GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3172511
Semester –VII
Subject Name: PRODUCT DESIGN AND VALUE ENGINEERING

Type of course: Professional Elective

Prerequisite: NIL

Rationale: The product development through engineering aspects always remains challenges to Engineers. The aim of present course is todevelop in the students' skills for evaluating, articulating, refining, and pitching a new product or service offering, either as a start-up business or a new initiative within an existing firm.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:
Suggested Specification table with Marks (Theory):

Sr. No.	Content	Total Hrs
1	**Product Design:** Introduction, Product life cycles, Characteristics of Successful Product development, Design and development of Products, Types of Design and Redesigns, Engineering Designs, Duration and cost of product development, the challenges of Product development.	05
2	**Product Configuration and Design for Function:** Design for function techniques, Function analysis, and function family tree. Engineering Ethics and Issues of society related to design of products, Design for safety, Design Evaluation: Design for manufacturing methodology, Design for assembly methodology, Additional Assembly evaluation methods. Product evaluation: Product design for disassembly, Evaluation of Product for disassembly aspects in products, Design for Product maintenance. Product specifications.	07
3	**Product Development Processes and Product Planning:** A Generic development process, concept development, the front end process, adopting the generic product development process, Product Planning Process, The challenges of Product development.	05
4	**Product Analysis and Material Selection:** Tools and charts used for product analysis like bill of materials, Gozinto chart, performance characteristics of materials, material selection process, sources of information on material properties, economics of materials, evaluation methods for material selection	06

5	**Product Architecture and virtual Product Prototyping:** Product Architectures type, Product Modularity and types, Modular design and methods. Advance functional methods: Function dependency, Module heuristics and application. Introduction to virtual reality, Design using virtual prototyping, Application of digital tools, Introduction to Additive manufacturing	06
6	**Identifying Customer Needs:** Customer Satisfaction, Voice of customer, Customer Populations Types of customer needs, Customer need models. Gathering Customer needs: Need Gathering Methods, Conducting Interviews: Like Dislike Method, Articulated-Use Method, Product feel and Industrial Design, Organizing and Prioritizing Needs: Grouping Interpreted needs, Affinity Diagram, Determining need Importance, Customer use patterns	08
7	**Value Engineering:** Definition, applications, Value Engineering Function: Approach of Function, Evaluation of Function, Determining Function, and Classifying Function, Evaluation of costs, Evaluation of Worth, Determining Worth, Evaluation of Value, Value Engineering tools and techniques.	08

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	**20**	**30**	**20**	**10**	**10**

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.

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Interpret Product design and development process.	35
CO-2	Identify customer orientated Product with functionary	15
CO-3	Selection of product architecture using virtual prototyping.	30
CO-4	Evaluation worth of a product	20

List of Open Source Software/learning website:
https://nptel.ac.in/courses/112/107/112107282/
https://nptel.ac.in/courses/112/107/112107217/

https://www.digimat.in/nptel/courses/video/112104230/L02.html

References:

1. Product Design, by Kevin Otto, Kristin wood, Pearson Education Inc.
2. Product design and development, by K.T. Ulrich and S.D. Eppinger, Tata McGraw Hill
3. Product Development, by Chitale & Gupta, Tata McGraw Hill
4. The Mechanical Process Design, by David Ullman, McGraw hill Inc
5. Engineering Design Process, by Yousef Haik, T M M Shahin, Cengage Learning
6. Product design & process Engineering by Niebel & deeper, McGraw hill
7. Value Management by Heller, Addison Wasley
8. Value engineering A how to Manual S. S. Iyer, New age International Publishers
9. Value Engineering: A Systematic Approach by Arthur E. Mudge - Mc GrawHill
10. New Product Development Timjones. Butterworth Heinmann, Oxford.
11. Value engineering A how to Manual S. S. Iyer, New age International Publishers
12. Value Engineering: A Systematic Approach by Arthur E. Mudge - Mc GrawHill
13. Assembly automation and product design – by Geoffrey Boothroyd, CRC Taylor & Francis
14. Product Design for Engineers, By Devdas Shetty, Cengage Learning

List of Experiments:

1. To study Product life cycles, characteristics, design and the challenges of development of products.
2. Study of Engineering Ethics and Issues of society related to design of products.
3. Exercise on Concept Development (Case study of different Product)
4. Concept development analysis for design for Assembly and Design for manufacturing
5. Exercise on material selection for Product
6. Exercise on Customer need (Survey for Product feature and functions)
7. Exercise on Product Architecture and Virtual Prototyping
8. Case study on Value Analysis and Value Engineering
9. Exercise on Evaluation of Worth of Product
10. Exercise on Determining functions and Classifying functions of Product.