

Subject- Submission of Minutes of meeting of FET Department

The BOS of Department of FET was held on 30/11/2023. The Minutes of meeting along with the desired documents is attached herewith for your kind information and further necessary action please.

D.No. Dean (Acad.)...1904

Dated 18/12/2023.

Vikas Nanda
Vikas Nanda 4/12/23
HOD (FET)

Dean (Academic) please allow to put up in Senate for inclusion of changes.

Jaitoon
25.12.2023

~~DIRECTOR,~~

~~Dean (Acad)~~

Vikas Nanda
5/12/23

Jaitoon
25.12.2023

BSS

- Xerox copy retained
- original may be forwarded to HOD (FET) for records, please.

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18/12/23

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Jaitoon
18.12.2023

HOD (CFET)

D.No. Dean (Acad.) 1705
Dated 05/12/23
SUE/FET/1398
05/12/2023

Receipt No./Serial No.
526/
5/12/2023
Date/Time

MINUTES OF THE BOARD OF STUDIES (BOS) MEETING OF FET DEPARTMENT

The meeting of Board of studies (BOS) was held at 10:30 a.m. onwards on 30th Nov, 2023, in the Conference Room of Department of the Food Engineering and Technology, SLIET, Longowal. The following are the members of the BOS.

1	Dr.B.S.Khatkar,Former Prof.,Deptt. of Food Technology, GJUS&T, Hisar, (Member)
2	Dr. Vikas Nanda, HOD and Chairman
3	Dr. D.C.Saxena, (Member)
4	Dr. H.K.Sharma, (Member)
5	Dr. P.S.Panesar (Member)
6	Dr. K. Prasad (Member)
7	Dr. C.S.Riar (Member)
8	Dr. Sukhcharn Singh (Member)
9	Dr. P. Kumar (Member)
10	Dr. Charanjiv Singh (Member)
11	Dr. Navdeep Jindal (Member)
12	Er Ashwani Kumar (Assistant Professor)
13	Dr. Sawinder Kaur, (Alumna of SLIET), Associate Dean and Head, Deptt. of Food Technology and Nutrition, Lovely Professional University, Phagwara
14	Ms. Manju Singla, Head QA, Gillco Agro Private Limited, Ludhiana-148008,
15	Ms Tanushree Banarjee, Officer-Production, Savencia Fromage & Dairy India (P) Limited, Noida , Topper of UG (2022)
16	Ms Mali Priti Sharad, Topper of M. Tech. programme
17	Mrs Srella Banerjee, 189/T/C Roy Bahadur Road, Behala, Kolkata, West Bengal

The following could not attend the meeting.

1.	Prof. C.S.Riar, (On leave)
2..	Mrs Srella Banerjee, 189/T/C Roy Bahadur Road, Behala, Kolkata, West Bengal

Agenda 1. - A revision in the course content of M.Tech. Subjects Food Process Equipment and Design (PCFT-821), (Novel Techniques in Food Packaging (PCFT 822) and Advanced Food Process Engineering (PEFT-911A)

After comprehensive review and analysis of the current syllabi for M. Tech. subjects, specifically and Food Process Equipment and Design (PCFT-821), Novel Techniques in Food Packaging (PCFT 822) and Advanced Food Process Engineering (PEFT-911A), it has become apparent that certain updates and modifications are essential to ensure that students are equipped with the latest and most relevant knowledge in the field of Food Engineering and Technology. After careful deliberation and consideration of the proposed revisions to these subjects, the Board of Studies has unanimously agreed to incorporate the recommended changes into the courses. These adjustments will be applicable to students admitted from the Academic Batch 2023-24. The duly recommended modified courses are provided as attachments to these BOS minutes.

