Rayat Shikshan Sanstha's

Karmaveer Bhaurao Patil College Vashi

[Autonomous College]

Syllabus for Approval

Sr. N0.	Heading	Particulars
1	Title of Course	S.Y.B.Voc. Food Technology
2	Eligibility for Admission	F.Y.B.Voc. Food Technology
3	Passing Marks	40%
4	Ordinances/Regulations (if any)	-
5	No. of Years/Semesters	Three years/ Six semester
6	Level	U.G.
7	Pattern	Semester
8	Status	New Syllabus
9	To be implemented from Academic year	2019-2020

AC- 02/03/2019

Rayat Shikshan Sanstha's

KARMAVEER BHAURAO PATIL COLLEGE VASHI

(AUTONOMOUS COLLEGE)

Sector-15- A, Vashi, Navi Mumbai - 400 703

2019-2020

Syllabus for S.Y.B.Voc.Course

Program: B.Voc. Food Technology

Course: S.Y.B.Voc. Food Technology

(Choice Based Credit, Grading and Semester System with effect from the academic year 2019-

Preamble

Food Technology is a B.Voc. course and an under graduation programme at Karmaveer Bhaurao Patil College Vashi, Navi Mumbai [Autonomous College]

Food science is the study of the physical, biological, and chemical makeup of food; the causes of food deterioration; and the concepts underlying food processing. Food scientists and technologists apply scientific disciplines including chemistry, engineering, microbiology, and nutrition to the study of food to improve the safety, nutrition, wholesomeness and availability of food. Depending on their area of specialization, food scientists may develop ways to process, preserve, package, and/or store food according to industry and government specifications and regulations.

Food technology is the application of food science to the selection, preservation, processing, packaging, distribution, and use of safe food. Related fields include analytical chemistry, biotechnology, engineering, nutrition, quality control, and food safety management.

Food processing is the treatment of food substances by changing their properties to preserve it, improve its quality or make it functionally more useful. Food processors take raw animal, vegetable, or marine materials and transform them into edible products through the application of labour, machinery, energy, and scientific knowledge. Chemical, biological, and mechanical processes are used to convert relatively bulky, perishable, and typically inedible food materials into shelf-stable, convenient, and palatable foods and beverages.

The food processing sector is highly fragmented industry. It widely comprises of the following sub-segments: Fruits and vegetables, Milk and milk products, beer and alcoholic beverages, meat and poultry, marine products, grain processing, packaged or convenience food and packaged drinks. A huge number of entrepreneurs in this industry are small in terms of their production and operations, and are largely concentrated in the unorganized segment.

With potential of being the biggest in the world India next to China is the world‟s second largest producer of food and processed food products. India is having the biggest consumption category, with spending on food accounting for nearly 21% of India‟s GDP and with a market size of $181 billion. The Indian domestic food market is expected to grow by nearly 40% of the current market size to $258 billion by 2015 and $344 billion by 2025 (World of Food India, 2011; Merchant, 2008).

The content of a syllabus should be such that it maintains continuity with the course content of graduate course. The present curriculum is made keeping this in mind and is an effort to impart fundamental knowledge of the subject needed at this level. The curriculum is designed as per the guidelines for Choice Based Credit System and reflects the total credit, teaching hours and evaluation pattern.

Objectives of the Course:

- To prepare students as a qualified food technologist for Food industries, research organization and teaching.
- To provide students with a solid foundation in basic sciences related to food technology, food science and food technology & engineering.
- To enable the students with good scientific and engineering knowledge so as to comprehend, design, and create food products and device for food industry and provide solutions for the challenges in food industry as well as in agriculture.
- To train students in professional and ethical attitude, effective communication skills, teamwork skills and multidisciplinary approaches related to food technology and engineering.
- To provide student with an academic environment aware of excellence, leadership, written ethical codes and guidelines, and the life-long learning needed for a successful professional career.

Course Learning Outcomes:

1. Graduate will able to focus on the importance of safe processed nutritious food.
2. Graduates will demonstrate an ability to design or process food products as per the needs and specifications.
3. Graduates will demonstrate an ability to work in Food industries, research organization and teaching.
4. Graduate will demonstrate skills to use modern tools and equipment to analyze food prone infection and food spoilage.
5. Graduates will demonstrate knowledge of professional and ethical responsibilities.
6. Graduate will be able to understand economic importance of food products and food laws. 9. Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues. 10. Graduate will develop confidence for self-education and ability for life-long learning.

