PERIYAR UNIVERSITY PERIYAR PALKALAINAGAR SALEM-636011

DEGREE OF MASTER OF SCIENCE

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR M.Sc. FOOD PROCESSING

FOR THE STUDENTS ADMITTED
FROM THE ACADEMIC YEAR
2023-2024 ONWARDS

M.Sc. FOOD PROCESSING

REGULATIONS AND SYLLABUS

(With effect from the academic year2023-2024onwards)

Preamble:

The postgraduate program in Food Processing has been designed to provide students a vast cope. Food Processing is the science and art of applying the principles of food processing and technology in various food industries. Food Processing has been started to meet the demands of the growing food processing sector. This has an immense scope on processing and preservation of food to fulfill the consumer's satisfaction.

Objectives of The Course:

1. To prevent the post-harvest losses.
2. To make available wholesome nutritious and appetizing food at economical rates.
3. To improve the quality, nutritive value and minimize loss of essential nutrition's during processing and preservation.
4. Ensuring long– term storage stability.
5. Marketing the processed food of high calorie density in compact and easy to reconstitute form.
6. To prevent food poisoning, contamination and adulteration.
7. To improve is mechanical processing operation store place or minimize labor.
8. Develop new varieties of instant or convenience food for the customers to go along with the fast moving world.

Eligibility for Admission

UG- Life science (Bio-Technology/ Microbiology/ Bio-Chemistry), Food Technology, Hotel Management &Catering Science, Home Science related subjects, B.Sc. Agriculture, B. Voc Food science and Nutrition Other science (Any Science degree holder who completed PG Diploma in Food Processing/ Food Science & Technology related discipline).

Duration of the program

Two academic years consisting of 4 semesters.

Highlights of the Revamped Curriculum

- The curriculum focuses on meeting the demands of the Food industry, Entrepreneurs, Public health sector, Hospitality industries, Healthcare and social welfare sectors.

- This student centric programme ensures knowledge and skill development

by providing hands on training ,on-the-job internships, projects, lab practices, Experiential activities, exposure to entrepreneurial skills and training for competitive examinations.

- The course content is comparable to world class curriculum.

- The courses are updated to include recent developments in the field of Food Processing.

- References are updated and web resources are cited.

- Each course in the curriculum carries either a practical/ activity or experiential. l earning component to ensure skill development along with acquiring knowledge in the subject.

- Potential for employability has been enhanced through mandatory internships. Digital literacy and competency is ensured using ICT enabled learning environment.

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION

PROGRAMME OUTCOMES - M.Sc. FOOD PROCESSING	
PO1	**Disciplinary knowledge and skills:** Acquire the knowledge about the chemical, biochemical, physical, microbiological changes that occur during processing and preservation of any food. Demonstrates theoretical and practical knowledge and Understanding of subjects related to Food Processing.
PO2	**Ethical awareness/reasoning:** To establish itself as the leader in human resource development for supporting the food technology sector.
PO3	**Critical thinker and problem solver:** Possess the ability to identify, and solve problems related to Food manufacturing. Capable of identifying and analysing problems and issues and seek solutions to real-life problems.
PO4	**Sense of inquiry:** Apply better/good practices and be more innovative in developing the food products as per the current requirements of the market. Capable of contributing Significantly and working enthusiastically both independently and in a group.
PO5	**Acquire Analyzing skills:** Acquire skills to analyse different food products and interpret the results in an effective manner. Demonstrates competency in accessing relevant and authentic information and data from electronic media with a motive to learn and synthesize information for academic and extension work presentation.
PO6	**Skilled project manager:** Demonstrates managerial skills required to bean Entrepreneur or serve in the food service industry.
PO7	**Digitally Efficient:** Acquires the ability to utilize ICT for professional purposes in The food processing industry.
PO8	**Flexibility Skill:** To provide flexibility to the students by means of pre-defined entry and multiple exit points.
PO9	**National and International Perspective:** Be equipped to transfer this knowledge to the consumer. Recognizes and assesses societal, environmental and cultural issues related to area of study within the local and global context.
PO10	**Lifelong learners:** To provide judicious mix of skills relating to a profession and appropriate content of general education. Capable of staying motivated to be updated consistently with content, concepts, theories, specializations, fields, technologies, books and avenues to meet professional and personal needs at any given instant.

	PROGRAMME SPECIFIC OUTCOMES
PSO1	Graduates with sufficient knowledge in the areas of quality control, food chemistry, food processing and preservation of foods.
PSO2	Development of a food technologist, food analyst, nutritionist and an administrator
PSO3	Equip themselves to higher levels of learning and/or for The development of new products.
PSO4	Accommodate to startup new venture in areas of food processing.
PSO5	Shall keep themselves abreast with the current trends to meet the food industry challenges
PSO6	Acquire essential skills in different lab techniques and interpret experimental data, applicable for innovative methods and advanced researches to draw Logical conclusions.

TEACHING METHODOLOGIES

Teaching methods: Chalk and Board, Experiential learning, Student centric learning and Small projects and Practical assignments; Virtual Classroom, LCD projector, Smart Class, Video Conference and Guest Lectures by eminent people.

Training students to engage in self-study without relying on faculty (for example

–library and internet search, manual and handbook usage, etc.)

Library, Net Surfing, Manuals, NPTEL, Naan Mudhalvan Courses Other university websites

Semester –I	**Credit**	**Hours**	**Semester-II**	**Credit**	**Hours**	**Semester-III**	**Credit**	**Hours**	**Semester– IV**	**Credit**	**Hours**
1.1. Core-I	5	7	2.1.Core-IV	5	6	3.1.Core-VII	5	6	4.1.Core-XI	5	6
1.2Core-II	5	7	2.2Core-V	5	6	3.2Core-VIII	5	6	4.2Core-XII	5	6
1.3Core –III	4	6	2.3Core– VI	4	6	3.3Core– IX	5	6	4.3Project with vivavoce	7	10
1.4 Discipline Centric Elective – I	3	5	2.4 Discipline Centric Elective– III	3	4	3.4Core– X	4	6	4.4Elective-VI(Industry /Entrepreneurship) 20%Theory 80% Practical	3	4
1.5 Generic Elective-II:	3	5	2.5 GenericElective-IV:	3	4	3.5 Discipline CentricElective -V	3	3	4.5 SkillEnhancement course /ProfessionalCompetency Skill	2	4
			2.6 NMEI	2	3	3.6 NMEII	2	3	4.6 Extension Activity	1	
			2.7 Human Rights	2	1	3.7 Internship / Industrial Activity	2	-			
	20	**30**		**24**	**30**		**26**	**30**		**23**	**30**
Total Credit Points-93											

M. Sc., Food Processing

SEMESTER –I

Course status	Course Title	Credits	Hours
Core-I	Food Processing Technology-I	5	7
Core–II	Food Processing Technology-II	5	7
Core-III	Food Processing and Preservation practical	4	6
Elective-I	Food Chemistry	3	5
Elective–II	Food production and agriculture	3	5
	Total	**20**	**30**

SEMESTER–I

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–I Theory	23PFPCT01	Food Processing Technology-I	7	5	25	75	100	3
Core – II Theory	23PFPCT02	Food Processing Technology-II	7	5	25	75	100	3
Core – III PracticalI	23PFPCP01	Food Processing and Preservation practical	6	4	40	60	100	3
Elective–I Theory	23PFPE01	Food Chemistry	5	3	25	75	100	3
Elective–II Theory	23PFPE02	Food production and Agriculture	5	3	25	75	100	3
		Total	**30**	**20**	**140**	**360**	**500**	

SEMESTER –II

Course status	Course Title	Credits	Hours
Core-IV	Food Microbiology	5	6
Core–V	Food Microbiology Practical	5	6
Core-VI	Food Analysis Practical	4	6
Elective-III	Instrumentation in food processing	3	4
Elective–IV	Food Biotechnology	3	4
NME I	Food Product Development	2	3
	Human Rights	2	1
	Total	**24**	**30**

SEMESTER–II

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–IV Theory	23PFPCT03	Food Microbiology	6	5	25	75	100	3
Core –V Practical II	23PFPCP02	Food Microbiology Practical	6	5	40	60	100	3
Core-VI Practical III	23PFPCP03	Food Analysis Practical	6	4	40	60	100	6
Elective–III Theory	23PFPE03	Instrumentation in food processing	4	3	25	75	100	3
Elective–IV Theory	23PFPE04	Food Biotechnology	4	3	25	75	100	3
NME I		Food Product Development	3	2	25	75	100	3
	23PFPHR01	Human Rights	1	2	25	75	100	3
		Total	**30**	**24**	**205**	**495**	**700**	

SEMESTER –III

Course status	Course Title	Credits	Hours
Core-VII	Food Regulations and Quality Control	5	6
Core-VIII	Research Methodology and Statistics	5	6
Core-IX	Food Packaging Technology	5	6
Core-X	Quality Control and Adulteration Practical	4	6
Elective-V	Food Product Development and Entrepreneurship	3	3
NME II	Food Processing	2	3
	In plant Training in Food Industry	2	-
	Total	**26**	**30**

SEMESTER –III

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–VII Theory	23PFPCT04	Food Regulations and Quality Control	6	5	25	75	100	3
Core – VIII Theory	23PFPCT05	Research Methodology and Statistics	6	5	25	75	100	3
Core – IX Theory	23PFPCT06	Food Packaging Technology	6	5	25	75	100	3
Core –X Practical IV	23PFPCP04	Quality Control and Adulteration Practical	6	4	40	60	100	6
Elective–V Theory	23PFPE05	Food Product Development and Entrepreneurship	3	3	25	75	100	3
NME II		Food Processing	3	2	25	75	100	3
	23PFPIT01	Inplant Training in Food Industry	-	2	-	-	-	
		Total	**30**	**26**	**165**	**435**	**600**	

SEMESTER –IV

Course status	Course Title	Credits	Hours
Core-XI Theory	Food Industrial Waste Management	5	6
Core–XII Theory	Animal Feed Formulation	5	6
	Project with Viva voce	7	10
Elective– VI Practical	Computer Applications in Food Processing Practical	3	4
Skill enhancement course	Food Additives	2	4
	Extension Activity	1	
	Total	**23**	**30**

SEMESTER –IV

List of Courses	Course Code	Course Title	Hrs/ Week	Credits	University Examination			Exam Hrs
					Internal	External	Total	
Core–XI Theory	23PFPCT07	Food Industrial waste Management	6	5	25	75	100	3
Core – XII Theory	23PFPCT08	Animal Feed Formulation	6	5	25	75	100	3
	23PFPPR01	Project with Viva voce	10	7	40	60	100	3
Elective– VI Practical	23PFPEP01	Computer Applications in Food Processing	4	3	40	60	100	3
Skill enhancement course	23PFPSEC01	Food Additives	4	2	25	75	100	3
		Extension Activity		1				
		Total	**30**	**23**	**155**	**345**	**500**	

LEARNING AND TEACHING ACTIVITIES

Work Load:

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload periods
Lectures	60	60
Tutorials	15	15
Assignments	5	5
Cycle Test or similar	2	4
Model Test or similar	1	3
University Exam Preparation	1	3
	Total	90Periods

1. **Tutorial Activities**
2. **Laboratory Activities**
3. **Field Study Activities**
4. **Assessment Activities**
5. **Assessment Principles:**

Assessment for this course is based on the following principles

1. Assessment must encourage and reinforce learning.
2. Assessment must measure achievement of the stated learning objectives.
3. Assessment must enable robust and fair judgments about student performance.
4. Assessment practice must be fair and equitable to students and give them the opportunity to demonstrate what they learned.
5. Assessment must maintain academic standards.