Tanushree

Dr. P. Kumar

Dr. P. Kumar
20/11/23
Dr. P. Kumar

Dr. P. Kumar

Dr. P. Kumar

Dr. P. Kumar
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Dr. P. Kumar
Dr. P. Kumar

Agenda 2. –Swapping of Unit Operations in Food Processing (Open Elective, OEFT-621B) with Professional Elective Food Storage Engineering (PEFT-621A)

The Unit Operations in Food Processing course holds immense importance, especially as a substantial portion of the GATE Examination revolves around its content. The knowledge acquired from this course bears significant value within the industry. Therefore, considering its relevance in both GATE Examination content and industrial applicability, it is crucial for B.E. (Food Technology) students to study this course. Consequently, the Board of Studies (BOS) of the department has resolved to approve this swapping, which is applicable to students admitted from the Academic Batch 2023-24. The duly recommended modified scheme of UG program is attached with these BOS minutes.

Agenda 3- Revision in the Contents of the UG course PEFT-711A (Health and Functional Food).

The contents of the UG course PEFT-711A (Health and Functional Food) are modified. The Board of Studies has unanimously agreed to incorporate the recommended changes into the course content. These adjustments will be applicable to students admitted from the Academic Batch 2023-24. The duly recommended modified course content are provided as attachments to these BOS minutes.

 Ms Mali Priti Sharad	 Ms Tanushree Banarjee	 Ms. Manju Singla	 Dr. Sawinder Kaur
 Dr. Ashwani Kumar (A.P)	 Dr. Navdeep Jindal	 Dr. Charanjiv Singh	 Dr P. Kumar
 Dr. Sukhcharn Singh	 Dr. K. Prasad	 Dr. P.S.Panesar	 Dr. H.K.Sharma,
 Dr. D.C.Saxena,	 Dr.B.S.Khatkar,	 Dr. Vikas Nanda, HOD and Chairman	

B. E.
In
FOOD TECHNOLOGY

(APPLICABLE FOR STUDENTS ADMITTED FROM THE ACADEMIC BATCH 2023-24)

SCHEME & SYLLABUS



खाद्य अभियांत्रिकी एवं प्रौद्योगिकी विभाग
Department of Food Engineering and Technology
संत लौंगोवाल अभियांत्रिकी एवं प्रौद्योगिकी संस्थान
SANT LONGOWAL INSTITUTE OF ENGINEERING AND TECHNOLOGY
(भारत सरकार, शि. म. के अधीन, सम विश्वविद्यालय)
(Deemed to be University under MoE, Government of India)
लौंगोवाल - १४८१०६. संगरूर (पंजाब) भारत
Longowal -148106. Sangrur (Punjab) India

VISION OF THE DEPARTMENT

To be a centre of excellence in training, research, outreach and consultancy services in food engineering and technology with emphasis on value addition of agricultural produce, food bioprocessing and technology, food nutrition, food quality and safety.

MISSION OF THE DEPARTMENT

1. To produce trained technical manpower of highest standard in the field of food engineering and technology
2. To re-orient and develop safe food products by applying fundamental and applied technologies
3. To provide solutions to the problem and leadership in the area of education, training and research

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

1. To develop the ability to apply the knowledge of Science, Mathematics, Computing and basic Engineering fundamentals to make students capable to analyze, interpret and design.
2. To develop the capability to apply latest engineering tools and techniques in Food processing with respect to social and global framework.
3. To create competent Professionals inculcated with leadership qualities and ethical responsibilities.
4. To develop the ability to communicate proficiently and work in a multidisciplinary team and competitive environment.
5. To build up the knowledge of current issues and capability to engage in life-long learning process and enable the students in totality to start-up their own business organizations or work as leaders in food industries.

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PROGRAM OUTCOME (PO)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

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11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1: Graduates having an ability to identify, analyse and solve technical problems relating to food systems together with allied streams.

PSO2: Graduates will be able to build the nation, by imparting technological inputs and managerial skills to become technocrats, entrepreneurs and will be able to develop new concepts on various emerging fields and pursue advanced research.

