GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering (Food Processing Technology)

Subject Code: 3141403

Materials and Manufacture of Food Equipment

4th 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	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	2	5	70	30	30	20	150

Content:

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

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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:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand the selection of materials for different food processing equipments	40
CO-2	Able to apply different machine fabrication operations and its principles during operation and maintenance of food processing equipments	30
CO-3	Able to understand welding process with respect to material of fabrication	30

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 values
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

Major Equipments

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

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List of Open Source Software/learning website:

a. http://standards.nsf.org/apps/group_public
b. http://www.haradacorp.co.jp/en/foodm/
c. http://www.balamand.edu.lb/