Assessment Details:

Assessment Item	Distributed Due Date	Weightage	Cumulative Weightage
Assignment1	3rdweek	2%	2%
Assignment2	6thWeek	2%	4%
Cycle Test –I	7thWeek	6%	10%
Assignment3	8thWeek	2%	12%
Assignment4	11thWeek	2%	14%
Cycle Test – II	12thWeek	6%	20%
Assignment5	14thWeek	2%	22%
Model Exam	15thWeek	13%	35%
Attendance	All weeks as per the	5%	40%
	Academic Calendar		
University Exam	17thWeek	60%	100%

CREDIT DISTRIBUTION FOR M .Sc FOOD PROCESSING

First Year

Semester-I

Part	Courses	Credit	Hours per Week(L/T/P)
Part A	Core Courses3 (CC1, CC2, CC3)	14	20
	Elective Courses2(Generic/ Discipline Specific)EC1,EC2	6	10
		20	**30**

Semester-II

Part	Courses	Credit	Hours per Week(L/T/P)
Part A	Core Courses3 (CC4, CC5, CC6)	14	18
	Elective Course2(Generic /Discipline Specific)EC3, EC4	6	9
Part B	NME-I & Human Rights	4	3
		24	**30**

SECOND YEAR

Semester-III

Part	Courses	Credit	Hours per Week(L/T/P)
Part A	CoreCourses3 (CC7, CC8, CC9)	15	18
	ElectiveCourse3(Generic /Discipline Specific)EC5	3	3
	Core Industry Module(CC10)	4	6
Part B	NME-II	2	3
	Internship	2	
		26	**30**

Semester-IV

Part	Courses	Credit	Hours per Week(L/T/P)
Part A	CoreCourses3(CC11,CC12)	10	12
	ElectiveCourse1(Generic /Discipline Specific)EC6	3	4
	Project with Viva voce (CC13)	7	10
Part B	Skill Enhancement Course	2	4
Part C	Extension Activity(Can be carried out from Sem II to Sem IV)	1	
		23	**30**

Testing Pattern(25+75)

Internal Assessment

Theory Course: For theory courses there shall be three tests conducted by the faculty concerned and the average of the best two can be taken as the Continuous Internal Assessment(CIA)for a maximum of 25marks.The duration of each test shall be one/ one and a half hour.

Computer Laboratory Courses: For Computer Laboratory oriented Courses, there shall be two tests in Theory part and two tests in Laboratory part. Choose one best from Theory part and other best from the two Laboratory part. The average of the best two can be treated as the CIA for a maximum of 25 marks. The duration of each test shall be one / one and a half hour. There is no improvement for CIA of both theory and laboratory, and also for University End Semester Examination.

WRITTEN EXAMINATION: THEORY PAPER (BLOOM'S TAXONOMY BASED)
QUESTION PAPER MODEL

Intended Learning Skills	**Maximum75Marks** **Passing** **Minimum:50%** **Duration: Three Hours**
	Part–A(10x 2 =20 Marks) Answer ALL questions **Each Question carries 2 mark**
Memory Recall / Example/Counter Example/Knowledge about the Concepts/ Understanding	Two questions from each UNIT
	Question1 to Question10
	Part – B (5 x 5 = 25 Marks) Answer ALL questions **Each questions carries 5 Marks**
Descriptions/Application (problems)	**Either-or Type** Both parts of each question from the same UNIT
	Question11(a) or11(b) To **Question15(a) or15(b)**
	Part-C (3x 10 = 30 Marks) Answer any THREE questions Each question carries 10 Marks
Analysis/Synthesis/Evaluation	There shall be FIVE questions covering all the five units
	Question16 to Question 20

Each question should carry the course outcome and cognitive level

For instance,

[CO1 : K2] Question xxxx

[CO3:K1] Question xxx

MINIMUM MARKS FOR PASSING:

a). Theory Papers:

The candidate shall be declared to have passed the examination if the candidate secures not less than 50 marks in total (CIA mark + Theory Exam mark) with minimum of 38 marks in the Theory Exam conducted by the University. The Continuous Internal Assessment (CIA) Mark 25 is distributed to four components viz., Tests, Assignment, Seminar and Attendance as 10, 05, 05 and 05 marks, respectively.

b). Practical paper:

A minimum of 50 marks out of 100 marks in the University examination and there cord notebook taken together is necessary for a pass. There is no passing minimum for the record notebook. However submission of record notebook is a must. Practical examination.

Scheme for internal marks (40marks)

Good laboratory practices	- 10 marks
Performance evaluation based on observation note and record	- 15 marks
Internal tests (Average of best 2 out of 3 tests)	- 10 marks
Attendance	- 5marks

Scheme for external marks (60marks)

Record	- 10marks
Practical	- 50marks

c). Project Work/Dissertation and Viva-Voce: A candidate should secure 50% of the marks for pass. The candidate should attend viva-voce examination to secure a pass in that paper. Candidate who does not obtain the required minimum marks for a pass in a Paper / Practical/ Project/Dissertation shall be declared Re-Appear (RA) and he / she has to appear and pass the same at a subsequent appearance.

Dissertation

Internal evaluation (25 marks)

Innovative idea	- 05marks
Performance evaluation	- 05marks
Report preparation	- 15marks

External evaluation (75 marks)

Report and presentation	- 50marks
Viva voce	- 25marks

CLASSIFICATION OF SUCCESSFUL CANDIDATES:

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class. All other successful candidate shall be declared to have passed in the Second Class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in the First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance. Candidates who pass all the examinations prescribed for the course in the first instance and within a period of two academic years from the year of admission to the course only are eligible for University Ranking.

MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME:

The maximum duration for completion of the PG Programme shall not exceed Four Years from the year of admission.

TRANSITORY PROVISION:

Candidates who were admitted to the PG course of study before 2023-2024 shall be permitted to appear for the examinations under those regulations for a period of three years, that is, up to end inclusive of the examination of April / May 2024. Thereafter, they will be permitted to appear for the examination only under the regulations then in force.

SYLLABUS FOR M.Sc., FOODPROCESSING

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD PROCESSING TECHNOLOGY – I</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPCT01</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td rowspan="2">Instructional hours Per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>6</td><td>1</td><td colspan="3">-</td><td colspan="2">7</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food processing technology–I</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. To know the principles and methods involved in the processing of perishable foods.
2. To develop skills in the perishable foods processing equipment’s.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT - I
Fruit &Vegetable Processing- Classification,PreProcessing,Processing&Preservation- Sizereduction,Mixing,Separation,Concentration,Freezing&Refrigeration, Drying & Dehydration, Chemicals, Processing by using Pulsed Light and Irradiation; Nutritional losses during Processing, Fruit &Vegetable Intermediate moisture products, Storage.
UNIT - II
Dairy Processing- Milk Pre-Processing; Processing &Preservation- Separation, Homogenization, Pasteurization, Standardization, Sterilization (UHT), Evaporation (Spray Drying), Chilling, Freezing &Refrigeration; Nutritional losses during Processing; Milk Product & By Products; Storage.
UNIT - III
Fleshy Food Processing – Meat, Poultry& Egg - Pre-Processing; Processing & Preservation- Smoking, Canning, Drying, Cooling, Canning, Pulsed Electric Field
Processing; Nutritional losses during Processing; Storage.</td></tr>
</table>

	UNIT - IV Sea Food Processing–Types; Pre Processing; Processing & Preservation-Dielectric, Ohmic and Infra-red heating-Nutritional losses during Processing; Storage **UNIT - V** Miscellaneous Perishable Food: Confectionery-Types Confectionery & Method of Preparation Sugarcane &Sago Technology–By-Product & Its Utilization.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination Question paper)	Questions related to the above topics, from various competitive examinations UPSC/ TRB/ NET / UGC–CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge,ProblemSolving,Analyticalability,ProfessionalCompetency,Professional Communication and Transferrable Skill
Recommended Text	1. Avantina Sharma, Text Book of Food Science and Technology, International Book Distributing Co, Lucknow, UP, 2006. 2. Sivasankar, Food Processing and Preservation, Prentice hall of India Pvt Ltd,NewDelhi.IIIrdPrinting,2005 3. Food Processing Technologies Impact on Product Attributes 2016 published by CRC Press Amit K. Jaiswal
Reference Books	1. P.J.Fellows, Food Processing Technology. Principles and Practices, Second Edition, Woodland Publishing Ltd, Cambridge, England, 2002. 2. Peter Zeuthenand Leif Bogh Sorenson, Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England, 2005. 3. Food Processing Principles and Applications 2014 published by Wiley Buddhi Lasmsal, Stephanie Clark, Stephanie Jung.
Website and E learning source	a.https://www.pdfdrive.com/food-science-and-technology-d41395460.html

	b.http://154.68.126.6/library/Food%20Science%20books/batch1/Food%20 %20The%20Chemistry%20of%20its%20Components%20Fourth_Edition.pdf

COURSE OUTCOMES

After successful completion of the course the student will be able to:

COS	Description
CO1	Classification, processing, and preservation methods for fruits and vegetables, including Freezing, drying, and storage.
CO2	Milk e-processing, preservation techniques like pasteurization, UHT, and spray drying, and understanding nutritional losses.
CO3	Pre-processing techniques, preservation methods such as canning and drying, and studying nutritional losses.
CO4	Types of seafood, pre-processing, preservation with dielectric, ohmic, and infra-red heating, and Storage considerations.
CO5	Confectionery types, sugarcane & sago technology, and utilization of by-products.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and discussion.

