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**UNIVERSITY**

Aegis: Charutar Vidya Mandal (Estd.1945)

## FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

**Programme:** Master of Technology (Food Technology)

**Semester:** 1

**Course Code:** 202380108

**Course Title:** Food Extrusion Technology

**Course Group:** Program Elective I

### Course Objectives:

1. To understand, demonstrate skills and apply knowledge in food extrusion processing.
2. To formulate, process and understand quality parameters of the varied combinations of ingredients in food extruder

### Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
3	0	2	4	50/20	50/20	25/10	25/10	150/60

\* J: Jury; V: Viva; P: Practical

### Detailed Syllabus:

Sr.	Content	Hours
1	Food Extrusion: Definition, introduction to extruders, principles and types, Uses of extruders in the food industry, Pre-conditioning of raw materials used in extrusion process, Extruder Selection, Design, and Operation for Different Food Applications	6
2	Single screw extruder: Principle of working, Net Flow, Operations, manufacturing of pasta and vermicelli	5
3	Twin screw extruder: Counter rotating and co-rotating twin screw extruder, Process characteristics of the twin screw extruder, Rheological Properties of Materials During the Extrusion Process, Advantages of Twin Screw Extruder	4
4	Effect of extrusion on food products: Chemical and nutritional changes in food during extrusion, factors affecting extrusion, Net Flow, Packaging materials for extruded product	5



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5	Breakfast cereals by extrusion technology: Classification of Breakfast cereals, Raw materials, process and quality testing for Ready to eat breakfast cereals	5
6	Texturized vegetable protein: Definition, Manufacturing process and quality parameters of TVP	4
7	Recent Advances in extrusion technology: Carbon dioxide or Nitrogen assisted extrusion technology, Extrusion in confectionary technology, Non-thermal Extrusion of Protein Products	4

**List of Practicals / Tutorials:**

1	Introduction of food extruders components and their functions
2	Determination of starch content in cereal flour
3	Determination of degree of gelatinization in cereal extrudates
4	Determination of quality parameters for available commercial extruded snack product
5	Effect of feed moisture content on extrudate food product characteristic
6	Effect of extruder screw speed and barrel temperature on extrudate food product
7	Effect of fiber rich ingredient on extrudate food product characteristics
8	Effect of fat addition on extrudate product characteristics
9	Texture profile analysis of extruded product
10	Studies on development of weaning food by extrusion technology

**Reference Books:**

1	Extruded foods by S. Matza Publisher Springer
2	Technology of Extrusion Cooking by N.D. Frame Publisher Springer
3	Extruders in Food Application by Riaz M.N. Publisher CRC Press
4	Extrusion of Foods by J.M. Harper Publisher CRC Press
5	Advances in Food Extrusion Technology by Maskan and Altan Publisher CRC Press

**Supplementary Reading Material :**

1	Role of extrusion in food processing by D.R. Gray and R. Chinnaaswamy in Food Processing: Recent Developments Edited by Anilkumar Gaonkar Publisher Elsevier Page 241-268.
2	Vivian Offiah, vassilis kontogiorgos and Kolawole O. Falade (2019). Extrusion processing of raw food materials and by-products: A review. Critical Reviews in Food Science and Nutrition Vol. 59 (18): 2979- 2998



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### Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Industrial/ Field visits
- Course Projects

### Internal Evaluation:

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

### Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
15	30	20	15	15	5	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

### Course Outcomes (CO):

Sr.	Course Outcome Statements	%weight
CO-1	Understanding basic fundamentals, design considerations, processing of different extruded products and selection of food extrusion equipments	35
CO-2	Understanding suitability of raw materials, preconditioning, process variables and extruder types for extrusion and its impact on extrusion process, rheological behaviour and product quality	35
CO-3	Understanding chemical and nutritional changes occurring in extrusion process and packaging requirement of extruded products	20
CO-4	Knowing recent trends and future aspects of food extrusion	10

### Curriculum Revision:

Version:	2.0
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025