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B.E. (Food Tech) Course Scheme and Syllabus

2023

Semester-I Group-B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	BSMA-401	Engineering Mathematics I	3	1	0	4	4
2	BSCH-401	Applied Chemistry	3	1	0	4	4
3	ESME-401	Elements of Mechanical Engineering	2	1	0	3	3
4	ESME-402	Workshop Technology and Practice	1	0	0	1	1
5	HSMC-401	English Communication and Soft Skills	1	0	0	1	1
6	BSCH-402	Applied Chemistry Lab	0	0	2	2	1
7	ESME-403	Elements of Mechanical Engineering Lab	0	0	2	2	1
8	ESME-404	Engineering Drawing	0	0	4	4	2
9	ESME-405	Workshop Technology and Practice Lab	0	0	4	4	2
10	HSMC-402	English Communication and Soft Skills Lab	0	0	2	2	1
11	MCCH-401	Environmental Studies	3	0	0	3	0
Total			13	3	14	30	20
Semester-II A Group-B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	BSMA-402	Engineering Mathematics II	3	1	0	4	4
2	BSPH-401	Applied Physics	3	1	0	4	4
3	ESEE-401	Elements of Electrical Engineering	2	1	0	3	3
4	ESCS-401	Elements of Computer Engineering	2	0	0	2	2
5	ESEC-401	Elements of Electronics Engineering	2	0	0	2	2
6	BSPH-402	Applied Physics Lab	0	0	2	2	1
7	ESEE-402	Elements of Electrical Engineering Lab	0	0	2	2	1
8	ESCS-402	Elements of Computer Engineering Lab	0	0	4	4	2
9	ESEC-402	Elements of Electronics Engineering Lab	0	0	2	2	1
Total			12	3	10	25	20
Semester-II B Group-B (FET)							
1	TPIN-421	Practical Training During Summer Vacations (In-house) 02 weeks				40	1 (S/US)
2	TPIN-422	Technical Competency				40	1 (S/US)

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B.E. (Food Tech) Course Scheme and Syllabus

2023

Semester-III Group B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	ESME-501	Engineering Mechanics	3	1	0	4	4
2	PCFT-511	Food Chemistry	3	1	0	4	4
3	PCFT-512	Food Microbiology	3	0	0	3	3
4	PCFT-513	Heat and Mass Transfer	3	1	0	4	4
5	HSMC-501	Principles of Management	3	0	0	3	3
6	PCFT-514	Heat and Mass Transfer Lab	0	0	2	2	1
7	PCFT-515	Food Chemistry and Microbiology Lab	0	0	2	2	1
8	MCMH-501	Indian Constitution	3	0	0	3	0
		Total	18	3	4	25	20
Semester-IVA Group B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	BSMA-501	Numerical and Statistical Methods	3	0	0	3	3
2	BSMA-502	Numerical and Statistical Methods Lab	0	0	2	2	1
3	BSBL-501	Biology for Engineers	2	0	0	2	2
4	MCUG-501	Universal Human Values-II: Understanding Harmony	3	0	0	3	3
5	PCFT-521	Food Biochemistry and Nutrition	3	1	0	4	4
6	PCFT-522	Food Biotechnology	4	0	0	4	4
7	PCFT-523	Food Engineering	3	1	0	4	4
8	PCFT-524	Food Engineering Lab	0	0	2	2	1
9	PCFT-525	Food Biochemistry and Nutrition and Biotechnology Lab	0	0	2	2	1
		Total	18	2	6	26	23
Semester-IVB (FET)							
1	TPID-521	Industrial Training 02 weeks				80	1 (S/US)
2	EAA-521+	Fractional credit course/Extra Academic Activity +GROUP A/B/C				40	1 (S/US)

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B.E. (Food Tech) Course Scheme and Syllabus

