SEMESTER S5

FOOD RHEOLOGY

Course Code	**PEFTT523**	**CIE Marks**	40
Teaching Hours/Week (L: T:P: R)	3-0-0-0	**ESE Marks**	60
Credits	3	**Exam Hours**	2 Hrs. 30 Min.
Prerequisites (if any)	Nil	**Course Type**	Theory

Course Objectives:

1. To understand the rheological properties of food and their significance in food processing.
2. To apply the knowledge of viscoelastic properties in handling equipments and processing of foods.

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Basic concepts of Food Rheology**: Introduction and scope, food rheological properties, Various types of stress, strain, modulus and viscosity, Poisson ratio evaluation,Physical state of a food material, various flows, Classical idealmaterials, Time effects (viscoelasticity), Rheological equations, Rheological models	**9**
2	**Rheological Properties of food:** Types of Deformation;Newtonian and Non-Newtonian fluids, Creep, Stress relaxation, Viscometry, Dynamic tests, Various behaviour: Force deformation behaviour, Stress strain behaviour (Basic &Bulk), Elastic plastic behaviour, Viscoelastic behaviour, Flow behaviour of Pseudoplastic, Thixotropic, Dilatant, Rheopectic and Plastic; Phasetransition in foods.	**9**
3	**Measurement of Rheological properties:** Different viscosity measurement and viscometers: Rotational viscometers, Vibrational (Oscillation) viscometer, Bostwick consistometer, Pressure-Driven	**9**

	Flow Viscometers, Capillary tubes and Falling sphere type, Torsion Gelometer for Solid Foods, Texture of Foods: Dough testing instruments.	
4	**Application of Rheology in fluid food handling and processing:** Textural properties of fruits & vegetables; Dough, Pasta and Baked products; dairy products; Meat; Fat and fat products; and their instrumental Measurements. Rheology of chocolate, Texturalcharacteristics of foodemulsions, Functions of emulsifiers inrelation to food texture,Sensory measurement of food texture and texture profile.	**9**

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

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

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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)**	• Each question carries 9 marks. • Two 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. **(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	Understand the rheological properties of food and their significance in food processing	**KL2**
CO2	Apply the knowledge of viscoelastic properties in handling and processing of foods	**KL3**
CO3	Differentiate different types of viscometers, understand their working and applications in food industry	**KL2 ,KL4**
CO4	Analyse the rheological properties and texture in food handling and processing	**KL4**

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

CO-PO Mapping Table:

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

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Food Physics Physical Properties- Measurement and Applications	Ludger O Figura	Springer.	2007
2	Rheological Methods in Food Process Engineering	James F. Steffe	Freeman Press.	1992
3	Rheology: principles, measurements, and applications	Macosko W. Christopher	Wiley	1994
4	Food Process Engineering	Heldman, D. R.	AVI Publications.	2007

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Dough Rheology and Baked Products:	Faridi, H. and Faubion, J. M.	CBS Publications, New Delhi.	1997
2	Engineering Properties of Foods:	Rao, M. A., Rizvi, S. S. H. and Datta A. K.	CRC Press.	2005.

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://archive.nptel.ac.in/courses/126/105/126105011/
2	https://archive.nptel.ac.in/courses/126/105/126105011/
3	https://archive.nptel.ac.in/courses/126/105/126105011/
4	https://archive.nptel.ac.in/courses/126/105/126105011/

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