Program Specific Outcome (Considered second year)

- To understand the knowledge of technology of Fish, Meat and Egg Processing, Spices And Plantation Crop, Fermented Foods, Cereals, Pulses And Oilseed, Beverages, Food Additives
- To gain the knowledge of Food Microbiology
- To get the practical knowledge Business and Marketing Management
- To develop the understanding in By Product Utilization and Waste Management

Scheme of examination for Each Semester:

Continuous Internal Evaluation: 40 Marks (Common Test-20 Marks & 20 Marks for-

Assignment, Projects, Group discussion, Open book test, online test etc.) based on all units of each paper.

Semester End Examination: 60 Marks will be as follows -

<table>
<tr><td rowspan="5">I.</td><td colspan="2">Theory: The Semester End Examination for theory course work will be conducted as per the following scheme.</td></tr>
<tr><td colspan="2">Each theory paper shall be of two hours duration.</td></tr>
<tr><td colspan="2">All questions are compulsory and will have internal options.</td></tr>
<tr><td>Q – I</td><td>Subject questions from Unit – I (having internal options.) 20 M</td></tr>
<tr><td>Q – II</td><td>Subjective questions from Unit – II (having internal options.) 20 M</td></tr>
<tr><td></td><td>Q – III</td><td>Objective type questions based on both the Units with equal weightage. 20 M</td></tr>
<tr><td>II.</td><td>Practical</td><td>The Semester End Examination for practical course work will be conducted as per the following scheme.</td></tr>
</table>

Sr. No.	Particulars of Semester End Practical Examination	Marks%
1	Laboratory Work	**40**
2	Journal	**05**
3	VIVA	**05**
	TOTAL	**50**

S. Y B.Voc Food Technology

SEMESTER III

Sr. no	Paper no	Title	Theory/ Practical/Project	Total Marks	Distribution of Total Marks (100)	
					End Semester Theory	Internal Assessment
1	UGFT 301	Technology of Fish, Meat and Egg Processing	Theory	100	60	40
2	UGFT 302	Technology of Spices and Plantation Crop	Theory	100	60	40
3	UGFT 303	Technology of Fermented Foods	Theory	100	60	40
4	UGFT 304	Food Microbiology	Theory	100	60	40
5	UGFT 305	Food Additives and Flavoured Technology	Theory	100	60	40
6	UGFT 306	Business Management	Theory	100	60	40
7	UGFTP 307	Food Analysis Practical-I	Practical	250	-	-

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SEMESTER IV

Sr. No	Paper No	Title	Theory/ Practical/ Project	Total Marks	Distribution of Total Marks (100)	
					End Semester Theory	Internal Assessment
1	UGFT 401	Technology of Cereals, Pulses and Oilseed	Theory	100	60	40
2	UGFT 402	Technology of Beverages	Theory	100	60	40
3	UGFT 403	Food Product Design and Development	Theory	100	60	40

4	UGFT 404	Food Plant Designing	Theory	100	60	40
5	UGFT 405	By Product Utilization And Waste Management	Theory	100	60	40
6	UGFT 406	Marketing Management	Theory	100	60	40
7	UGFTP 407	Food Analysis Practical-II	Practical	300	-	-

S. Y B.Voc Food Technology

Credit Based Semester & Grading System

2019-20

SEMESTER III

Course code	Unit	Title	Credits	Lectures
UGFT 301		**Technology of Fish. Meat and Egg Processing**	**02 Credits**	**15 Lectures**
	1	**Compositional and Nutritional aspects of animal food:** 1. Fish: Classification, composition, spoilage (physical, chemical & biochemical) 2. Meat: Definition of carcass, concept of red meat and white, Composition of meat, marbling of meat, Post mortem changes in meat, Rigor mortis, tenderization of meat, ageing of meat. 3. Egg: Composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality 4. Identification of quality (Freshness) of Meat, Fish and Egg.		