2023

Semester-V-A Group-B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	PCFT-611	Technology of Animal Product	3	0	0	3	3
2	PCFT-612	Dairy Technology	3	0	0	3	3
3	PCFT-613	Animal Product Technology and Dairy Technology Lab	0	0	4	4	2
4	OEXX-611	Open Elective-I	3	0	0	3	3
5	OEXX-612	Open Elective-II	3	0	0	3	3
6	PEFT-611	Professional Elective-I	3	0	0	3	3
7	HSMC-603	Engineering Economics and Entrepreneurship	3	0	0	3	3
Total			18	0	2	20	20
Semester-V-B Group-B (FET)							
1	EAA-611+	Fractional credit course/ Extra Academic Activity +GROUP A/B/C				40	1 (S/US)
Semester-VI-A Group-B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	PCFT-621	Technology of Cereal, Pulses and Oilseeds Processing	3	1	0	4	4
2	PCFT-622	Technology of Fruits and Vegetable Products	3	0	0	3	3
3	PCFT-623	Plant Foods Lab	0	0	2	2	1
4	OEXX-621	Open Elective-III	3	0	0	3	3
5	OEXX-622	Open Elective-IV	3	0	0	3	3
6	PEFT-621	Professional Elective-II	3	0	0	3	3
7	HSMC-601	Technical Communication	2	0	0	2	2
8	HSMC-602	Technical Communication lab	0	0	2	2	1
Total			17	1	4	22	20
Semester-VI B Group-B (FET)							
1	TPID-621	Industrial Training 04 weeks				160	2 (S/US)
2	EAA-621+	Fractional credit course/ Extra Academic Activity +GROUP A/B/C				40	1 (S/US)

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B.E. (Food Tech) Course Scheme and Syllabus

2023

Semester-VII Group-B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	PCFT-711	Food Analysis and Quality Control	3	1	0	4	4
2	PCFT-712	Packaging Technology	3	0	0	3	3
3	PCFT-713	Food Analysis, Quality Control and Packaging Technology Lab	0	0	2	2	1
4	OEXX-711	Open Elective-V	3	0	0	3	3
5	PEFT-711	Professional Elective - III	3	1	0	4	4
6	PEFT-712	Professional Elective - IV	3	0	0	3	3
7	PRFT-711	Project Stage I and Seminar	0	0	4	4	2
Total			15	2	6	23	20

Semester-VIII Group B (FET)							
S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	PEFT-721	Professional Elective - V	3	0	0	3	3
2	PEFT-722	Professional Elective - VI	3	0	0	3	3
3	PRFT-721	Project Stage - II	0	0	12	12	6
Total			6	0	12	18	12

OR

S No	Sub Code	Subject Name	L	T	P	Hrs.	Credits
1	INID-721	Internship in Industry	0	0	40	40	6
2	PRFT-721	Project Stage - II	0	0	12	12	6
Total			0	0	12	12	12

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LIST OF OPEN ELECTIVES COURSES

S.NO.	Sub. Code	Subject Name	L	T	P	Hrs.	Credits
1	OEFT-611	Open Elective-I	3	0	0	3	3
a)	OEFT-611A	Separation Technology	3	0	0	3	3
b)	OEFT-611B	Biochemical Engineering	3	0	0	3	3
2	OEFT-612	Open Elective-II	3	0	0	3	3
a)	OEFT-612A	Principle of Food Processing	3	0	0	3	3
b)	OEFT-612B	Principle of Food Preservation	3	0	0	3	3
3	OEFT-621	Open Elective-III	3	0	0	3	3
a)	OEFT-621A	Food and Nutrition	3	0	0	3	3
b)	OEFT-621B	Food Storage Engineering	3	0	0	3	3
4	OEFT-622	Open Elective-IV	3	0	0	3	3
a)	OEFT-622A	Fundamentals of Biotechnology	3	0	0	3	3
b)	OEFT-622B	Food Laws and Regulations	3	0	0	3	3
5	OEFT-711	Open Elective-V	3	0	0	3	3
a)	OEFT-711A	Flavor Technology	3	0	0	3	3
b)	OEFT-711B	Food Plant Sanitation and Waste Management	3	0	0	3	3