<table>
<tr><td>Title of the Course</td><td colspan="7">FOODPROCESSINGTECHNOLOGY–II</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core II</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPCT02</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td>Instructional hours</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>Per week</td><td>6</td><td>1</td><td colspan="3">-</td><td colspan="2">7</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food processing technology–II</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">This course will enable students to:
To know the principles and methods involved in the processing of on perishable foods.
To develop skills in the nonperishable foods processing equipment’s.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT - I
Cereal Technology-Rice-Parboiling and milling methods, High-Pressure Processing, by products of
Rice milling and their utilization; Wheat-Milling, by-products of milling, Nutritional losses during
Processing; Storage. Conventional and non- conventional foods-Breakfast, Extruded products.

UNIT - II
Millets Technology-major and minor millets-Types, Pre-Processing, Processing & amp; methods to
Remove toxic factors; Nutritional losses during Processing; Storage.

UNIT - III
Pulse Technology-Types, Pre-Processing, Processing & amp; methods to remove toxic factors;
Nutritional losses during Processing; Storage.

UNIT - IV
Oil seed Technology-Types; Pre-Processing; Processing & amp ;Preservation-Extraction of oils, meal concentrates and Value Addition;
Nutritional losses during Processing; Storage.

UNIT - V
Spice Technology (Indian) - Classification, Anti-Microbial & Antioxidant Properties, Processing, By- Products of Spices – Extraction of Oleoresin, Essential oil & amp; Spice Blends, Medicinal Value of Spices;
Nutritional losses during Processing; Storage.</td></tr>
<tr><td>Extended Professional Component (is a part of internal component</td><td colspan="7">Questions related to the above topics, from various competitive examinations UPSC/ TRB/ NET / UGC–CSIR / TNPSC / etc.</td></tr>
</table>

only, Not to be included in the external examination question paper)	
Skills acquired from this Course	Knowledge,ProblemSolving,Analyticalability,ProfessionalCompetency,Professional Communication and Transferrable Skill
Recommended Text	1. Avantina Sharma, Text Book of Food Science and Technology, International Book Distributing Co, Lucknow, UP, 2006. 2. Sivasankar, Food Processing and Preservation, Prentice hall of India Pvt Ltd, New Delhi. IIIrd Printing, 2005. 3. Food Processing Technologies Impact on Product Attributes 2016 published by CRC Press Amit K. Jaiswal
Reference Books	1. Peter Zeuthen and Leif Bogh Sorenson, Food Preservation Techniques, Woodland Publishing Ltd, Cambridge, England, 2005. 2. P.J.Fellows,Food Processing Technology. Principles and Practices, Second Edition, WoodlandPublishingLtd,Cambridge,England,2002. 3. Food Processing Principles and Applications 2014 published by Wiley Buddhi Lamsal, Stephanie Clark, Stephanie Jung
Website and E learning source	• https://www.niir.org/books/book/complete-technology-book-on-processing-dehydration-canning-preservation-fruits-vegetables-processed-food-industries-4th-revised-edition/isbn 9788193733929/zb,,41,a,3,0,a/index.html • https://libro.eb20.net/Reader/rdr.aspx?b=1640043

COURSEOUTCOMES

After successful completion of the course the student will be able to:

COS	Description
CO1	Classification, processing, and preservation methods for fruits and vegetables, including Freezing, drying, and storage.
CO2	Milk processing, preservation techniques like pasteurization, UHT, and spray drying, and Understanding nutritional losses.
CO3	Pre-processing techniques, preservation methods such as canning and drying, and studying nutritional losses.
CO4	Types of seafood, pre-processing, preservation with dielectric, ohmic, and infra-red heating, and storage considerations.
CO5	Confectionery types, sugarcane &sago technology, and utilization of by-products.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions.

Title of the Course	Food Processing and Preservation Practical						
Paper No.	Core III						
Category	Core	Year	I	Credits	4	Course Code	23PFPCP01
		Semester	I				
Instructional hours per Week	Lecture	Tutorial	Lab Practice			Total	
	-	-	6			6	

COURSE OBJECTIVES:

To enable the students

• Comprehend the knowledge gained on characteristics and properties of foods during cooking.

• Apply the properties of food in various food processing and preparations Analyze the factors affecting cooking quality of foods.

• Create appropriate food preparation and processing methods to ensure quality standards.

UNIT - 1

Demonstration – Effect of blanching on foods.

Reconstitution test for dried vegetables.

Preservation of coconut shreds using humectants

UNIT – 2

Preservation by drying:

Drying and dehydration of fruits and vegetables, vathal and vadagam

Preservation by fermentation:

Preparation of fermented product –wine, vinegar, sauerkraut.

UNIT – 3

Preservation by high concentration of sugar:

Sugar–Jam, Jelly, Squash, Marmalade, Preserve, Ginger Murabba.

Preservation by high concentration of salt and acid:

Salt - Pickle, Sauce, Ketchup.

UNIT-4

Preservation of Milk:

Preservation by application of heat (boiling)

Preservation by low temperature (freezing, refrigeration)

Preservation by acid – Paneer

UNIT-5

Demonstration of various machineries in food processing

TEXTBOOKS:

1. Srilakshmi B. (2015).Food Science ,New Age International (P) Ltd. Publishers.

2. Potter N. and Hotchkiss J.H. (1996). Food Science, Fifthed., CBS Publishers and Distributors, New Delhi

3. Reddy S M. (2015). Basic Food science and technology. New Age International publishers. 2nd Edition.

REFERENCES:

1. Desrosier, N. W. and James N.(2007). Technology of food preservation AVI Publishers.

2. Manay,S. and Shadaksharamasamy, (2004).Food: Facts and Principles, New Age International Publishers, New Delhi. 1st edition.

E - LEARNINGRESOURCES:

http://www.fao.org/3/V5030E/V5030E00.htmhttps://fmtmagazine.in/fruits-vegetables-processing-technologies/

COURSEOUTCOME:

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Gain knowledge on sensory analysis and cereal cookery concept
CO2	Understand the properties of various food.
CO3	Analyze the cooking quality of foods and apply knowledge in food industries.
CO4	Identify and understand the Physical characteristics.
CO5	Revise appropriate food preparation and processing methods to ensure standards in food industry.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussion.

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD CHEMISTRY</td></tr>
<tr><td>Paper No.</td><td colspan="7">ELECTIVE 01</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PFPE01</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td>Instructional hours Per week</td><td>Lecture
4</td><td>Tutorial
1</td><td colspan="3">Lab Practice
-</td><td colspan="2">Total
6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food chemistry</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
Gain knowledge on the properties & composition of different foods.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Properties of Foods: Physico-Chemical properties of foods –Organic food components, Colloids-definition, types & properties& uses in food system. Water-Structure, Water content in foods, physical properties, Hydrogen bonding, Types of water in foods, Water activity-Water activity and food spoilage. Interaction of water with food components, Moisture determination.

UNIT - II
Carbohydrate classification, occurance, structure, properties, physic-chemical reactions. Hygroscopicity & solubility, optical rotation, mailardreaction, caramalisation, gelatinization, dextrinisation, retrogradation. Fibre-classification, food sources, functional properties and uses.

UNIT - III
Proteins- classifications, structure, physical and chemical properties of proteins. Reaction of protein in Food system-Dissociation, denaturation, hydration, swelling, foam Formation & Stabilisation, emulsification. Amino acid in Maillard reaction. Nature of protein in meat, milk, egg and cereals, pulses, Reactions of protein in food system

UNIT - IV
Lipids- Classification, physical and chemical properties, Fattyacid Classification, structure and properties. Physiochemical reactions – Isomersation, hydrogenation, unsaturation,inter-esterification, emulsification, auto–oxidation, rancidity

UNIT – V
Vitamins Structure & properties of A,D,E,K, folic acid, thiamine, niacin ,ascorbic acid, cholecalciferol in foods. Minerals-Structure & Properties of Calcium, Phosphorus, Iron, Zinc, Copper & Iodine.</td></tr>
</table>

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC/ TRB/ NET / UGC–CSIR / TNPSC / etc**.**
Skills acquired from this Course	Knowledge,ProblemSolving,Analyticalability,ProfessionalCompetency,Professional Communication and Transferrable Skill
Recommended Text	1. Iqbal.s.a., Mido.Y, "FoodChemistry" Discovered Publishing Houses, NewDelhi ,2005. 2. Lilianhoagland Meyer, "FoodChemistry", CBS Publishers and Distributors, 4596/1- A, 11 DaryaGanj, NewDelhi – 110002 (India). 3. Fennema's Food Chemistry 2017 CRC Press Kirk L.Parkin,Srinivasan Damodaran
Reference Books	1. Alais, Lindan,"Food Biochemistry",Ellishorunros LTD., NewYork. 2. Potter, N.N.1978,Food Science 3rdEd. AVI,Westport. 3. Coultatte,. T.O.,"Food The Chemistry of Components", Rsc, Royal Society of Chemistry
Website and E learning source	• https://archive.org/details/in.ernet.dli.2015.549657/page/n3/mode/2up • http://154.68.126.6/library/Food%20Science%20books/batch1/Food%20 - %20The%20Chemistry%20of%20its%20Components%20Fourth_Edition.pdf

COURSE OUTCOMES

After successful completion of the course the student will be able to:

COS	Description
CO1	Understand physico-chemical properties of foods, including colloids, water structure, and Moisture determination.
CO2	Classify carbohydrates and fibers, grasp their structures and properties, and comprehend Physic - chemical reactions.
CO3	Identify protein classifications, structures, and reactions in food systems like denaturation and emulsification.
CO4	Categorize lipids, comprehend their physical and chemical properties, and explain key reactions Like hydrogenation and rancidity.