	2	**Processing of Meat, Fish, Egg:** 1. FSSAI Regulations for processing of Meat, Fish and Egg. 2. Meat: colour, Flavour, Texture, Water holding capacity, Emulsification capacity of meat) 3. Fish: Chilling, Freezing, Curing, Drying, Salting, Pickling, curing and canning of fish. 4. Egg: Egg composition and nutritive value, Factor affecting egg quality, Preservation of egg refrigeration and freezing, Thermal processing, dehydration and Coating		
	3	**Products from Fish, Meat and Egg:** 1. Fishery products- Surmai- Process, Traditional and modern production lines, quality of surmai Products, Fish protein concentrate, Fish protein Extract 2. Meat product- sausages (processing of ready to Eat meat products) 3. Egg Products- Egg powder, frozen egg pulp, Designer eggs. 4. Equipment used in Fish, Meat and Egg Processing.		
UGFT 302		**Technology of Spices and Plantation Crops**	**02 Credits**	**15 Lectures**
	1	**Spice Processing:** 1. Introduction, Classification, composition and function. 2. Major international quality specifications of spices 3. Spice processing spice reconditioning, spice grinding, post processing treatments.		
	2	**Processing of Major Spices:** 1. FSSAI Regulations for processing for Spices. 2. Major spices- Paper, cardamom, ginger, clove, nutmeg, vanilla, cinnamon, Chilli and turmeric. 3. Methods of manufacture 4. Chemistry of the volatiles, enzymatic synthesis of flavour identical		

	3	**Spice Extraction:** 1. Value added spices products- Spice volatile oils, spice oleoresins. 2. Use of spice extractives, replacement of spice with oils and oleoresins, alternative products, Ground spices, processed spices, organic spices, curry powder		
UGFT 303		**Technology of Fermented Food**	**02 Credits**	**15 Lectures**
	1	**Introduction to Fermented Foods:** 1. Range of fermentation process- Microbial Biomass, Microbial enzymes, Microbial Metabolites, Recombinant products. 2. Classification of fermentation process- Lactic acid fermentation, alcoholic fermentation. 3. Importance of fermentation in food industry-Flavour, Enhancement, Nutritional value, Preservation, Antibiotic properties.		
	2	**Media and inoculum for fermentation:** 1. Typical media, medium formulation, Water source, energy source, carbon source, nitrogen source, mineral. 2. Growth factors, nutrient recycle oxygen requirement, anti-foams, medium optimization. 3. Inoculum – criteria for transfer of inoculums, development of inocula for yeast, bacterial and mycelia process, aseptic inoculation of plant fermenters.		
	3	**Fermented food products:** 1. FSSAI Regulations for Fermented Food Products. 2. Fermented meat products- Cured raw meat, semidry fermented sausages, dry fermented sausages, mold ripened sausages. 3. Fermented soy products- soy sauce, fermented whole soy beans, fermented whole soy beans, fermented tofu, temphe. 4. Fermented Vegetables- Chinese pickle, kimchi, sauerkraut. 5. Technology for Fermented cereal products- Idali Dosa Batter, Bread, beer, Wine, Vinegar.		

UGFT 304		Food Microbiology	02 Credits	15 Lectures
	1	**Introduction to food microbiology:** **1.** FSSAI Regulations for Food Microbiology. 2. Discovery, Current status, role of food microbiology, sources of micro-organisms in food, changes caused by microorganisms- food fermentation, purification, lipolysis. 3. Growth and survival of microorganisms in foods, biological, chemical and physical changes caused by microorganisms, physical and chemical methods to control microorganisms.		
	2	**Characteristics of microorganisms:** 1. Classification of microorganisms, nomenclature, morphology- yeast and moulds, bacterial cells, viruses. 2. Importance microbes in food, microbial growth characteristics- microbial reproduction, nature of growth in food. 3. CFU, TPC counting, microbiological analysis of food, Theory for identification.		
	3	**Food Preservation:** 1.Factors influencing microbial growth in food- intrinsic and extrinsic factor 1. Hydrogen ion concentration, moisture requirement, concept of water activity, temperature, oxidation reduction potential, inhibitory substances and biological structure. 2. FSSAI Regulations for processing and Principles of different food preservation methods		
UGFT 305		**Food Additives and Flavour Technology**	**02 Credits**	**15 Lectures**
	1	**Introduction to food additives:** 1. FSSAI Regulations for food additive in food processing. 2. Role of food additive in food processing functions- classification – intentional and unintentional food additives. Safety evaluation of food additives, beneficial and toxic effects.		
	2	**Types of food additives:** 1. Preservatives, antioxidants, colours and		

