Sant Gadge Baba Amravati University, Amravati

Faculty: Science and Technology
Programme: B.Sc. with Food Processing & Technology (Syllabus for Semester III and IV)

POs:
Students of undergraduate general degree program at the time of graduation will be able to -
PO1.Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, check out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
PO2.Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
PO3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO4. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
PO5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
PO6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
PO7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest contexts socio-technological changes.

PSOs:
Upon completion of the programme successfully, Student would be able to

1. Use the source and variability of raw food material and their impact on food processing operations.
2. Explain the spoilage and deterioration mechanisms in foods and apply methods to control deterioration andspoilage.
3. List the principles that make a food product safe for consumption.
4. Apply the unit operations required to produce a given food product.

Employability Potential of the Programme:

Student opting for B.Sc. with subject Food Processing & Technology have opportunities in the field of food and nutrition as well as technology. Some of the avenues are listed below,

1. Teaching: Teaching profession can be chosen in the colleges and other institutions offering the courses related to food science, nutrition, catering and hotel management as well as nursing
2. In food Industries: As shift supervisors, production officers/ managers, quality control analyst, research scientist, purchasing, and marketing personals
3. In hospitals: As dietitians

4. In Government sectors: Food analysts (Food and Drugs)
5. In hotel industries: Chef, supervisors
6. Entrepreneurship: There is huge market of food and food products. Many food manufacturing units can be started in low investment as compared to other industries. So By completing these subjects they can start production of many products such as fruits candies, squash, juices, jams, jelly, ketchup, pickles, canned vegetables, bakery and confectionaries, spices, Indian snacks (Farsan, chevda, shev, chakli, etc.), potato, banana chips, milk and milk products, etc.

Sant Gadge Baba Amravati University Amravati

Scheme of teaching, learning &Examination leading to the Degree Bachelors of Science (Choice Based Credit System) (Three Years Six Semesters Degree Programme- C.B.C.S)

(B.Sc. Part-II) (Semester-III) FOOD PROCESSING & TECHNOLOGY

Sr N	Subjects	Subject Code	**Teaching & Learning Scheme**							Duration of Exams Hrs.	Examination and Evaluation Scheme						
			Teaching Period Per week				Credits				Maximum Marks					Minimum Passing	
			L	**T**	**P**	**Total**	**Theory**	**Practical**	**Total**		**Theory + MCQ External**	**Skill Enhancement module Internal**	**Practical**		**Total Marks**	**Marks**	**Grade**
1	FPT (3S) Fundamentals of Food Microbiology (Theory)	FPT3-T	6			6	4.5		4.5	3 hours	80	20	Internal	External	100	40	p
2	FPT (3S) Practical	FPT3-P			6	6		2.25	2.25	4 Hours			25	25	50	25	p
3	Total		6		6	12	4.5	2.25	6.75	7 hours	80	20	25	25	150	65	P

Syllabus Prescribed for 2023-2024 UG Programme

Programme: UG with Food Processing & Technology

Semester-III

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
FPT3-T	**Fundamentals of Food Microbiology**	**90**

Cos

After completion of this course the student will able to

- Prepare various types of nutrient media for the cultivation
- Diagram the typical eukaryotic and prokaryotic cell with their organelles
- Classify microorganisms and justify their importance in food
- Compare various microorganism according to their properties
- Justify the role of microorganisms in Fermentation