CO5	Recognize the structures and properties of vitamins and minerals in foods, understanding their Importance in human nutrition

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD PRODUCTION AND AGRICULTURE</td></tr>
<tr><td>Paper No.</td><td colspan="7">ELECTIVE02</td></tr>
<tr><td>Category</td><td>Elective</td><td>Year</td><td>I</td><td>Credits</td><td>3</td><td>Course Code</td><td>23PFPE02</td></tr>
<tr><td></td><td></td><td>Semester</td><td>I</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Instructional Hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td></td><td>4</td><td>1</td><td colspan="3">-</td><td>5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of Food production and agriculture</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">Enable students to
1. To learn about scope of agriculture and production of cropping India and Tamilnadu.
2. To improve the knowledge about post harvesting techniques of food grains.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Agriculture-scope in India and TamilNadu, Branches of Agriculture, Agronomic classification of crops and their economic importance, Major crops of India and TamilNadu-Adaptation and distribution. Agro-climatic norms of major field crops, Development of scientific agriculture in world and India. Traditional Agricultural practices Vs Modern Agricultural practices

UNIT-II
Crop production- Production trends in world, India and Tamil Nadu. Factors affecting crop production. Zero budget agricultural production. Systems of farming-wet, irrigated, dry and rain fed farming. Factors governing the choice and varieties, Cropping patterns and systems in India and Tamil Nadu, crop rotation -advantages of crop rotation followed in India and Tamil Nadu.
UNIT -III
General procedure for cultivation of wetland crops and garden land crops-field preparation, sowing/planting, maintenance/field sanitation, cost of cultivation and economics .Importance of Me-too syndrome in agricultural production.
Irrigation management–methods of irrigation suitability, advantages and limitations, irrigation systems of India and Tamil Nadu. Weeds Classification and its characteristics, principles and methods of weeds control (outline only)</td></tr>
</table>

	UNIT – IV Manures and fertilizers-Types and its role in crop production, factors affecting quantity of manures and fertilizers for different crops. Drawbacks of artificial fertilizers Nutrient potential of different organic manure Agricultural, Industrial and Urban wastes- preparation enriched Farm Yard Manure(FYM)–Zinc enriched organics, compost making- coir pith, sugarcane trash, farm waste, farm weds and vermicomposting **UNIT - V** Storage of food grains-Types and characteristics of storage structures, grain storage and distribution system in India and Tamil Nadu. General aspects of food security in India. Agricultural research schemes in India and Tamil Nadu. Government subsidy scheme for agricultural farming. Government Bodies supporting agriculture–NABARD, SFAC, KVK, Horticulture board, MSME, DIC, SFC, FPO.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination Question paper)	Questions related to the above topics, from various competitive examinations UPSC/TRB/ NET/UGC–CSIR /TNPSC/etc.
Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Dharma, A.K.1996. Organic Farming for sustainable Agriculture. Agri Botanical Publishers(India), Bikaner. 2. Gopal Chandra De.1997. Fundamentals of Agronomy. Oxford and IBH publishing Co.Pvt Ltd, New Delhi. 3. Icar.1996. Handbook of Agriculture. Indain Council of Agricultural Research, New Delhi. 4. T.N.A.U.1999. Crop production guide.T.N.A.U .and Directorate of Agriculture , Chennai.
Reference Books	1. Agricultural Trade, Policy Reforms, and Global Food Security By Kym Anderson· 2016 published by Palgrave Macmillan US

	2. Globalization of Food and Agriculture and the Poor By Per Pinstrup-Andersen, International Food Policy Research Institute·2008. 3. Sustainable Agriculture and Food Security 2022 published by Springer International Publishing Elena Popkova, Marina Kovaleva, Walter Leal Filho
Website and e-learning source	•http://eprints.nias.res.in/755/1/2014-SP5 Organic%20Farming%20and%20Sustanability.pdf • https://ncert.nic.in/textbook/pdf/hesc101.pdf

COURSE OUTCOME:

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	The concepts and principles of food processing.
CO2	The various processed food products from plant And animal sources.
CO3	The by-products utilization from food processing.
CO4	The systematic knowledge of basic and applied Aspects in food processing and technology.
CO5	The various post-harvest technologies for different food products

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD MICROBIOLOGY</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core IV</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPCT03</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food microbiology</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students to :
1. To list the major food spoilage microorganisms
2. To analyze methods used to control or destroy microorganism commonly found in food.
3. To understand the role of beneficial microorganisms in food processing and preservation</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Introduction to Food Microbiology, Classification of micro-organism, importance of micro-organisms in food- primary sources of micro-organisms in food- intrinsic and extrinsic parameters of food affecting microbial growth. Isolation and detection of microorganisms in food

UNIT –II
Spoilage of foods - principles and types of spoilage. Microbial spoilage of cereal and cereal products and its prevention. Microbiology of milk and milk products kinds of microorganism, sources of contamination and prevention.

UNIT - III
Contamination, spoilage and preventive measures of sugar and sugar products, fruits and vegetables- kinds, sources, prevention

UNIT –IV
Microbiology, spoilage and preventive measures of meat, poultry, fish, egg.

UNIT –V
Food in relation to diseases- Food poisoning and intoxication- Bacterial- Bacillus, Clostridium botulinum, Clostridium</td></tr>
</table>

	perfringens, E.coli, Salmonella, Shigella, Staphylococcus aureus, Non bacterial- protozoa, fungi, virus, algae – characteristics and preventive measures. Indicators of water and food safety and quality.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Frazier, W.C and Westoff, 1995.Food Microbiology, Tata McGraw Hill Publishing Co.Ltd, NewDelhi. 2. Gould,G.G.1996.New methods of Food Preservation, Blackie Academic & Professional, Chennai. 3. Jay,J.M.1996.Modern Food Microbiology.CBS Publishers & Distributors, NewDelhi.
Reference Books	1. King.R.D and P.S.J. Cheetham 1986.Food Biotechnology, Elsvier Applied Science, NewYork. 2. George J.Banwart, 1998. Basic Food Microbiology, 2nd edition, CBS Publishers, NewDelhi.
Website and e-learning source	• http://www.cold.org.gr/library/downloads/Docs/Handbook%20of%20Food%20Preservation. PDF • https://mprc.ajums.ac.ir/_nrc/documents/Modern%20Food%20Microbiology.pdf

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Understand the Classification & primary source of microorganism.
CO2	Name and describe Microbial spoilage of cereals & milk products.
CO3	Enumerate Fruits, vegetables & sugar products – contamination, spoilage & preventive measures; Fleshy foods-contamination, spoilage & preventive measures.
CO4	Predict the causative agent and pathogenesis of disease causing food-borne pathogens.
CO5	To learn about the pathogens and spoilage of microorganisms

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, PowerPoint presentations, Assignments and Discussions

Title of the Course	**FOOD MICROBIOLOGY PRACTICAL**						
Paper No.	**Core V**						
Category	**Core**	**Year**	I	**Credits**	5	**Course Code**	**23PFPCP02**
		Semester	II				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	5	1	-			6	

Learning Objectives

To enable the students to:

- To ensure that your food product is safe for consumption, microbiology lab food testing is a must
- The aim of these tests is to detect and quantify pathogenic microorganisms

PRACTICALS

UNIT - 1

Preparation of common laboratory media and special media.

Staining: Gram staining, acid –fast, spore, capsule and flagellar staining, Motility of bacteria, staining of yeast and mold.

UNIT - 2

Identification of important molds and yeast.

UNIT – 3

Microbiology of milk -MBRT

Microbiology of water -MPN Test

UNIT – 4

Isolation and identification of specific microorganism in processed foods. (any foods)

Isolation and identification of specific microorganism in unprocessed foods. (Fruits, vegetables, fleshy foods, bottled drinks)

UNIT – 5

Isolation of specific culture.

TEXT BOOKS:

1. Frazier, W.C and Westoff, 1995.Food Microbiology, TataMcGraw Hill Publishing Co.Ltd, NewDelhi.

2. Gould, G.G.1996.New methods of Food Preservation, Blackie Academic & Professional, Chennai.

3. Jay, J.M.1996. Modern Food Microbiology. CBS Publishers & Distributors, NewDelhi.

REFERENCES:

1. King.R.D and P.S.J.Cheetham 1986.Food Biotechnology, Elsvier Applied Science, NewYork.

2. George J. Banwart, 1998.Basic Food Microbiology, 2nd edition, CBS Publishers, New Delhi.

COURSEOUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	The student will be able to isolate and identify specific Microorganisms in foods
CO2	Illustrate the role of microorganisms in foods
CO3	Cultivate and enumerate microorganisms from various food samples
CO4	The knowledge to describe the diversity of microorganisms
CO5	Compare various physical and chemical methods used in the control of micro organisms

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

Title of the Course	**FOOD ANALYSIS PRACTICAL**						
Paper No.	**Core VI**						
Category	**Core**	**Year**	I	**Credits**	4	**Course Code**	**23PFPCP03**
		Semester	II				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	5	1	-			6	

Learning Objectives

To enable the students to:

- To characterize food products in terms of chemical composition, traceability, safety, quality and nutritional value.
- Select appropriate analytical techniques for specific food components
- Compare advanced and conventional techniques and instruments to analyze chemical and physical properties of food.

PRACTICALS

UNIT – 1

Estimation of moisture content

Estimation of ash content.

Estimation of carbohydrate by anthrone method.

Estimation of protein by Lowrys method.

Determination of Fibre content

Estimation of total sugar in honey by phenol sulphuric acid

UNIT – 2

Estimation of minerals –Calcium, Phosphorous, Iron

UNIT – 3

Estimation of Fats- Saponification number, Iodine number, Acid number of oils

Estimation of lipid content in egg yolk

UNIT – 4

Estimation of vitamins- Vitamin A ,Vitamin C

UNIT – 5

Demonstration on Calories, Nitrogen, Thiamine, Fat, Riboflavin

TEXT BOOKS:

1. Oser,B.L.,(1954)Hawke's Physiological Chemistry, XIV Edition, Tata MC Graw Hill Publishing company Ltd, Mumbai.

2. Jayaram.J.(1996),Laboratory manual in Biochemistry, New Age International Ltd, Publishers, New delhi, fifth reprint.

REFERENCES:

1. Raghuramulu, N.Nair, K.A. and Kalyanasundram, A.(1983) A manual of laboratory techniques, National, Institute of Nutrition, Silver prints, Hyderabad.