		flavours, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anti-cracking agents- uses and functions in formulations, indirect food additives. 2. Mode of action and principle of Preservatives, antioxidants, colours and flavours, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anti-cracking agents		
	3	**Flavour Technology:** 1. Types of flavours, flavours generated during processing- reaction flavours, flavour composites, stability of flavours during food processing, analysis of flavours, extraction techniques of flavours, flavour emulsions, essential oils and oleoresins.		
UGFT 306		**Business Management**	**2 Credits**	**15 Lectures**
	1	**Planning** 1. Nature, importance and purpose of planning- planning process, objectives- 2. Types of plans MBO-features-steps		
	2	**Directing** 1. Meaning and nature of directing- motivation meaning, importance, theories of motivation, Leadership, meaning, styles managerial grid by blake and Mounton- like rts foue level model-coordination-meaning and importance.		
	3	**Organising and staffing** 1. Nature and purpose of organization, principles of organization- types of organization, organization chart- organization manual departmentation, committees Authority- delegation of Authority- responsibilities and accountability-centralization V/s decentralisation of authority-nature and importance of staffing-process of selection and recruitment.		

References-

UGFT-301-

1. Textbook on Meat, Poultry and Fish Technologyby Manish Kumar Chalti July 2015.
2. Food, Facts and principles by N. Shakuntala Manay, M. Shadaksharaswamy
3. Essentials of Food Science: 4th edition; V.A. Vaclavik and E.W. Christian

UGFT 302-

1. B. Shree Lakshmi: "Food Science" (second edition), New Age International, New Delhi.
2. Swaminathan: "Text book Of Food Science", Vol-1, BAPPCO, Bangalore.
3. Devendrakumar Bhatt & Priyanka Tomar: An Introduction to Food Science, Technology & Quality Management, Kalyani Publishers.
4. Sumati R. Mudambi: Fundamentals of Food & Nutrition Wiley Eastern Ltd, New Delhi.

UGFT 303-

1. Prakash Triveni: Food Preservation, Aadi Publication, Delhi.
2. M. Shafiur Rahman: Hand Book of Food Preservation, Marcel Dekker Inc, New York
3. McWilliams and Paine: Modern Food Preservation, Surjeet Publication.

UGFT 304-

1. Food Microbiology Paperback – 1 Sep 2018 by M.R. Adams .
2. Handbook of food preservation M.Shafiur Rehman.

UGFT-305

1. W. P. Edward: Science of Bakery Products.
2. Emmanuel Obene: Chocolate science and Technology

UGFT- 306

1. Sethi, Anjanee&Bhavana Adhikari. *Business Communication*. New Delhi: Tata McGraw Hill Tickoo, Champa& Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.
2. Sonie, Subhash C. *Mastering the Art of Effective Business Communication*. New Delhi:Student Aid Publication, 2008.
3. Herekar, Praksh. *Business Communication*. Pune: Mehta Publications, 2007.
4. Herekar, Praksh. *Principals of Business Communication*. Pune: Mehta Publications, 2003.
5. Rai, Urmila& S. M. Rai.*Business Communication*. Himalaya Publishing House, 2007.
6. Pradhan, N. S. *Business Communication*. Mumbai: Himalaya Publishing House, 2005.
7. Pardeshi, P. C. *Managerial Communication*. Pune: Nirali Prakashan, 2008.