LIST OF PROFESSIONAL ELECTIVES COURSES

S.NO	Sub. Code	Subject name	L	T	P	Hrs	Credits
1	PEFT-611	Professional Elective-I	3	0	0	3	3
a)	PEFT-611A	Fluid Flow Operation	3	0	0	3	3
b)	PEFT-611B	Post-harvest Engineering	3	0	0	3	3
2	PEFT-621	Professional Elective-II	3	0	0	3	3
a)	PEFT-621A	Unit Operations in Food Processing	3	0	0	3	3
b)	PEFT-621B	Technology of Bakery and Confectionary Products	3	0	0	3	3
3	PEFT-711	Professional elective-III	3	0	0	3	3
a)	PEFT-711A	Health and Functional Food	3	0	0	3	3
b)	PEFT-711B	Technology of Food Plant by Product Utilization	3	0	0	3	3
4	PEFT-712	Professional Elective-IV	3	0	0	3	3
a)	PEFT-712A	Technology of Beverages	3	0	0	3	3
b)	PEFT-712B	Industrial Microbiology	3	0	0	3	3
5	PEFT-721	Professional Elective-V	3	0	0	3	3
a)	PEFT-721A	Food Additives and Ingredients	3	0	0	3	3
b)	PEFT-721B	Technology of Fats and Oils	3	0	0	3	3
6	PEFT-722	Professional Elective-VI	3	0	0	3	3
a)	PEFT-722A	Food Processing Plant Layout and Design	3	0	0	3	3
b)	PEFT-722B	Innovative Techniques in Food Processing	3	0	0	3	3

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LIST OF SUBJECTS TO BE OFFERED FOR HONOR DEGREE IN FOOD TECHNOLOGY

Semester	Sub. Code	Subject name	L	T	P	Hrs	Credits
V	HDFT-611	Enzymes in Food Processing	3	1	0	4	4
V	HDFT-612	Basic Agricultural Process Engineering	3	1	0	4	4
VI	HDFT-621	Instrumental Techniques in Food	3	1	0	4	4
VII	HDFT-711	Food Rheology	3	1	0	4	4
VIII	PHFT-721	Project Honors	0	0	8	8	4
		Total	12	4	8	24	20

LIST OF SUBJECTS TO BE OFFERED FOR MINOR DEGREE IN FOOD TECHNOLOGY

Semester	Sub. Code	Subject name	L	T	P	Hrs	Credits
IV	MDFT-521	Food Processing and Preservation	3	1	0	4	4
V	MDFT-611	Food Biochemistry and Nutrition	3	1	0	4	4
VI	MDFT-621	Plant Food Product Technology	3	1	0	4	4
VII	MDFT-711	Unit Operations in Food Engineering	3	1	0	4	4
VIII	MDFT-721	Engineering Properties of Foods	3	1	0	4	4
		Total	15	5	0	20	20

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B.E. (Food Tech) Course Scheme and Syllabus**2023****Structure of BE (Food Technology) program in comparison with the model curriculum**

Course Components	Curriculum Content (% of total number of credits of the program)	Total number of contact hours	Total number of credits	As Per AICTE
Basic Sciences	15.0	27	24	25
Engineering Sciences	15.0	33	24	24
Humanities and Social Sciences	6.9	13	11	12
Program core	31.9	57	51	48
Program Electives	11.9	19	19	18
Open electives	9.4	15	15	18
Projects	5.0	16	8	15
Practical/Industrial Training	3.1	4	5	
Extra Academic activities	1.9	11	3	
Total number of Credits			160	160

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Subject Name : Novel Techniques in Food Packaging
Subject Code : PCFT-822
L T P : 3 0 0
Credits : 3

Course Objectives

- To impart advance knowledge related to the various packaging technology systems.
- To make aware on different packaging systems that improves safety and shelf life of food products.
- To acquaint about food-package interaction and their effect on food quality.
- To make student aware on the recycling of packaging materials, biodegradable packaging materials and safety and legislative aspects.

