned food	1
5.	Practical on Packaging of foods:	2
6.	Drying of food using Tray dryer/other dryers	1
7.	Osmotic dehydration	2
8.	Minimal Processing	1
9.	Testing of Packaging material	1
10.	Practical on Thermal processing : Thermal process Calculations	1
11.	Practical on Separation processes : Principles and methods of: distillation, extraction, washing, filtration, sedimentation, sieving and centrifugation	2

F.Y.B.Voc (Food Processing Technology)**24BVO12103: Food Microbiology****Total lectures: 30****Total Credits: 2****Course Outcomes:**

CO1: Students will understand the basic concepts in microbiology, principle and working of different instruments used in lab along with its application.

CO2: They will get the knowledge about the how bacteria grows, different factors which affect their growth, different requirements for bacterial growth, different isolation and purification methods used for bacteria

CO3: They will understand the principle and importance of different staining methods used for bacteria.

CO4: They will gain knowledge on different sources, types of bacteria that cause spoilage in food, various changes that occur during spoilage in food depending on their nutrient content.

CO5: Students will understand different methods that can be used to prevent and detect bacterial spoilage of food.

CO6: They will understand importance of fermentation and preservatives different methods and its importance.

Chapter No.	Content 2 Credit	Lectures (30L)
1.	Introduction To Microbiology	
	Introduction, History And Development Of Microbiology, Definition And Scope Of BVO 12102 Food Microbiology, Introduction To Instruments And Equipments Needed In Microbial Studies. Inter-Relationship Of Microbiology With Food Sciences	08
2.	Microbial Growth	
	Growth Curve, Growth Of Microorganisms In Laboratory, Design Of Media: Composition, Factors Affecting Microbial Growth, Isolation Characterization And Purification Of Microorganisms, Concept Of Pure Culture, Co-Culture And Mixed, Culture, Preservation And Maintenance, Methods For Microbial Cultures, Staining Techniques (Monochrome, Negative, Differential, Special Staining), Cultivation – <i>In Vitro And In Vivo</i> , Biofilm Formation	08
3.	Fermentation	
	Fermentation–Definition And Types, Design Of Fermenter Microorganisms Used In Food Fermentations, Dairy Fermentations- Starter Cultures ,Types And Methods Of Preservation And Propagation, Lactic Acid And Aroma Compounds Production, Health Benefits Of LAB, Fermented Foods-Types, Methods Of Manufacture	08

	For Vinegar, Sauerkraut, Tempeh, Miso, Soya Sauce ,Beer, Wine And Traditional Indian Foods	
4.	Control Of Microbial Growth In Food	
	Principles And Methods Of Preservation, Physical Methods Of Food Preservation- Dehydration, Freezing, Cool Storage, Heat Treatment (Esp. Thermobacteriology), Irradiation, Chemical Preservatives, Biopreservatives Esp. Bacteriocins, New Non Thermal Methods, Introduction To Hurdle Concept And Predictive Microbiology	06

REFERENCE BOOKS

1. General Microbiology - Stanier, 5th Ed.
2. Introduction to Microbiology - Ingraham, 2th Ed.
3. Industrial Microbiology - An Introduction, Waites, M.J.
4. Principles of Fermentation Technology- Whitaker. A
5. Industrial Microbiology- A. H. Patel
6. Industrial Microbiology- Lester Earl Casida

F.Y.B.Voc (Food Processing Technology)
24BVO12104: Practical on Food Microbiology

Course Outcomes:

1. Students will learn how to prepare media.
2. Students learn about cleaning and sterilization of glassware.
3. Students learn about different staining techniques.
4. They will learn how to prepare slant, swab and stab.
5. They will learn how to check the quality of milk by methylene blue reduction test.
6. They will learn how to control of microbial growth by physical methods-heat

Sr. No.	Food Microbiology (2 Credits)	Practical (10P)
1	Introduction to the Basic Microbiology Laboratory Practises and Equipments	1
2	Fuctioning and use of compound microscope	1
3	Cleaning and sterilization of glassware	1
4	Preparation and sterilization of nutrient broth	1
5	Preparation of slant, stab and plates using nutrient agar	1
6	Cultivation and sub-culturing of microbes	1
7	Morphological study of bacteria and fungi using permanent slides	1
8	Simple staining, Gram's staining, Negative staining, Endospore staining, Standard Plate Count Method	1
9	Microbial examination of curd, Microbial examination of processed fruit and vegetable products, Microbial examination of canned foods, Microbial examination of egg	1
10	Control of microbial growth by physical methods-heat	1

F.Y.B.Voc (Food Processing Technology)**24BVO12105: Food Safety****Total lectures: 30****Total Credits: 2****Course Outcomes:**

1. Students will understand about food safety and its importance.
2. Students will get knowledge of different types of hazards and how to prevent it.
3. They will get knowledge regarding sources of food contamination, food infection and food poisoning.
4. They will understand about pest control and different methods for food storage.
5. They will be acquiring knowledge regarding temperature control and its importance in food industry.
6. Students will get knowledge regarding importance of personal hygiene and management of hazards.