2.Sadasivam, S and Manickam, A(1991) Biochemical methods, Newage International Pvt. Pu blishers, New delhi, 2nd Edition

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	The student will be able to undertake the nutrient analysis of calories, fiber, moisture, ash, calcium, iron, iodine number, lipid content, vitamin A& C
CO2	Describe various analytical methods employed to quantify the composition and reactions of various food components.
CO3	Gain a clear understanding of the analytical procedures used to analyse specific food components
CO4	Apply a range of chemical analyses of food components
CO5	Interpret and report on results obtained in a scientific format

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">INSTRUMENTATION IN FOOD PROCESSING</td></tr>
<tr><td>Paper No.</td><td colspan="7">ELECTIVE 03</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPE03</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td>Instructional hours</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>Per week</td><td>3</td><td colspan="2">1</td><td colspan="2">-</td><td colspan="2">4</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of instrumentation in food processing</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students to :
1. To develop the skill about operation techniques in food processing equipment’s.
2. To learn sensors and temperature control instrumentation are critical for measuring, regulating, and recording temperatures to ensure food safety</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Unit operations – classification – conservations of mass and energy- Dimensions and units – Dimensional and unit consistency – dimensionless ratios – Evaporators Single and multiple effect evaporator- Vacuum evaporator- - Forced circulation evaporators.

UNIT –II
Mechanical separations- Filtration –Filter cake compressibility- Filtration equipment- Sedimentation, Gravitational sedimentation of particles in fluid and gas. Setting under combined forces- Centrifugal and liquid–Liquid separation– Centrifuge–Size reduction.

UNIT - III
Principles of combination in Crushing and Mixing – Characteristics- Particle size distribution – Energy and power requirements – Crushing efficiency- Mixing of solids, pastes, dry powders- Criteria of mixer effectiveness- Mixing index. Solar equipments – Heaters, driers, cookers, distillators for food products.

UNIT –IV
Refrigerators – Types of refrigeration system- Mechanical vapour compression – Vapour absorption system – Components of mechanical refrigeration- Refrigerants Properties-Comparison of Freon and ammonia systems-cold storages-Design of cold storages-Defrosting-Humidifiers and dehumidifiers.</td></tr>
</table>

	UNIT –V Principles and uses of Gas chromatography, Gas liquid chromatography, Electrophorosis, High performance liquid chromatography and Atomic Absorption Spectrophotometry, pH meter, Photoelectric colorimeter.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Coulson, J.M. and J.F. Richaradson, 1977. Chemical Engineering. Volume I to Vthe pergamon press NewYork. 2. Earle,R.L.1985 unit operations in Food Processing Pergamon Press. Oxford. U.K. 3. Henderson,S.M.and R.L.Perry1955.Agricultural process Engineering, John Wileyand sons, NewYork. 4. McCabe, W.L. and J.C.Smith 1976 unit operations of chemical Engineering. McGraw– HillInc. Kosaido printing Ltd. Tokyo, Japan.
Reference Books	1. Pande,P.H.1994 Principles of Agricultural Processing AText Book, Kalyan Publishers, Ludhiana. 2. Sahay, K.M. and K.K. Singh, 1994. Unit operation of Agricultural Processing, Vikas Publishing House Pvt., Ltd., NewDelhi. 3. W.W. Ewing, 1970, Instrumental Methods of Chemical Analysis, McGraw Hill Book Company, NewDelhi.
Website and E learning source	•https://books.google.co.in/books?id=cJRc8NHac5wC&printsec=frontcover&source=gbs_atb#v=onepage&q&f=false •https://books.google.co.in/books?id=FE6UUliY7i8C&printsec=frontcover&vq=%22Instrumentation+and+Sensors+for+the+Food+Industry%22&source=gbs_citations_module_r&cad=7#v=onepage&q=%22Instrumentation%20and%20Sensors%20for%20the%20Food%20Industry%22&f=false

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Understand the general Unit operations-classification, mass & energy, types of evaporations.
CO2	Apply the knowledge of Mixing & crushing-energy & power requirements & solar equipments. Refrigerators-types, humidifiers & dehumidifier.
CO3	Gain knowledge of Mechanical separation, filtration equipments & size reduction
CO4	Compare different instrumental methods for specific food analysis
CO5	Describe the basic principles of instrument, theories and operations of key components of the instrument used for food component analysis.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD BIOTECHNOLOGY</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective 4</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPE04</td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td>Total</td></tr>
<tr><td>4</td><td>1</td><td colspan="3">-</td><td>5</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food biotechnology</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students to :
1.To develop students knowledge, understanding and skills in food biotechnology.
2.To enhance students ability to identify current and future research directions in food biotechnology.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT-I
Important industrial microorganism. Media for industrial fermentations, criteria used in media formulation, medium composition–energy, carbon, nitrogen and other growth factors–buffering and antifoam agents. Production of culture, maintenance and preparation, bacterial culture, yeast culture and mold culture.

UNIT-II
Food Fermentation–Batch and continuous process, Ferment or design–solid substrate fermentation, downstream processing, instrumentation and control. Alcoholic beverages: Beer, wine: Non alcoholic beverages: tea, coffee, cocoa, Dairy products.

UNIT-III
Fermented vegetables-sauerkraut, soya based foods – tofu, temphe, yogurt; meat fermentation- sausage; Vinegar. Development of novel sweeteners, production of fats- Lard, amino acids-L-aspartate, Development and formulation of probiotic foods. Isolation & purification of starch, Starch in food industry, Modification of starch. Isolation of protein from soyabean, milk, egg; Protein hydrolysates;</td></tr>
</table>

	Modification of protein. **UNIT-IV** Enzyme technology in food industry: industrial enzymes and its applications (with respect to food processing industry). Micro encapsulation, List of industrial enzymes and their applications in food industry, Production of food industrial enzymes. Immobilization of enzymes- method of immobilization, advantage and disadvantage of immobilization. Uses of immobilized enzymes- High fructose corn syrup preparation. **UNIT-V** Ethical issues concerning GM foods; testing for GM foods; current guidelines for the production, release and movement of GM foods; labeling and traceability; trade related aspects; biosafety; risk assessment and risk management. Public perception of GM foods. IPR. GMO Act 2004. (Genetically Modified Crops Management Act 2004).
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1.Owen pward (1989), Fermentation Biotechnology Principles, Processes And Products,Prentice H New Jersey. 2.Solomons, G.L.(1983), Single Cell Proteins-Critical Reviews of Biotechnology, Moo Young Compressive Biotechnology Scientists Foundations,Engineering Consideration. 3.Prescot(1987), Industrial Food Preservation, John Willey And Sons. 4.Frazier And WestHoff (1995), Food Microbiology,Tata Mcgraw

	Hill Publishing Company Ltd, New Delhi. 5.Dubey, R.C. (2001) Text Book Biotechnology S.Chand And Co Ltd, New Delhi.
Reference Books	1.Gupta,P.K.(1996),ElementsofBiotechnology,RostogiAndCo,Meerut. 2.Paul, P.C. and Palmer (1972) Food Theory And application John Wiley Sons, NewYouk 3.GaryWalshAndDenisR.Headen,ProteinBiotechnology,S.ChandAndCo,Ltd,NewDelhi. 4.Dubey,R.C.AndMaheswari,D.K.A.TextBookofMicrobiology,S.ChandAndCo,Ltd,NewDelhi. 5.FoodScienceAndFoodBiotechnology,2003,GustaraF.Gutierrez-Lopez. 6.Lee,B.H.FundamentalsofFoodBiotechnology.VCH.2006.
Website and e-learning source	• https://g.co/kgs/5J7wnE • https://content.kopykitab.com/ebooks/2016/07/8081/sample/sample_8081.pdf

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Identify the Media composition & production culture.
CO2	Identify the composition & production culture.
CO3	Apply Modification of starch & protein, development of novel sweeteners.
CO4	Appraise Enzyme technology, micro encapsulation.
CO5	Interpret GM Foods production, biosafety & risk management.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="8">FOOD PRODUCT DEVELOPMENT</td></tr>
<tr><td>Paper No.</td><td colspan="8">NME I</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td colspan="2" rowspan="2"></td></tr>
<tr><td>Semester</td><td>II</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="3">Total</td></tr>
<tr><td>2</td><td>1</td><td colspan="3">-</td><td colspan="3">3</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basic concepts of food product development.</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">To enable the students to :
1. To develop students knowledge, understanding and skills in food product development.
2. To enhance students ability to identify current and future research directions in food product development.</td></tr>
<tr><td>Course Outline</td><td colspan="8">UNIT-I
Definition and classification, Characterization and factors shaping new product development. Role of ingredients and processing in defining attributes.

UNIT-II
Shelf life requirements and factors affecting shelf life and product attributes.

UNIT-III
Process of flow sheet development, preparation of concept testing documentation.

UNIT-IV
Concept testing approaches sampling methods, role of sensory evaluation. Preparation of concept testing documentation.