S. Y. B. Voc. Food Technology

Credit Based Semester & Grading System

2019-20

SEMESTER IV

Course code	Unit	Title	Credits	Lectures
UGFT 401		**Technology of cereals, Pulses and Oilseeds**	**02 Credits**	**15**
	1	**Paddy processing:** **1.** FSSAI Regulations for Paddy processing **2.** Composition and quality characteristics, curing of paddy, Parboiling, Steaming, Drying. **3.** Types of dryers, operations and functions. **4.** Flattened rice and puffed rice		
	2	**Rice and wheat Milling:** 1. FSSAI Regulations for Rice and Wheat milling. 2. Paddy dehusking process, Rice mill process, Engelberg huller mills, Modern rice mill, Pre cleaner, Rubber roll shellers, Paddy separators, Polishers 3. Wheat milling, Wheat composition and nutritional value. Wheat milling process, Cleaning, conditioning treatment, milling break roll and reduction roll		
	3	**Oil seed processing:** 1. FSSAI Regulations for Oil seed processing 2. Introduction & methods, Hydraulic press & screw press. 3. Solvent extraction methods, Clarification, degumming, neutralization, bleaching, deodorization process, blending of oils, 4. Hydrogenation, Fractionation, Winterization.		

UGFT 402		**Technology of Beverage**	**02 Credits**	**15**
	1	**Introduction to Beverages:** 1. FSSAI Regulations for beverages. 2. Importance, status of Beverage industry in India 3. Manufacturing process of juices-based beverages, synthetic beverages, carbonated and sports drinks. 4. Types of processing of juice Manufacturing Based on Previous and after Pasteurization.		
	2	**Alcoholic Beverages:** 1. Manufacturing process and types of fermented drinks- Wine, synthetic vinegar. 2. Role of yeast in beer and other alcoholic beverages, Equipment used for brewing & distillation, wine and related beverages. 3. FSSAI Regulations for alcoholic beverages.		
	3	**Types of Tea and Coffee:** 1. Tea: Black tea, green tea, oolong tea Coffee: vacuum coffee, drip coffee, iced coffee, Instant coffee. 2. Processing of tea and Coffee 3. Decaffeination of coffee 4. FSSAI Regulations for Tea and coffee.		
UGFT 403		**Food product design and development**	**02 Credits**	**15 Lectures**
	1	**Concept of product development:** 1. Need, Importance, objectives for new product development 2. Product susses and failure, Factors for susses. 3. Innovation Strategy. Product design and process development, product launch and evaluation 4. FSSAI Regulations for product development		

	2	**Managing of product development process:** 1. Principles of product development, people in product development, Designing the product development process, Key decision points. 2. Quality assessment of new developed products		
	3	**Product development process:** 1. Ideas, Formulation based on source availability and cost competitiveness for concept, development of new products, product strategy, product design and process development, product commercialization, product launch and evaluation. 2. Sensory Evaluation: a. Customer oriented test: Preference test, acceptance test, Hedonic test. b. Product oriented test: difference test Ranking for intensity test, Scoring for intensity test, Descriptive type.		
UGFT 404		**Food Plant Designing**	**02 Credits**	**15 Lectures**
	1	**Plant Design & Plant Layout:** 1. FSSAI Regulations for plant design and layouts. 2. Introduction, influences of location on plant layout, location factor, location theory and modules, economic plant size. 3. Study for Diagrams of piping and pumping. 4. Preparation of plant layout, plant layout problem, importance, objectives, Types of layout, Advantages of good layout		
	2	**Plant Building and location Design:** Consideration in building design, types of factory buildings, choices of building construction, material floor, foundation, walls, doors, windows, drains etc. ventilation, fly control, mold prevention and illumination in food processing industry.		
	3	**Plant Layout and equipment layout:** Plant layout and design of bakery and biscuit industries, fruits and vegetable processing industries including beverages, Milk and milk products, meat, poultry and fish processing industry.		

UGFT 405		**By product utilization and waste management**	**2 Credits**	**15 Lectures**
	1	**Introduction and waste characterization:** 1. Types of waste, concept, scope and importance of waste management. 2. Temperature, pH, BOD, COD, TOD, Fat, Oil, grease, metal, forms of phosphorous and sulphur in waste waters.		
	2	**Effluent Treatment:** 1. Pre-treatment of waste, sedimentation, coagulation, flocculation and flotation 2. Secondary treatments: Biological oxidation trickling filters, activated sludge process 3. Industrial waste treatment: characteristics of industrial waste water, treatment levels. 4. Pollution control.		
	3	**Waste utilization:** 1. Agro industries- cereals, pulses, oilseeds, fruits & vegetables, plantation crops. 2. Animal & marine product industries- 3. By products from dairy, egg, meat, fish and poultry		
UGFT 406		**Marketing Management**	**2 Credits**	**15**
	1	**Marketing management and segmentation:** 1. Introduction- definition, marketing concepts, functions, marketing research 2. Market segmentation concept, need, basic market targeting, market positioning, and consumer behaviour. 3. Study of SWOT analysis and Gap analysis.		
	2	**Marketing of products:** Product meaning, product development, product labelling, pricing of products, factor influencing pricing, pricing policy and strategies, Types of pricing		
	3	**Logistic supply chain management:** Its elements, channel of distribution, types and factors affecting the choice of a channel of distribution.		