COURSE MODULE	UNIT	CONTENT
DSC	Unit-I	Introduction to microbiology, Brief History, Food Microbiology, Microorganisms and its relation with food, various type of microorganisms; Bacteria Algae; fungi, viruses Protozoa etc. Taxonomy; Definition taxonomic ranks, Classification ,major characteristics used for classification eukaryotes and prokaryotes three domain system Microbial cell, Structure important organs of cell. **(15 Periods)**
	Unit-II	Growth of microorganisms; Age of cell, synchronized and balanced growth generation time exponential growth and rate constant, Microbial growth curve, method of measurement of growth, cell mass and its determinant intrinsic factors affecting growth, mode of nutrition in microorganisms, nutritional requirement of microorganisms. **(15 Periods)**
	Unit-III	Bacteria; introduction general characteristics, Size , Shape, Colony Characteristics, Classification of bacteria Gram positive Gram negative bacteria, Group of Bacteria important in food, such as acid forming bacteria, Proteolytic bacteria, Lipolytic bacteria, Saccharolytic bacteria, Pectinolytic bacteria, Thermophillic & Thermoduric bacteria, Psychrotropic, Halophillic, Rope forming, etc. bacteria important in food and their application such as Acetobactor, Aeromonas, Alkaligenes, Bacillus, Clostridium, Ervinia, Escherishia, Lactobacillus, micrococcus. **(15 Periods)**
	Unit-IV	Fungi: Introduction, general characteristics, and classification; Yeast & Moulds: Size, shape, Structure, important organs, difference between yeast & moulds. Genera, types of yeast and moulds important in food such as *mucor Rhizopus, Aspergillus, Penicillium Tri-chothecium,* etc. and their

		applications; A short introduction to Algae, Actenomycetes, Protozoa. Microbial contamination, causes of contamination, prevention of contamination, prevention, common food borne pathogenic microorganisms. **(15 Periods)**
	Unit-V	Cultivation of microorganisms: pure culture, isolation of pure culture; Media: types, composition, preparation, maintenance and preservation; Sterilization processes, staining and observation; Types of staining: simple, differential staining, gram staining, spore staining; Enumeration of microorganisms: types and methods; Microbial contamination: causes and prevention; Fermentation; definition, types; Batch, Continuous, Aerobic and Anaerobic fermentation, Methods of microbial examination of food (**15 Periods)**
SEM		a. Demonstration and understanding the structure of various types of cells b. Preparation of various types of nutrient media c. Diagrammatic understanding of growth curve of microorganism d. Collection of local samples of molds and their staining e. Demonstration and handling of equipments f. Fermentation of milk, etc (**15 Periods)**
		Cos By the end of this module, the students will be able to: 1. Prepare media and grow the microorganisms 2. Compare various microorganisms and their staining
**Activities for SEM:		1.Class test(10M) 2. Assignment(5M) 3. Visit to Food Industry or Laboratory/Group discussion /Seminars and projects/Any innovative activity (5M).

Syllabus Prescribed for 2023-2024 UG Programme

Programme: UG with Food Processing & Technology
Semester-III

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
FPT3-P	**FPT-(3S) Practical**	**06 / per week /per batch**

COs

At the end of the Lab/Practical course, the students will be able to

1. Acquire the skills in the use and care of basic Food microbiology equipments.
2. Understand the life cycle of microorganisms
3. Prepare various types of media
4. Perform the staining of microorganisms
5. Analyze the food samples for the microbial contamination
6. Isolate the microorganism from the sample of food or water

Practical: 3S Food Processing & Technology

List of Practical/Laboratory Experiments/Activities etc.

1. The working and handling of various equipments
2. Preparation and sterilization of media
3. The techniques of aseptic transfer of microbes
4. Isolation of bacteria by streak plate technique
5. Preparation of staining solution
6. Identification of microorganisms by simple staining
7. Identification of microorganisms by gram staining
8. Staining of yeast and moulds.
9. Microbial analysis of water and food stuff

The distribution of marks for the practical examination shall be as follows:

External Examination		Internal Examination	
Performance of any two experiments	20 Marks	Attendance & students performance	10 Marks
Viva-voce	05 Marks	Practical Record book	10 Marks
		Viva-voce	05 Marks
Total	25 Marks	**Total**	25 Marks

Course Material/Learning Resources

1. Laboratory Techniques in Food Analysis; D. Pearson; Butterworths.
2. Nutrition & Dietetics 1st and 2nd Edition; Subhangini Joshi.
3. Microbiology Vol.I &II by C.B. Powar and H.F.Daginawala.