UNIT-V
Research and new product development – patents – patent laws – International code for Intellectual Property rights.</td></tr>
<tr><td>Extended Professional Component (is a part of internal component only, Not to be included in the external examination question</td><td colspan="8">Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.</td></tr>
</table>

paper)	
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1.Sivarama prasad.A,1985,Agricultural Marketing in India-Mittal Publications, New Delhi. 2. 2.Acharya.S.S,andN.L.Agarwal,1992,Agricultural Marketing in India-Oxford and IBH Publishing Pvt.,Ltd.,New Delhi. 3. Developing New Food Products For a Changing Market Place,2nd Edition,2005,Aaron,L.Brody,JohnB.Lord.
Reference Books	1.New Food Product Development,2004,GordonW.Fuller. 2.John Kao , Creativity & Entrepreneurship package Compatibility, toxicity, tainting and corrosion. Packaging and environment.
Website and e-learning source	https://books.google.co.in/books/about/New_Food_Product_Development.html?id=pnhI6e_zSWAC&printsec=frontcover&source=kp_read_button&redir_esc=y https://books.google.co.in/books?hl=e&lr=&id=nC7OGhzZn5YC&oi=fnd&pg=PR9&dq=info:PDilBbWmXuEJ:scholar.google.com/&ots=i3fMfkzxS6&sig=3O0kzWHVZR86EV_mEsjx0PPqaI#v=onepage&q&f=false

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Know the basic principles, concept of food product development & factors involved in food habit alteration
CO2	Understand the steps in product development & calculate the nutritive value, cost of production
CO3	Formulate of new food products for all age groups
CO4	Apply the Concept of market & marketing efficiency
CO5	To know the concept of food product development & factors involved in food habit alteration

MAPPING (CO/PSO) :

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussion

<table>
<tr><td>Title of the Course</td><td colspan="8">FOOD REGULATIONS AND QUALITY CONTROL</td></tr>
<tr><td>Paper No.</td><td colspan="8">Core VII</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>II</td><td>Credits</td><td>5</td><td>Course Code</td><td colspan="2">23PFPCT04</td></tr>
<tr><td>Semester</td><td>III</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="8">Basic concepts of food regulations and quality control</td></tr>
<tr><td>Objectives of the course</td><td colspan="8">To enable the students
1. To standardize food products through sensory evaluation.
2. To understand the fundamental food quality control procedures.
3. To know about Food standards and Laws</td></tr>
<tr><td>Course Outline</td><td colspan="8">UNIT – I
General principles of quality control – quality attributes size, shape, color, consistency, viscosity, texture, taste and flavor.

UNIT –II
Methods of evaluation of food quality–sensory, objective technique, microbiological methods of quality evaluation, shelf life assessment.

UNIT - III
Common adulterants, tests to detect adulterants contaminants, naturally occurring toxins in food metallic pesticide and preservative contaminants. Nonnutritive food components and their potential health effects, phoyphenols, tannins, phytooestrogens, cyanogenic compounds, lecithin, saponins.

UNIT –IV
Government and trade standards for quality–food laws and regulations– PFA, FPO and Food Safety Act 2006. BIS standards, Agmark standards, Compulsory National legislation Act, Essential Commodities Act, Consumer protection Act. International Standards for export, Codex Alimentarius, WTO, ISO, WHO and FAO, FSSAI, APEDA and MPEDA.

UNIT -V
Rules and regulations for setting up of a processing unit. Criteria for ingredients and finished products. Aspects of microbiological safety in food preservation technologies, Establishment and implementation of HACCP, Continuous Assessment System, Total quality management and quality audits in food industries.</td></tr>
<tr><td>Extended Professional Component (is</td><td colspan="8">Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.</td></tr>
</table>

a part of internal component only, Not to be included in the external examination question paper)	
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Giridarillal Sidappa G.S., and Tandon, G.L. (1979) Preservation of fruits and vegetables, ICAR, New Delhi. 2. FPO (1955) Quality control. 3. Horace D. Graham. 1980 The safety of foods, 2nd End. AVI Publishing Co. Inc. Westport.
Reference Books	1. Julie Miller Jones.1992Food Safety, Enagan Press, USA. 2. Lewis M.J. 1987 Physical Properties of Food and processing system. Ellis Horwood Ltd., England. 3. Picgott, J.R.1984. Sensory analysis of Foods Elsevier. Applied Science Publisher,New York. 4. Principles and practices for the safe processing foods, David Ashapton. 5. Early.R.(1995):Guide to Quality Management Systems for the Food Industry.
Website and e-learning source	https://books.google.co.in/books/about/Physical_Properties_of_Foods_and_Food_Pr.html?id=F_GiAgAAQBAJ&printsec=frontcover&source=kp_read_button&redir_esc=y

COURSEOUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Understand the Principles of quality control & attributes.
CO2	Enumerate Methods of food quality evaluation.
CO3	Name and describe Food adulteration, contamination & nonnutritive food components and its health effects.
CO4	To know the attributes of quality and attribute.
CO5	Develop the knowledge Standards for food quality Rules & regulation for setting up a processing unit.

MAPPING (CO/PSO) :

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">RESEARCH METHODOLOGY AND STATISTICS</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core VIII</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>II</td><td>Credits</td><td>5</td><td>Course Code</td><td>23PFPCT05</td></tr>
<tr><td>Semester</td><td>III</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of research methodology and statistics</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students:
To know about research & their types, coding, report writing, & their probability.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Meaning of Research, Role of Statistics and research in Home Science Discipline, objectives of research, Types of research and their application, selection and formulation of research problem, Hypothesis, Designing a research – different types, census and sample method, Theoretical basis of sampling, Sampling methods- Random sampling methods, size of sample, sampling and Non-sampling errors.

UNIT –II
Methods of collecting primary data- Questionnaire, preparation of schedules, interview method, case- study method, Experimentation method, sources of secondary data, precautions while using secondary data. Editing and coding the data, Organization of data, classification- meaning and objectives, types of classification, formation of discrete and continuous frequency distribution, Tabulation – role, parts of a table, general rules of tabulation, types of tables.

UNIT - III
Representation of data- Diagrammatic and graphical representation- significance of diagrams and graphs, general rules for constructing diagrams, Types of diagrams, graphs of time series, graphs of frequency distribution. Interpretation and report writing- meaning of interpretation technique, precautions, format of research report, types, steps and stages, mechanism and style, essential of good report, footnotes and bibliographical citations. Scale of measurements.</td></tr>
</table>

	UNIT –IV Measures of central tendency- mean, median, mode, their relative advantages and disadvantages, measures of dispersion- mean deviation, standard deviation, quartile deviation, co-efficient of variation, percentile and percentile ranks. Association of attributes, contingency tables, correlation, coefficient of correlation and its interpretation, rank correlation, regression equations and predictions. **UNIT -V** Probability-Rules of probability and its applications. Distribution-Normal, binomial, their properties, importance of these distributions in statistical studies. Tests of significance, large and small samples,"t"and F test, tests for independence using chi- square test. Analysis of variance–One-way and two-way classification.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Kothari,C.R.(2002), Research Methodology 2. Gupta,S.P.(2002), Statistical Methods, Sultana Chandandsons,31 strevised edition 3. Devadas, R.P.(1989), A Handbook on Methodology of Research, Sri Ramakrishna Vidhyalaya, Coimbatore. 4. Ramakrishnan, P. (2001), Biostatistics, Saras publication.
Reference Books	1. Donald, H.M.C.Burney (2002), Research Methods, Fifth edition, Thomson and Wadsworth Publications 2. Shanthi,P., Sophia and Bharathi (2000), Computer oriented statistical methods/ probability and statistics, charulatha publications, second edition. 3. Pillai,R.S.N and Bagavathi, V (2001),Statistics, Chand and company limited

Website and e-learning source	• https://books.google.co.in/books?id=hZ9wSHysQDYC&printsec=frontcover&dq=Kothari,C.R.(2002),+Research+Methodology&hl=en&sa=X&ved=2ahUKEwiGl8mFxM3uAhXZ8XMBHXdvBf8Q6AEwAHoECAAQAg • https://books.google.co.in/books?id=g42fbO0xrg0C&pg=PA364&dq=Gupta,S.P.(2002),+Statistical+Methods,+Sultana+Chand+and+sons,+31st+revised+edition&hl=en&sa=X&ved=2ahUKEwizpPuqxM3uAhWEguYKHV_GAUkQ6AEwAHoECAEQAg

COURSEOUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Addresses the issues inherent in selecting a research problems
CO2	Classify the types of research.
CO3	Discuss the techniques and tools to be employed in completing a research project.
CO4	Apply the methods of data collection
CO5	To test the goodness of fit and independence of attributes.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD PACKAGING TECHNOLOGY</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core IX</td></tr>
<tr><td>Category</td><td>Core</td><td>Year</td><td>II</td><td>Credits</td><td>5</td><td>Course Code</td><td>23PFPCT06</td></tr>
<tr><td></td><td></td><td>Semester</td><td>III</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food packaging technology</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students:
1. To understand the various properties of food packaging materials.
2. To Select suitable packaging material for different food substances.
3. To understand the concept of canning of food products.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Packaging-Concepts, definition, significance, classification, Flexible packaging materials and packaging forms-paper, regenerated cellulose, film, aluminum foils, and lamination, wrappers, bags, pouches and collapsible tubes.

UNIT –II
Spiral packaging methods- vacuum packaging, gas packaging and shrink packaging. Packaging of milk and milk products–milk, condensed milk, evaporated milk, milk powder, cream, butter & cheese. Semi rigid packaging materials & forms–Aluminum Containers, set up paper cartons, folding paper board cartons, moulded pulp containers and plastic containers.

UNIT – III
Rigid packaging materials-glass containers and Composite Containers. Rigid packaging materials and package forms-Aerosol containers, Solid & Corrugated fiber board Containers, wooden boxes & crates. Cylindrical shipping containers and problems in packaging dehydrated foods. Packaging requirements & materials for chocolate and Confectionaries-chocolate, candy, confectionary peanut butter, chewing gum, jams &jellies. Packaging requirements and materials for beverages, vegetables and fruits juices, carbonated soft drinks.</td></tr>
</table>

	UNIT –IV Packaging requirements and materials for fish- fresh, frozen, salted, smoked fish meal. Packaging of egg products. Packaging equipment, principles of weighing filling, sealing, wrapping, cartooning, capping, labeling, coding, marking including bar coding and strapping **UNIT -V** Packaging –Laws and regulations. Aseptic and retort packaging. Testing and evaluation of packaging media- retail packs and transport packages. Produce package Compatibility, toxicity, tainting and corrosion. Packaging and environment.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Stainley Sacharous, Roger.C. Griffin, Principles of food packaging 2nd edition, AVI. Publishing.Co., Westport. 2. Paine, F.A. & Paine, H.Y.A. Hand book of food packaging Leonard Hill.Blackie Son's Ltd, London. 3. Sacharow, S. Hand Book of packaging materials, A VI Publishing company, West Port. 4.Croshy,N.T. Food packaging materials, Applied Science publication limited, London. 5. Paine,F.A.The packaging media, Blackie and Son's Ltd, London.
Reference Books	1. Sacharow and Grilin, Food Packaging, AVI Publications Hot chikess, Food and Packaging interactin-American Chemical Society. 2. Robertson,G.L.Food packaging Technology,News Port,Marcell

	Dekkar,Inc. 3. FoodPackagingPrinciplesAndpractice,1998,GordonL.Robertson. 4. NovelFoodPackagingTechniques,2003,Raija Ahvenainen. 5.Active Packaging For Food Applications,Aaron,L.Brode,Eugene R.Strupinsky,2001.
Website and e-learning source	• https://books.google.co.in/books?id=-OA4szVQvsAC&printsec=frontcover&dq=food+packaging+technology+ppt&hl=en&sa=X&ved=2ahUKEwjP8eD8ss3uAhWD-2EKHdqYDsIQ6AEwAHoECAEQA • https://books.google.co.in/books?id=BizOBQAAQBAJ&printsec=frontcover&dq=food+packaging+technology+ppt&hl=en&sa=X&ved=2ahUKEwjP8eD8ss3uAhWD-2EKHdqYDsIQ6AEwAnoECAIQAg

COURSEOUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Understand the basic concepts of food packaging
CO2	Comprehend on protective packaging of foods
CO3	Study about the packaging materials used for the different food materials
CO4	Evaluate different packaging materials based on various types of analysis in the laboratory
CO5	Comprehend the packaging standards and regulations

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions.

