SEMESTER 5

NOVEL FOOD PROCESSING TECHNOLOGY

Course Code	**PEFTT525**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	**ESE Marks**	60
Credits	5/3	**Exam Hours**	2 Hrs. 30 min.
Prerequisites (if any)	None	**Course Type**	Theory

Course Objectives:

1. Students will be learning the latest technologies in food processing and its applications

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Introduction and HPP Introduction to Food Process Engineering** Scope and importance. High Pressure processing – principle, equipment and process of HPP treatment, Application of HPP in food processing.	9
2	**Membrane Technologies and PEF** Membrane technologies in food processing – Overview of Membrane technology. Microfiltration, Ultra filtration (UF), Nano filtration(NF) and Reverse Osmosis (RO) and theirindustrial applications. Pulsed electric field processing - Principle, process and application in food processing sector	9
3	**Ultrasonic processing** Properties and application of ultrasonic processing techniques. Microwave and radio frequency processing. Ohmic heating, IR heating, dielectric heating and Food irradiation, Effects on foods Applications of irradiation.	9
4	**Hurdle technology and Nanotechnology** Hurdle technology - Concept of hurdle technology and its application. Nanotechnology, its principles and applications in foods	9

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Course Assessment Method
(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	*Internal Ex*	*Evaluate*	*Analyse*	*Total*
5	**15**	**10**	**10**	**40**

Criteria for Evaluation(Evaluate and Analyse): 20 marks

1. **Problem Definition (2 points)**
   - Check for clarity and completeness of the problem definition.
   - Check for clear objectives and divide into sub objectives
2. **Problem Analysis (4 points)**
   - Examine the problem and identify the variables and responses
   - Divide the problem to manageable parts
3. **Implementation of software (2 points)**
   - Use suitable software for getting the solution
   - Check for the appropriateness of tools used
4. **Evaluate (4 points)**
   - Evaluate the proposed solution.
   - Assess the correctness of solution.
5. **Validation of the results (4 points)**
   - Validate the results using available data.
   - Do the error analysis of the results obtained.
6. **Conclusion and presentation (4 points)**
   - Summarize the results obtained
   - Do critical thinking of the results obtained and evaluate.
   - Submit a technical report

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End Semester Examination Marks (ESE):

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	2 questions will be given from each module, out of which 1 question should be answered. Each question can have a maximum of 3 sub divisions. Each question carries 9 marks. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Carry out the high-pressure processing in food industry	**K2**
CO2	Explain in detail about all membrane technology so that it can be applied in processing industry.	**K2**
CO3	Process the food items through novel heating methods.	**K3**
CO4	Apply nanotechnology to food processing to produce novel foods.	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

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CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	1	-	-	-	-	-	-	-
CO2	3	3	2	-	1	-	-	-	-	-	-	-
CO3	3	2	2	-	2	-	-	-	-	-	-	-
CO4	3	2	3	-	1	-	-	-	-	-	-	-

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Food processing Handbook,	James G Brennan, Alistair S Grandison (Ed.),	Wiley – VCH	2011
2	Introduction to Food Process Engineering	P G Smith	Springer	2011
3	Food process engineering and technology	Zeki Berk	Elsevier	2013

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Transport Processes and Separation Process Principles	Geankoplis, C.J.	Prentice Hall	4th Edition, 2003
2	Coulson & Richardson's Chemical Engineering Vol.2 (Particle Technology & Separation Processes")	Richardson, J.E. et al	Butterworth – Heinemann / Elsevier,	5th Edition, 2003
3	Unit Operations in Chemical Engineering	McCabe W.L., Smith J.C.	McGraw – Hill Int.,	7th Edition,2001
4	Transport Processes and Separation Process Principles	Geankoplis, C.J.	Prentice Hall	4th Edition, 2003

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Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://youtu.be/a4aKLHCLyD8?list=PLbRMhDVUMngdSyw7OUHJJNYPfo_p4Ysln
2	https://youtu.be/ZGfNTI0fGsU?list=PLbRMhDVUMngdSyw7OUHJJNYPfo_p4Ysln
3	https://youtu.be/zwBVB5MICFA?list=PLbRMhDVUMngdSyw7OUHJJNYPfo_p4Ysln
4	https://youtu.be/jebsSUpUlqw?list=PLbRMhDVUMngdSyw7OUHJJNYPfo_p4Ysln