Course Outcomes

On successful completion of the subject, the students will be able to

- Acquire advance knowledge on various packaging technology systems
- Learn about various type of scavengers and emitters for improving the food quality
- Acquire advance knowledge on the properties and production of various packaging materials and effect of various indicators used in supply chain management to indicate the food quality
- Acquire knowledge about interaction between package-flavour, gas storage systems for food storage, recycling and use of green plastics for reducing the pollution.
- Learn about consumer response about new packaging systems edible films, coating, safety and legislative requirements

Mapping of Course Outcome and Program Outcome

CO/PO Mapping: (S/M/W indicates strength of the correlation) 3-Strong, 2-Medium, 1-Weak						
		Program Outcome (PO)				
		PO1	PO2	PO3	PO4	PO5
Course Outcome (CO)	CO 1	3	2	3	2	3
	CO 2	3	3	3	2	3
	CO 3	3	3	3	3	3
	CO 4	3	3	3	2	3
	CO 5	3	2	2	3	3
Average		3.0	2.6	2.8	2.4	3.0

Unit	MAIN TOPICS	DETAILED CONTENTS	LECTURES
I	Active and intelligent packaging	Active Packaging Techniques and intelligent Packaging Techniques, current use of novel Packaging Techniques	04
	Oxygen, ethylene and other scavengers	Oxygen scavenging technology, selecting right types of oxygen scavenger, ethylene scavenging technology, carbon dioxide and other scavengers	04
	Antimicrobial food packaging	Antimicrobial agents, constructing antimicrobial packaging systems, factors affecting the effectiveness of antimicrobial packaging	04
	Non-migratory bioactive polymers (NMBP) in food packaging	Advantages of NMBP, Inherently bioactive synthetic polymers: types and application, Polymers with immobilized bioactive compounds and their applications	04
	Time Temperature indicators (TTIs)	Defining and classifying TTIs, Requirements for TTIs, development of TTIs, Maximizing the effectiveness of TTIs, Using TTIs to monitor shelf life during distribution	04
	The use of freshness indicator in packaging	Compounds indicating the quality of packaged food products, freshness indicators, pathogen indicators, other methods for spoilage detection	04
	Nanotechnologies in Food Packaging		01
II	Packaging-flavour interaction	Factors affecting flavour absorption, role of food matrix, role of differing packaging materials, flavour modification and sensory quality	03
	Moisture regulation	Silica gel, clay, molecular sieve, humectants, salts, irreversible adsorption	03
	Developments in modified atmosphere packaging (MAP)	Novel MAP gas, testing novel MAP applications, applying high oxygen MAP	03
	Recycling packaging materials	Recyclability of packaging plastics, improving the recyclability of plastics packaging, testing safety and quality of recycled materials, using recycled plastics in packaging	03
	Green plastics for food packaging	Problems of plastic packaging wastes, range of biopolymers, developing novel biodegradable materials	02

Integrating intelligent packaging, Distribution and consumer response	Supply chain for perishable foods, role of packaging in the supply chain, creating integrated packaging, storage and distribution. Consumer response to new packaging concept	03
Edible Films and Coatings	Properties, types, sources, applications, advantages, disadvantages, theories of plasticization, challenges and opportunities.	03
Safety and legislative aspects of packaging	Regulatory considerations, plastic, metal, paper and glass packaging	02

Recommended Books**Author**

Ahvenainen

Robertson

Hanlon, Kelsey & Forcinio

Paine and Paine

Title

Novel Food Packaging Techniques

Food Packaging

Handbook of Package Engineering

A Handbook of Food Packaging

**SEMESTER
III**

Subject Name : **Advanced Food Process Engineering**
Subject Code : **PEFT-911A**
L T P : **3 0 0**
Credits : **3**

Course Objectives:

- To familiar the students to the theory and application of different engineering operations.
- To be able to apply the fluid flow, heat and mass transfer and separation principles to analyze and design food processes.
- To understand engineering principles and practical applications of thermal processing for increasing shelf life of food products.
- To be able to identify and apply the energy management strategies in food process industries.

