

# GUJARAT TECHNOLOGICAL UNIVERSITY

## FOOD PROCESSING & TECHNOLOGY (14) MATERIALS & MANUFACTURE OF FOOD EQUIPMENT SUBJECT CODE: 2141403 B.E. 4<sup>th</sup> SEMESTER

**Type of course:** Food Processing Technology

**Prerequisite:** Nil

**Rationale:** Students of food processing technology will get customized with the manufacturer of food processing equipment and machinery, materials used include carbon steel, aluminum bronze, abrasion resistant steel, aluminum, stainless steel, cast steel, bronze and various others. Various capabilities include fabrication, assembly, welding, machining, rolling, forming, turning, milling, sawing, drilling, rebuilding and refurbishing. This course gives the idea of different standards like ASME, ANSI and AWS

### Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
		PA	ALA		ESE	OEP				
4	0	2	6	70	20	10	20	10	20	150

### Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	<b>Material Properties :</b> Thermo-physical & mechanical properties of materials like ferrous metals, alloys & polymers.	4	8
2	<b>Structural Properties :</b> Properties of materials under load & their suitability for specific applications.	4	7
3	<b>Polymers:</b> Definition, Mechanism of polymerization. Applications in food industry.	2	5
4	<b>Plastics, Elastomers &amp; Rubbers:</b> Introduction and applications. Composite Materials	4	8
5	<b>Orthographic Views:</b> Conversion of pictorial views into orthographic views.	4	6
6	<b>Sectional views of objects:</b> Principles, Standards & Conventions.	5	12
7	<b>Joints &amp; Couplings:</b> Screw threads, Screw fastenings, Pin & Cotter joints, Shaft couplings.	7	12
8	<b>Production Drawings:</b> Basic concepts and terminologies.	5	8
9	<b>Introduction to Assembly Drawings:</b> Heat exchangers, Evaporators, Condensers, Pumps & Valves etc.	4	8
10	<b>Basic Sheet Metal Operations:</b> Heat treatment processes, Gas welding & cutting operations.	5	7
11	<b>Welding:</b> Electric arc welding, Resistance welding, Electro-beam welding, Forge welding, Friction welding, Diffusion welding & Explosion welding.	5	12
12	<b>Food equipments standard and safety:</b> Introduction, standards of different equipments , and safety	5	8

### Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
23%	17%	22%	21%	16%

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate and above Levels (Revised Bloom's Taxonomy)**

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

### Reference Books:

1. Elements of Material Science, Lawrence H Van Vlack; Addison Wesley.
2. Mechanics of Structures Vol.-I, Junnarkar & Shah; Charotar Publishing House.
3. Machine Drawing, N.D.Bhatt & V.M.Panchal; Charotar Publishing House.
4. Welding Processes & Technology, Parmar R.S; Khanna Publisher.
5. Manufacturing Technology: Foundry, Forming & Welding.
6. P.N.Rao; Tata McGraw Hill Publishing Company.
7. Material Science, Narula & Gupta; Tata McGraw Hill Publishing Company.
8. Process Equipment Design, M.V. Joshi and V.V. Mahajani, McMillan India Ltd

### Course Outcomes:

After successful completion of the course students should be able to:

1. Understand the selection of materials for different food processing equipments.
2. Able to apply different machine fabrication operations and its principles during operation and maintenance of food processing equipments.
3. Able to understand welding process with respect to material of fabrication

### List of Practicals:

1. Conversion of pictorial views into orthographic views
2. Sectional views
3. Screw Threads & Screw Fastenings
4. Welding symbols & Welded joints
5. Assembly & Details of valves
6. Element of Production Drawing
7. To draw/duplicate the assembly & production drawing of the specified food processing equipments.
8. To draw/duplicate the assembly & production drawing of the specified food processing equipments
9. To study oxy-acetylene welding and Gas cutting processes
10. Study the various Electric Arc welding processes (i) MMAW (ii) TIG & (iii) SAW.
11. To study Resistance welding process

### Open Ended Problems:

Establishes minimum public health and sanitation requirements for materials used in the construction of commercial food equipment. So that food equipment materials will not adulterate food nor render food equipment difficult to clean and sanitize

### Major Equipments

1. Arc welding machine

2. Gas welding machine
3. Resistance welding machine
4. Submerged arc welding machine

**List of Open Source Software/learning website:**

- a. [http://standards.nsf.org/apps/group\\_public](http://standards.nsf.org/apps/group_public)
- b. <http://www.haradacorp.co.jp/en/foodm/>
- c. <http://www.balamand.edu.lb/>

**ACTIVE LEARNING ASSIGNMENTS:** Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.