Title of the Course	QUALITY CONTROL AND ADULTERATION PRACTICAL						
Paper No.	Core X						
Category	Core	Year	II	Credits	4	Course Code	23PFPCP04
		Semester	III				
Instructional hours per week	Lecture	Tutorial	Lab Practice			Total	
	5	1	-			6	

Learning Objectives

To enable the students to :

- To identify and correct any deviations from the established quality standards.
- To provide a systematic survey on the theory and implementations of quality control and management activities for different activities.

PRACTICALS

UNIT 1

Establishing Sensory Panels – Designing sensory testing facilities – Analytical test- Conduct a Sensory Evaluation test – Designing score card, Objective evaluation, Instruments used for texture evaluation.

UNIT 2

Adulteration test –for adulterants in milk. Fat and oil, Spices and Condiments.

UNIT 3:

Quality test for milk and ghee.

UNIT 4:

Quantitative test- Water absorption capacity, oil absorption capacity, gluten content in wheat flour

UNIT 5:

Titrable acidity, Total soluble solids, Bulk density, Forming stability of egg

TEXT BOOKS:

1. Giridarillal Sidappa G.S., and Tandon, G.L. (1979) Preservation of fruits and vegetables, ICAR, New Delhi.

2. FPO (1955) Quality control.

3. Horace D. Graham. 1980 The safety of foods, 2nd End. AVI Publishing Co. Inc. Westport

REFERENCES:

1. Julie Miller Jones.1992 Food Safety, Enagan Press, USA.

2. Lewis M.J. 1987 Physical Properties of Food and processing system. Ellis Horwood Ltd., England.

3. Picgott, J.R.1984. Sensory analysis of Foods Elsevier. Applied Science Publisher, New York.

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	**CO Statement**
CO1	Understand the Principles of quality control & attributes.
CO2	Enumerate Methods of food quality evaluation.
CO3	Name and describe Food adulteration, contamination & nonnutritive food components and its health effects.
CO4	To know the attributes of quality and attribute.
CO5	Develop the knowledge Standards for food quality Rules & regulation for setting up a processing unit.

MAPPING (CO/PSO):

CO/PSO	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD PRODUCT DEVELOPMENT & ENTREPRENEURSHIP</td></tr>
<tr><td>Paper No.</td><td colspan="7">Elective 5</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPE05</td></tr>
<tr><td>Semester</td><td>III</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>2</td><td>1</td><td colspan="3">-</td><td colspan="2">3</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food product development & entrepreneurship</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students:
1 .To know about principle of new product development.
2. To know the steps involved in new food product development & Marketing Strategy.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Basic principles & concept of food product development. Cultural approach to development of dietary pattern of various groups-linguistic, regional, religious(ethic). Factors involved in food habit alteration, availability, importance & role of different research & development departments in food production industry.

UNIT –II
Steps in product development –material resources based on market demand, standardization methods involved in product development. Portion size & portion control, Calculation of nutritive value & cost of production, Shelf life & storage stability evaluation procedure of developed food products.

UNIT – III
Formulation of new food products for infants, preschool children, adolescents, pregnant & nursing mothers, old age, sports persons. Selection & training of judges, Development of score card analysis of data. Role of advertisement & technologies in promotion of new products.

UNIT –IV
Concept of market & marketing- Approaches of study marketing & marketing functions, market structure, marketing efficiency. Role of</td></tr>
</table>

	government in promoting agricultural marketing. Conditions for sale, license & identification & quality of processing. Studying the global market status, economic feasibility of new products. **UNIT –V** Entrepreneurship- concept definition of entrepreneurship, Types of entrepreneurship, women entrepreneur, growth, prospects & problems. Small business: Definition & composition of small business- Economic contribution of small business. Strategic planning for small business – Steps in strategic planning
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Sivarama prasad.A,1985,Agricultural Marketing in India-Mittal Publications, New Delhi. 2. Acharya.S.S,and N.L.Agarwal,1992,Agricultural Marketing in India-Oxford and IBH Publishing Pvt.,Ltd.,New Delhi. 3. Developing New Food Products For a Changing Market Place,2nd Edition, 2005,Aaron,L.Brody,JohnB.Lord.
Reference Books	1. New Food Product Development, 2004,GordonW.Fuller. 2. John Kao , Creativity & Entrepreneurship package Compatibility, toxicity, tainting and corrosion. Packaging and environment.
Website and e-learning source	• https://books.google.co.in/books/about/New_Food_Product_Development.html?id=pnhI6e_zSWAC&printsec=frontcover&source=kp_read_button&redir_esc=y • https://books.google.co.in/books?hl=e&lr=&id=nC7OGhzZn5YC&oi=fnd&pg=PR9&dq=info:PDilBbWmXuEJ:scholar.google.com/&ots=i3fMfkzxS6&sig=3O0kzWHVZR86EV_mEsjx0PPqaI#v=onepage&q&f=false

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Know the basic principles, concept of food product development & factors involved in food habit alteration
CO2	Understand the steps in product development & calculate the nutritive value, cost of production
CO3	Formulate of new food products for all age groups
CO4	Apply the Concept of market & marketing efficiency
CO5	Understand the steps in product development

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussion

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD INDUSTRIAL WASTE MANAGEMENT</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core XI</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPCT07</td></tr>
<tr><td>Semester</td><td>IV</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of food industrial waste management</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students:
To learn treatment methods, waste disposal methods from food industry.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Introduction; Classification & characterization of food industrial wastes from fruit and vegetable processing industry, beverage industry, fish, meat and poultry industry, sugar industry and dairy industry.

UNIT –II
Waste disposal methods- physical, chemical and biological; Economical aspects of waste treatment and disposal.

UNIT – III
Treatment methods for liquid wastes from food process industries; Design of activated sludge process, Rotating biological contactors, Trickling filters, UASB, Bio gas plant.

UNIT –IV
Treatment methods of solid wastes; Biological compositing, drying and incineration;Design of solid waste management system; Land filldi gester,Vermicompostingpit.

UNIT -V
Bio filters and bio clarifiers, Ion exchange treatment of waste water, Drinking – water treatment, Recovery of useful materials from effluents by different methods</td></tr>
</table>

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1.Food Industry Wastes: Disposal and Recovery; Herzka A& Booth RG;1981,AppliedSciencePubLtd. 2.Water& Wastewater Engineering; Fair GM, Geyer JC&OkunDA;1986,JohnWiley&Sons,Inc. 3.Wastewater Treatment; Bartlett RE;Applied SciencePubLtd.
Reference Books	1 .Symposium: Processing Agricultural & Municipal Wastes; Inglett GE;1973, AVI. 2.Food Processing Waste Management; Green JH& Kramer A;1979AVI. 3.Environmental Biotechnology :PrinciplesandApplications;RittmannBE&McCartyPL;2001,Mc-Grow-HillInternationaleditions. 4.Environmental Biotechnology; Bhattacharyya BC & Banerjee R; Oxford University Press.
Website and e-learning source	• https://books.google.co.in/books?id=W0EqBgAAQBAJ&pg=PA26&dq=Food+Industry+Wastes:+Disposal+and+Recovery;+Herzka+A+%26+Booth+RG;+1981,+Applied++Science+Pub+Ltd&hl=en&sa=X&ved=2ahUKEwi0zLi9ws3uAhVz4XMBHYpfDc8Q6AEwAnoECAEQAghttps://books.google.co.in/books?id=VhdFd0V3H5YC&pg=PA269&dq=Environmental+Biotechnology;+Bhattacharyya+B+C+%26+Banerjee+R;+Oxford+University++Press&hl=en&sa=X&ved=2ahUKEwjo8vLjw83uAhVBIbcAHQf5CmcQ6AEwAHoECAAQAg

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Understand Classification &characterization of food industrial waste.
CO2	Handle Industrial waste disposal methods and economical aspects.
CO3	Apply Treatment methods for liquid waste and solid waste from food industry
CO4	Control environmental pollution by proper treatment of food waste
CO5	To know the handling methods and economical aspects.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">ANIMAL FEED FORMULATION</td></tr>
<tr><td>Paper No.</td><td colspan="7">Core XII</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Core</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">5</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPCT08</td></tr>
<tr><td>Semester</td><td>IV</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>5</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of animal feed formulation</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students:
To provide the students with knowledge on feed composition, their digestion process, and nutrient metabolism.
To learn to evaluate the nutritional value of the different components, through the application of various systems.</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Nutrient requirements of cattle and buffalo, growth pattern in India domestic buffalo, Intestine meat production from buffalo.

UNIT –II
Nutrient requirement for growth, milk production, feeding of goats, natural common feeds and Fodders of goats. Nutrient requirement & feeding of Dogs & Ducks.

UNIT – III
Nutrient requirements- reproduction, feeding of sheep and weaning pigs, feeding schedule, growers rations.

UNIT –IV
Nutrient requirements of poultry, formulation of poultry rations, feed requirement for production, feeding schedule.