Course Outcomes:

On successful completion of the subject, the students will be able to

- Apply the engineering principles required for process design.
- Explain the working and design features of various food process equipments.
- Calculate the thermal process time, drying and freezing times of different food products.
- Apply the concept of psychrometry in Drying
- Explain refrigeration cycles and calculate the freezing time.

Mapping of Course Outcome and Program Outcome

CO/PO Mapping: (S/M/W indicates strength of the correlation) 3-Strong, 2-Medium, 1-Weak						
		Program Outcome (PO)				
		PO1	PO2	PO3	PO4	PO5
Course Outcome (CO)	CO 1	3	3	3	3	3
	CO 2	3	2	3	2	3
	CO 3	3	2	3	3	3
	CO 4	3	2	2	2	3
	CO 5	3	3	2	2	3
Average		3	2.4	2.6	2.4	3

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UNIT	MAIN TOPICS	DETAILED CONTENTS	Lectures
I	Fluid Flow	Material and energy balance problems, Flow of fluids foods, sanitary pipes and fittings, pumps, stirrers and mixers, Related numerical problems	8
	Mechanical Separation	Theory of centrifugal separation, cyclone separators, Theory of ultra-filtration and reverse osmosis, selection and types of membranes and properties, concentration polarization, mathematical description of flow through membrane, application and use in food industry.	5
	Thermal Processing	Factors affecting spoilage of different types of food products, Target microorganism for thermal processing, Concept of D, F and Z value, Microbial inactivation Method for thermal process evaluation - Commercial sterility, pasteurization and sterilization methods based on slowest heating region; process time evaluation for batch sterilization by graphical method; calculation of process time for continuous sterilization of liquid foods; factors affecting rate of heat penetration; effect of can size on sterility requirement; related numerical problems	12
II	Drying and Evaporation	Psychrometry, Effect of various process like adiabatic heating, adiabatic cooling, Humidification, Dehumidification, Drying, Mixing etc. on the seven properties of air. Sorption isotherm, kinetics of water absorption, mechanics of movement of air through stationary bed, thin layer and thick layer bed drying, simulation models for drying systems, Evaporation. basics, design of single and multi-effect evaporators	10
	Refrigeration and Food Freezing	Refrigeration cycles, components of vapour compression refrigeration system, different refrigeration systems for ultra-low refrigeration. Freezing point depression, freezing point curves, phase diagrams, Ice crystal formation, Enthalpy change during freezing, Plank's equation and other modified equations for predicting rates of product freezing; Cryogenic freezing and IQF, and design concepts of freezing equipment, methods of freeze concentration and drying, Design calculations related to refrigeration load, and system capacity.	10

Books Recommended:

Author (s)

Title

Brennan and Cowell

Food Engineering Operations

Charm, S.E

. Fundamentals of Food Process Engg

Geankoplis

Transport Process & Unit operations

Harper, J.C.

Elements of Food Engg

Heldman and Singh

Food Process Engineering

Smith, P G.

Introduction to Food Process Engineering

Stumbo C.R.

Thermobacteriology in Food Process

Toledo, R.T.