4. Microbiology by M.A. Pelezar, R.D. Reid & C.S. Chan, Tata Macgraw Hill Publication Co limited, New Delhi.
5. Food Microbiology by W.C. Fraizer, Tata Macgraw Hill Publication.
6. Introduction to Microbiology by A.S. Rao
7. Food Microbiology by Adam Moss
8. Dairy Microbiology by Parihar & Parihar
9. Food Microbiology by Bohra Pradeep. Jodhpur Arobios India
10. Text book of Microbiology Purohit S, Jodhpur Arobios India
11. Food Microbiology Bohara & Parihar, Jodhpur Agrobias
12. Industrial Microbiology, Patel A H, Mumbai Mcmillan, Mumbai
13. General l Microbiology Vol I & II , Dr. Pawar C B Mumbai Mcmillan, Mumbai
14. Good contaminants origin Propagation and Analysis Mahindra SN New Delhi APH Publication
15. Applied microbiology Dr. Parihar Pramila , New delhi Swastik Publication
16. Food and Diary Microbiology Dr Rao M K New Delhi Mangalam publication
17. Modern Food Microbiology Jay J M , New Delhi CBS Publication
18. A Dictionary of Microbiology Sharma JL, New Delhi CBS Publication
19. Basic Food Microbiology , New Delhi CBS Pulication

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(B.Sc. Part-II) (Semester-IV) FOOD PROCESSING & TECHNOLOGY

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			Teaching Period Per week				Credits				Maximum Marks					Minimum Passing	
			L	**T**	**P**	**Total**	**Theory**	**Practical**	**Total**		**Theory + MCQ External**	**Skill Enhancement module Internal**	**Practical**		**Total Marks**	**Marks**	**Grade**
1	FPT (4S) Food Quality & Management (Theory)	FPT4-T	6			6	4.5		4.5	3 hours	80	20	Internal	External	100	40	p
2	FPT (4S) Practical	FPT4-P			6	6		2.25	2.25	4 Hours			25	25	50	25	p
3	Total		6		6	12	4.5	2.25	6.75	7 hours	80	20	25	25	150	65	P

Syllabus Prescribed for 2023-2024 UG Programme

Programme: UG with Food Processing & Technology
Semester-IV

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
FPT4-T	**Food Quality & Management**	**90**

COs

After completion of this course the student will able to

- Identify the factors responsible for food spoilage
- Evaluate quality of food by sensory evaluation
- Compare various techniques of quality management
- Justify the advantages of modern food cooking processes over the traditional methods
- Associate the role of various food laws with the quality of food and food products
- Analyze the packaging materials for the labeling and the ingredients

COURSE MODULE	UNIT	CONTENT
DSC	**Unit-I**	Quality of food: introduction, definition, quality factors in food, classification of quality factors – appearance factors (color, size & shape, texture), flavor factors (taste, aroma), nutritional factors & safety factors Quality assessment methods Sensory evaluation of food- Introduction, objectives, type of food panels, characteristics of panel member, layout of sensory evaluation laboratory, sensitivity tests, threshold value, paired comparison test, duo trio test, triangle test, hedonic scale, chemical dimension of basic tastes, Amoore's classification of odorous compounds, Sherman and Sczezniak classification of food texture. Food spoilage: Definition, causes, factors affecting, and types **(15 Periods)**
	Unit-II	Food safety: introduction, definition, importance, factors affecting food safety Hazards: biological, chemical and physical hazards; types and examples Food safety quality management system: risk analysis Hazard Analysis Critical Control Point (HACCP) System- risk assessment, risk management, risk communication, General Principles of food safety risk management, seven HACCP principles, need of HACCP, benefits of HACCP Quality management system: introduction, definition, importance Total quality management (TQM) Food safety education and training: introduction, need for education and training, Food Safety and Standards Authority in India (FSSAI): Introduction, functions & duties, provisions for food products
	Unit-III	Food laws and regulations:

		Prevention of food adulteration act (PFA act) - introduction, features of act, implementation Essential Commodity Act (ECA) - Fruit Product Order (FPO), Vegetable Oil Product Order, Meat Product Control Order, Milk and Milk Product Order (MNPO), Edible Oil Packaging Order Standard of weight & measure act, Export act, Bureau of Indian Standards Act (BIS), Agmark, ISI mark, ISO, FAO, WHO Codex – work of codex, National Codex Contact Point (NCCP) for India, functions and responsibilities of NCCP **(15 Periods)**
	Unit-IV	Packaging: introduction, principles & functions of packaging, types of packaging & packaging materials (metal, glass, flexible films, single films, edible, biodegradable films, paper, board), latest trends in packaging, and effect of Packaging materials on Food Food labeling: introduction, definition, general principles of labeling, mandatory labeling requirements of prepackaged foods, additional mandatory requirements, exemptions from mandatory labeling requirements, optional labeling, nutrition labeling and nutrition claims **(15 Periods)**
	Unit-V	Hygiene and sanitation: sources of food contamination, types of cleaning agents, sanitizers, personal hygiene, Sampling and analysis of food: introduction, definition, Acceptable Quality level (AQL), General sampling precautions, types, preservation, labeling of samples, sampling for different food commodities, scale of sampling Methods of analysis of Food: Chromatography: introduction, principle, types, and applications Spectrophotometry: introduction, principle, types, and applications **(15 Periods)**
SEM		a. Sensory evaluation of food and food products b. Demonstration of methods of sanitation c. Application of various food laws d. Demonstration of personal hygiene e. Categorization of food products by observing the packaging and labeling **(15 Periods)**
	COs: By the end of this module, the students will be able to: 1. Criticize the food products for its quality by using sensory evaluation 2. Compare the various methods of sanitation 3. Use the food laws 4. Predict the quality of food products by observing the packaging and labeling	
	**Activities	1.Class test(10M) 2. Assignment(5M) 3. Visit to Food Industry or Laboratory/Group discussion /Seminars and projects/Any innovative activity (5M).

Syllabus Prescribed for 2023-2024 UG Programme

Programme: UG with Food Processing & Technology

Semester-IV

Code of the Course /Subject	Title of the Course/Subject	Total Number of Periods
FPT4-P	**FPT-(4S) Practical**	**6 periods /per week/per batch**

COs:

By the end of this module, the students will be able to:

1. Apply food preservation knowledge for the preservation of food products
2. Evaluate the quality of the food product by the method of sensory evaluation
3. Apply the right method for the preservation of particular food commodity
4. Determine the shelf life of food product
5. Incorporate the methods to find out the adulteration in the food products
6. Compare the various methods of food preservation with their advantages and disadvantages
7. Summarize the quality of market food products by reading the food packet labeling

Practical: 4S Food Science

List of Practical /Laboratory Experiments.

1. To identify the various physical, chemical hazards in local food shop
2. Identification of safe and unsafe product in HACCP
3. To study the calibration of weights and measures
4. To study the various sources of contamination
5. To study the chromatography technique to separate various materials
6. To verify lambert- beers law
7. To study the spectrophotometry instrument
8. Study of type of food and packaging material from a local market
9. Study of food labeling on various packaged food available in market
10. Study of food labeling
11. Categorization of different labeling according to their type
12. Study of preparation of sensory evaluation card
13. To carry out the sensory evaluation of some food products
14. Detection of adulteration in some basic market food

The distribution of marks for the practical examination shall be as follows:

External Examination		Internal Examination	
Performance of any two experiments	20 Marks	Attendance & students performance	10 Marks
Viva-voce	05 Marks	Practical Record book	10 Marks
		Viva-voce	05 Marks
Total	25 Marks	**Total**	25 Marks

Course Material/Learning Resources

1. Preservation of Fruits and Vegetables by Girdhari Lal
2. Food safety concept and Reality by Mahindra S. N.
3. Outline of Food Technology by Harry W Von
4. Handbook of Analysis and Control for Fruits and Vegetable Products by Ranganna S
5. Food Science by Potter Norman N
6. Food and Food Production Encyclopedia by Considmem Douglas
7. Food Facts and Principles by Maney S
8. Chemical Changes in Food During Processing by Richardson T
9. The technology of Food Preservation by Desrosier N
10. Principles and Practices for the Safe Processing of Foods by Shapton D A
11. Food Processing and Preservation by Sivasankar B
12. Food Science by Shilakshmi B
13. Food Science and Nutrition by Roday S
14. Food Science Laboratory Manual by Srilakshni B
15. A First Course in Food Analysis by Sathe A Y
16. Text Book on Food Storage and Preservation by Khader V
17. Quality Food Management Principles and Applications by Crusius V C
18. Essentials of Food and Nutrition, Volume I & II by Swaminathan.