UNIT -V
Tree leaves and shrub straws and crop residues- agro- industrial by-products, rations for feeding during scarcity, preparation of feed.</td></tr>
</table>

Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Hutton,J.B,1962:Proc.New Zealand Sc.Anim.Prod. 2. Ranjhan.S.K. 1991. Chemical composition of Indian feeds and feeding of farm animals, ICAR, New Delhi
Reference Books	1.Razdan,M.N.,Bhosreker,M.Rand Ray,SN.,1965.Ind.J.DairyScie.18,96. 2.Ranjhan,.S.K.2001.Animal Nutrition in the tropic,5th revised edition, P;288-490.
Website and e-learning source	• https://www.researchgate.net/publication/40185239_Feeding_standards_and_feeding_systems • https://www.google.com/url?sa=t&source=web&rct=j&url=http://gohardanehco.com/wp- content/uploads/2014/02/Animal-

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Understand the nutrient requirements of Cattle &Buffalo
CO2	Understand the nutrient requirement for growth in milk production of goals
CO3	To know about the pigs nutrient requirements for growth & milk production
CO4	To know about the nutrient requirements & feeding of sheep & poultry. Understand the leaves, shrub straws crop residues &preparation of feed.
CO5	Understand the nutrient requirement & feeding of sheep

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions

M.Sc. FOOD PROCESSING SEMESTER-IV

PROJECT WITH VIVA-VOCE

Each student shall be required to prepare a training report on the basis of a training undergone by the candidate in Food Industrial Organization, suggesting a possible solution for problems of current interest in the area of processing. The Report Should demonstrate the capability of the student for some creative potential and original approach to solve the practical problems in today's Business or Industry. The report should include industrial research, experiments, interpretations, planning and design of an improved and integrated processing, management systems, presented in a comprehensive manner with recommendations for solutions based on scientifically worked outdate. It contains less than 200 pages.

Topic of dissertation may be chosen from any broad area of Food Processing. The Dissertation to be submitted should include

1. Abstract
2. Introduction
3. Objectives of the study
4. Materials and Methods employed
5. Results and Discussion
6. Summary and Conclusions and
7. Bibliography

Title of the Course	COMPUTER APPLICATION IN FOOD PROCESSING PRACTICAL						
Paper No.	**Elective VI**						
Category	**Elective**	**Year**	II	**Credits**	2	**Course Code**	23PFPEP01
		Semester	IV				
Instructional hours per week	**Lecture**	**Tutorial**	**Lab Practice**			**Total**	
	2	1	-			3	

Learning Objectives

To enable the students to:

1. Learn the fundamental principles, basic concepts and scientific theorems related to the basic computer subjects and their relevance in their daily life.

2. Develop the skills of observation, analyzation, explaining the facts.

PRACTICALS

Windows (2007)

1. a.DOS Commands
   I. Internal Commands.
   II. External Commands.
1. b. Windows (2007).
   I. Windows Explorer.
   II. Main& Accessories.

MS-OFFICE

2. MS.WORD:

2.1. a. Starting MS-WORD, Creating, Saving, Printing (with options), Closing and Exiting.

b. Study of Word–Menu/toolbars.

2.2. Create a document, save it and edit the document as follows:

i) Find and Replace options.

ii) Cut, Copy, Paste options.

iii) Undo and Redo options.

2.3. Format the document:

i) Using Bold, Underline and Italic.

ii) Change Charactersizesing the font dialog box.

iii) Formating paragraph: Center, Left aligns& Right align

iv) Changing paragraph and line spacing, Using Bullets and Numbering in Paragraphs.

v) Creating Hanging Paragraphs.

2.4. Using tap settings enhancing the documents (Header, Footer, Page Setup, Border, Opening &Closing Toolbars, Print Preview).

2.5. Creating Tables in a document, Selecting Rows & Column sort the record by using tables format painter and AutoFormat.

2.6. Prepare a Mail Merge.

2.7. Create a Macros

3. MS-EXCEL

3.1 Create a worksheet, moving/copying/inserting/deleting rows and columns (usage of cut, paste, commands, copying a single cell, copying a range of data, filling up a cell. Undo command, inserting a row, column, deleting rows and columns).

3.2. i) Formatting numbers (Selection Command, Currency format)

ii).Drawing border around cells.

iii).Printing a worksheet (Print preview,Margin Setting,Header,Footer).

3.3. Creating charts

i) Using chart wizard

ii) Changing the chart type(Pie,Bar,Line)

iii) Inserting titles for the axes X.Y

iv) Changing colors.

v) Printing charts.

3.4 Math Functions

i) SUM,COUNT, AVERAGE

ii) MAX,MIN

iii) STDDEV,VAR

iv) ABS,EXP,INT

v) LOG10ANDLOG

vi) MOD,ROUND SORT

vii) USING AUTOSUM

4. MS-POWERPOINT

a. Creating a presentation using auto content wizard.
b. Different views in power point presentation.
c. Setting animation effects/ grouping/ ungrouping/ cropping power/ point objects.
d. Printing a presentation/Importing–Exporting file.
e. Creating an organization chart in Power Point.

5. VISUAL BASIC(6.0)

5.1 Arithmetic Calculator
5.2 Create a Access database for student marklist and generate a data report. Create a database for reservation (Bus,Train& Air) and generate a data report

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	Analyze a given program and develop an algorithm to solve the problem.
CO2	Improve upon a solution to a problem.
CO3	Describe the basic structure of a Visual Basic.
CO4	Understand the operating system and its working .
CO5	Learn the basic word processing, Spreadsheet and Presentation graphics software skills.

MAPPING (CO/PSO):

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Powerpoint presentations, Assignments and Discussions

<table>
<tr><td>Title of the Course</td><td colspan="7">FOOD ADDITIVES</td></tr>
<tr><td>Paper No.</td><td colspan="7">Skill Enhancement Course</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">Elective</td><td>Year</td><td>II</td><td rowspan="2">Credits</td><td rowspan="2">2</td><td rowspan="2">Course Code</td><td rowspan="2">23PFPSEC01</td></tr>
<tr><td>Semester</td><td>IV</td></tr>
<tr><td rowspan="2">Instructional hours per week</td><td>Lecture</td><td>Tutorial</td><td colspan="3">Lab Practice</td><td colspan="2">Total</td></tr>
<tr><td>3</td><td>1</td><td colspan="3">-</td><td colspan="2">6</td></tr>
<tr><td>Prerequisites</td><td colspan="7">Basic concepts of fishery by-products and value addition</td></tr>
<tr><td>Objectives of the course</td><td colspan="7">To enable the students:</td></tr>
<tr><td>Course Outline</td><td colspan="7">UNIT – I
Food additives- definitions, classification and functions, need for food additives, food preservatives, classifications, antimicrobial agents (types, mode of action and their application), safety concerns, regulatory issues in India, international legal issues

UNIT –II
Antioxidants (synthetic and natural, mechanism of oxidation inhibition), chelating agents: types, uses and mode of action Coloring agents: color retention agents, applications and levels of use, natural colorants, sources of natural color (plant, microbial, animal and insects), misbranded colors, color extraction techniques, color stabilization

UNIT – III
Flavour technology: 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; authentication of flavours etc.

UNIT –IV
Sweeteners: natural and artificial sweeteners, nutritive and non-nutritive sweeteners, properties and uses of saccharin, acesulfame-K, aspartame, corn sweeteners, invert sugar sucrose and sugar alcohols (polyols) as sweeteners in food products .Emulsifiers: Types, selection of emulsifiers, emulsion stability, functions and mechanism of action.</td></tr>
</table>

	UNIT -V Nutrient supplements & thickeners, polysaccharides, bulking agents, antifoaming agents, synergists, antagonists. Additives, food uses and functions in formulations; permitted dosages, indirect food additives; harmful effects/side effects associated with various additives (various diseases), additives and natural alternatives.
Extended Professional Component (is a part of internal component only, Not to be included in the external examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / TNPSC / etc.
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Fennema O. R. (1996) Food Chemistry 3rd edition, Marcel Dekker Inc. 2.Fisher C. & Scott T. R. (1997) Food flavours- Biology and Chemistry, The Royal Society of Chemistry. 3. Branen A. L., Davidson P. M. & Salminen S. (1980) Food Additives 2nd edition, Marcel Dekker Inc. 4.A.O.A.C. (1997) Official methods of analysis. 16th edition, Vol. II. AOAC International Publciation
Reference Books	1. Branen AL, Davidson PM & Salminen S. (2001). Food Additives. 2nd Ed. Marcel Dekker. 2. Gerorge AB. (1996). Encyclopedia of Food and Color Additives. Vol. III. CRC Press. 3. Gerorge AB. (2004). Fenaroli 's Handbook of Flavor Ingredients. 5th Ed. CRC Press. 4. Madhavi DL, Deshpande SS & Salunkhe DK. (1996). Food Antioxidants: Technological, 5. Toxicological and Health Perspective. Marcel Dekker. Morton ID & Macleod AJ.(1990). Food Flavours. Part A, BC. Elsevier. 6. Nakai S & Modler HW. (2000). Food Proteins. Processing

	Applications. Wiley VCH. 7. Stephen AM. (Ed.). (2006). Food Polysaccharides and Their Applications. Marcel Dekker.
Website and e-learning source	• https://agritech.tnau.ac.in/fishery/fish_index.html • https://nfdb.gov.in/PDF/Fish%20&%20Fisheries%20of%20India/1.Fish%20and%20Fisheries%20of%20India.pdf

COURSE OUTCOMES

On successful completion of the course the students will be able to

CO No.	CO Statement
CO1	The programme is designed to mould highly skilled fisheries and aquaculture technicians having a thorough understanding of the core areas of the subject
CO2	It includes skills related to taxonomic identification, chemical analyses, applied computing, aquarium fisheries management, health management in aquaculture,
CO3	A degree in Fishery studies is great way to pursue your passion for aquaculture and work towards building a rewarding career.
CO4	Such postgraduates are appointed to the posts like Farm Manager, Hatchery Manager, Fisheries Inspector, Aqua Cultist, Fish Exporter, Marine Biologist & Marine Scientist, Fish Trader, Fish Breeder, Hatchery/Farm Operator, Fisheries Extension Officer/ Technical Officer, Feed Mill goes.

MAPPING (CO/PSO)

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	3	3
CO3	3	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**3**

PEDAGOGY:

Lecture, Journal Reviewing, Power point presentations, Assignments and Discussions