Fundamentals of food process Engineering

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SEMESTER II

Subject Name : Food Process Equipment and Plant Design

Subject Code : PCFT-821

L T P 3 1 0

Credits 4

Course Objectives

- To familiarize the students to the various mechanical properties of the different materials required for fabrication of equipments.
- To study the various types of stress produced in various equipments and selection of materials for fabrication of equipments.
- To impart knowledge of basic principles required for the design and fabrication of processing equipments like storage tanks, pressure vessels, heat exchangers, piping system etc.
- To impart the knowledge regarding destructive and non destructive testing of equipment materials.

Course Outcomes

On successful completion of the subject, the students will be able to

- Demonstrate strong basics in selection and design of various processing equipments required in the food processing, transportation and storage operations.
- Evaluate the design considerations for various food processing equipments
- Design and evaluate the design choices of the various process equipments storage tanks, pressure vessels, heat exchangers etc. used in the food processing industry.
- Employ the technical competence for understanding and installation of process plant piping.
- Apply scientific principles in the design and setting up of new food processing plant as Entrepreneur and/or consultant.

Mapping of Course Outcome and Program Outcome

CO/PO Mapping: (S/M/W indicates strength of the correlation) 3-Strong, 2-Medium, 1-Weak						
		Program Outcome (PO)				
		PO1	PO2	PO3	PO4	PO5
Course Outcome (CO)	CO 1	3	2	2	2	3
	CO 2	3	2	3	2	3
	CO 3	3	3	3	3	3
	CO 4	2	2	3	2	3
	CO 5	3	3	2	2	3
Average		2.8	2.4	2.6	2.2	3

UNIT	MAIN TOPIC	DETAILED CONTENTS	Lectures
I	Introduction to Machine Design	Introduction to equipment or machine design, Basic requirements for machine elements and machines, classification of engineering materials, selection of materials for engineering purposes, mechanical properties of metals, Manufacturing considerations in machine design; introduction to load, stress, strain, Young Modulus of Elasticity or Stress modulus or Modulus of rigidity, Stress strain diagram, Factor of safety, Theories of failure under static load.	04
	Design considerations of processing equipment	Design considerations of processing equipment in Food Industry: machinery for drying, milling, separation, grinding, mixing, evaporation etc.	08
	Corrosion mechanism	Theories of corrosion, types of corrosions, factors influencing corrosion, prevention of corrosion	04
	Pressure Vessels	Codes and regulations, Basic data for design of pressure vessels, classification of pressure vessels, stresses in thin cylindrical shell, circumferential (hoop) stresses and longitudinal stresses, design of thick pressure vessels Design of cylinder heads and cover plates, optimum proportions of a vessel, determination of optimum vessel size, Purging of vessels. Stresses induced in vessels; Reinforcement of cylinder for high pressure vessels.	08
II	Storage Tanks	Design of storage vessels/ tanks, horizontal and vertical tanks, design of insulated and un-insulated tanks, nozzles and mountings, Design problems.	05
	Heat Exchangers	Theoretical concept of LMTD and NTU, general design considerations, design of double pipe heat exchanger, design of shell and tube heat exchanger; Design of plate heat exchanger, construction codes	06
	Plant Piping	Different types of pipes, Stresses in Pipes, Design of Pipes fabrication method of different types of pipes, testing of piping material, colour codes, different types of piping joints.	05
	Plant Design	Plant design concepts and general design considerations, Feasibility analysis and preparation of feasibility report: plant size, factors affecting plant size and their interactions, estimation of break-even and	08

		economic plant size; Product and process design, process selection, process flow charts, Hygienic design aspects and worker's safety, functional design of plant building and selection of building materials, management techniques in plant design including applications of network analysis, preparation of project report and its appraisal.	
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Books Recommended:**Author (s)****Title**

M. V. Joshi

Process equipment design

R.T. Toledo

Fundamentals of food process Engineering

Brennan, J.G. and J.R.

Food Engineering Operations

Cowell

Heldman, D.R. and

Food Process Engineering

R.P. Singh

R.C. Sachdeva

Fundamentals of Engineering. Heat and Mass Transfer

Slade F.H.

Food Processing Plant