References-

UGFT –401

1. Technology of Cereals (4th Edition) N .L Kent, 1994.
2. Post harvest technology of cereals, pulses and oilseeds: A Chakraverty
3. Oilseed processing technology by Shukla, Prabhat K, Srivastava ,Ram. K Gupta

UGFT –402

1. Handbook of Food and Beverage Fermentation Technology Y. H. Hui, Lisbeth Meunier-Goddik, Jytte Josephsen, Wai-Kit Nip, Peggy S. Stanfield CRC Press, 19-Mar-2004
2. The Complete Technology Book on Alcoholic and Non-Alcoholic Beverages(Fruit Juices, Whisky, Beer, Rum and Wine) : NPCS Board of Consultants & Engineers.

UGFT –403

1. Concept Research in Food Product Design and DevelopmentHoward R. Moskowitz Ph.D.,Sebastiano Porretta Ph.D.,Matthias Silcher M.A, Feb 2005.
2. Consumer and Sensory Evaluation Techniques: How to Sense Successful Products: by Cecilia Y. Saint-Denis

UGFT –404

1. Food Plant Design1st EditionAntonio Lopez-Gomez, Gustavo V. Barbosa-Canovas
2. FOOD PLANT DESIGN Clark, J. Peter Oak Park, Illinois, USA

UGFT –405

1. Utilization of By-Products and Treatment of Waste in the Food Industry Editors: Oreopoulou, Vasso, Russ, Winfried (Eds.)
2. food Processing Waste Management: Treatment and Utilization TechnologyHardcover – 1 Jan 2011 by V. K. Joshi, S. K. Sharma.

UGFT –405

1. Sethi, Anjanee&Bhavana Adhikari. *Business Communication*. New Delhi: Tata McGraw Hill Tickoo, Champa& Jaya Sasikumar. *Writing with a Purpose*. New York: OUP, 1979.
2. Sonie, Subhash C. *Mastering the Art of Effective Business Communication*. New Delhi:Student Aid Publication, 2008.
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7. Pardeshi, P. C. *Managerial Communication*. Pune: Nirali Prakashan, 2008.

S. Y B.Voc Food Technology Practical

Credit Based Semester & Grading System

2019-20

Course code	Title	Total
UGFTP 307	**Food Analysis Practical-I**	**4 credits**
	1. Quality evaluation of fish/prawn. 2. Subjective evaluation of Fresh Fish. 3. Identification of spices and food additives used in fruits and vegetable processing. 4. Identification and characterization of flavouring compounds of spices 5. Introduction to the Basic Microbiology Laboratory Practices and Equipment 6. Functioning and use of compound microscope 7. Estimation of fibers, colors, antioxidants, flavor enhancers 8. Packaging study of spices 9. Preparation of curry powder 10. Simple staining and Gram's staining	
UGFTP 407	**Food Analysis Practical-II**	**4 credits**
	1. Physical characteristics of Wheat. 2. Estimation of Gluten Content of flour. 3. Estimation of Potassium Bromate in flour. 4. Preparation of Fruit Juice. 5. Preservation of fruits juices with addition of preservative. 6. Preparation of common fruit beverages. 7. Design and layout of milk processing plant 8. Design and layout of fruit processing plant 9. Design and layout of beverage plant 10. Design and layout of bakery and confectionery plant	

References-

1. Textbook on Meat, Poultry and Fish Technologyby Manish Kumar Chalti July 2015.
2. Food Microbiology Paperback – 1 Sep 2018 by M.R. Adams