Sr. No	Content (2 Credits)	Lectures (30L)
1.	Introduction to Food Safety <ul style="list-style-type: none"> • Definition • Types of hazards, biological, chemical, physical hazards • Factors affecting BVO 12408 Food Safety • Importance of Safe Foods 	03
2.	Food Hazards of Physical and Chemical Origin <ul style="list-style-type: none"> • Introduction • Physical Hazards with common examples • Chemical Hazards (naturally occurring ,environmental and intentionally added) • Impact on health • Control measures 	05
3.	Food Hazards of Biological Origin <ul style="list-style-type: none"> • Introduction • Indicator Organisms • Food borne pathogens: bacteria • Food borne pathogens: viruses • Food borne pathogens: eukaryotes • Seafood and Shell fish poisoning • Mycotoxins 	05
4.	Microbial Food Spoilage Sources Of Microorganisms In Foods Some Important Food Spoilage Bacteria	04

	Changes Caused By Micro-Organisms During Spoilage (Breakdown Of Proteins, Carbohydrates, Fats And Other Constituents) Spoilage Of Specific Food Groups- Milk And Dairy Products, Meat, Poultry And Seafoods, Cereal And Cereal Products, Fruits And Vegetables And Canned Products.	
5.	<p>. Management of hazards</p> <ul style="list-style-type: none"> • Need • Control of parameters • Temperature control • Food storage 	05

References:

1. Handbook of food toxicology by S. S. Deshpande
2. The BVO 12408 Food Safety information handbook by Cynthia A. Robert, 2009
3. Nutritional and safety aspects of food processing by Tannenbaum SR
4. Microbiological safety of food by Hobbs BC, 1973
5. BVO 12408 Food Safety Handbook by Ronald H. Schmidt, Gary E. Rodrick
6. 1. Lawley, R., Curtis L. and Davis, J. The BVO 12408 Food Safety Hazard Guidebook , RSC publishing, 2004
7. De Vries. BVO 12408 Food Safety and Toxicity, CRC, New York, 1997
8. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
9. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 & Sons; USA, 1987

F.Y.B.Voc (Food Processing Technology)
24BVO12106: Practical on Food Safety

Course Outcomes:

1. Students will learn how to prepare different types of media.
2. Students learn about different methods of isolation of bacteria.
3. Students learn about bacteriological analysis of water.
4. They will learn about swab test, HACCP and ISO: 22000.
5. They will get introduction regarding biochemical test used for identification of bacteria.

Sr. No.	Pr. On Food safety and hygiene	Practical
1	Preparation of different types of media (complex, differential and selective)	1
2	Enumeration of aerial microflora using PDA	1
3	Microbiological Examination of different food samples	2
4	Bacteriological Analysis of Water	1
5	Assessment of surface sanitation by swab/rinse method	1
6	Assessment of personal hygiene	1
7	Biochemical tests for identification of bacteria	1
8	Scheme for the detection of food borne pathogens	1
9	Implementation of FSMS – HACCP, ISO : 22000	1

F.Y.B.Voc (Food Processing Technology)
24DSC12407: Business Trades in Food Industry

Course Outcomes:

1. Students will understand about business managements.
2. Students will get knowledge of various National and International government institutions for food industries.
3. Students will be acquiring knowledge regarding Export, Import and International trades.
4. Students will understand about production management and human resource management.

Chapter No.	Content 2 Credit	Lectures (30L)
1.	Business Management	
	Present status of food industry, sectors in food industry, definition of management, principles, goals, functions of management (planning, organizing, staffing, directing and controlling),	08
2.	Management	
	Production management, material management, inventory management, financial management, human resource management, personnel management, marketing and retail management	08
3.	International Marketing	
	International marketing and international trade, salient features of international marketing, international marketing involvement, deciding which and how to enter international market, international trade theories, free trade v/s protection, export trend and prospects of food products in India.	08
4.	Government Institutions	
	APEDA, MFPI, Tea Board, Spice Board, GATT, WTO	06

References:

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2. N. Shakuntala Mane, M. Shadaksharaswamy (2008), Food Facts and Principles, New Age International Ltd. Publication, New Delhi.
3. M. C. Shukla (2005), Business Organization and Management, S. Chand Publications
4. D. B. Pathak (2011), Management, Nirali Prakashan, Pune.