GUJARAT TECHNOLOGICAL UNIVERSITY

INDUSTRIAL ENGINEERING
PRODUCT DEVELOPMENT AND VALUE ENGINEERING
SUBJECT CODE: 2161502
B.E. 6th SEMESTER

Type of course: Core

Prerequisite: No specific prerequisites. Students should have a basic understanding of the products and how they are processed.

Rationale: This subject focuses on the basic concepts of product design and product developments combined with value engineering and expose the various aspects to develop new products considering aesthetics, ergonomics, environment and other human factors.

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)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Product design:** Product classification and characteristics, product analysis, product design function, design aids, product experience, technology of product. Various aspects of design viz. functional, aesthetic, visual, ergonomic and part manufacturing. Various stages of design, marketing research, feasibility studies, standardization, defects investigation. Selections of materials, important engineering materials, new materials, process selection criteria and process design.	**20**	35
2	**Ergonomics:** Scope and objectives of ergonomic, applications of human factors in engineering, ergonomics and product design.	**10**	15
3	**Value Engineering** **a.** Introduction: concept of value engineering, advantages and applications, problem recognition, role of creativity. **b.** Analysis of Functions: Functions, use, esteem and exchange values, basic V/S secondary functions, using and evaluating functions.	**20**	30
	c. Value engineering techniques: Selecting products and operations for VE action, determining and evaluating functions, assigning rupee equivalents, developing alternative means to Required functions, decision making for optimum alternatives.	**14**	20

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30	40	15	5	5	5

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create 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. (a) Product design & process Engg. By Niebel & deeper (McGraw hill)
   (b) Industrial design by Doren (McGraw Hill)
   (c) Designing for Industry by Ashford, Pitman

2. (a) Value Analysis by Zimmermann
   (b) Human factors in engineering design by Chapines & Gardine, Wiley
   (c) Value engineering in manufacturing by ASTME prentice
   (d) Value management by Heller, Addison Wasley
   (e) Value analysis by Ougbson Pitman
   (f) Value engineering A systematic approach by Mudge (McGraw Hill)

Course Outcome:

After learning the course the students should be able to:

1. Demonstrate an understanding of the overview of all the product design and development
2. Understand the importance of ergonomics in the design of new products and the effects of other human factors in engineering.
3. Understand all aspects of value and value engineering procedure.

At the end of this course the student is expected to demonstrate an understanding of the overview of all the product development and value engineering processes.

List of Experiments:

1. Human factors in engineering.
2. Principles of ergonomics in product design.
3. Importance of value (a case study)
4. Types of value components and study of basic and secondary functions.
5. Considerations in improving value.
6. All costs for function (a case study)
7. Value analysis by questionnaires.
8. Advance techniques for value engineering.
9. Product analysis (a case study)
10. Various aspects of design.
11. Errors in product design (defect investigation).
12. Study of Tread Mill with ergonomic aspects.

Design based Problems (DP)/Open Ended Problem:
To design and develop low cost and high quality product using value engineering principles

List of Open Source Software/learning website: www. nptel.ac.in

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.