

# GUJARAT TECHNOLOGICAL UNIVERSITY

## MECHANICAL (MACHINE DESIGN) (09)

PRODUCT DESIGN

SUBJECT CODE: 2720915

SEMESTER: II

**Type of course:** Post Graduate

**Prerequisite:** Zeal to learn the Subject

**Rationale:** The focus of Product Design and Development is integration of the marketing, design, and manufacturing functions of the firm in creating a new product. The course aims to introduce the basic concepts of product design and development process.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2 <sup>#</sup>	2	5	70	30	20	10	10	10	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
1	<b>Introduction :</b> Importance of design, The design process, Considerations of Good Design, Morphology of Design, Duration and cost of product development, Challenges of product development, Designing to codes and standards, Product and process cycles, Forecasting, Market Identification, Competition Benchmarking.	8	20%
2	<b>Development Processes and Organizations:</b> A generic development process, concept development: the front-end process, adopting the generic product development process, the AMF development process, product development organizations, the AMF organization; Product planning process: Identify opportunities, Evaluate and prioritize projects, allocate resources and plan timing, complete pre project planning, reflect all the results and the process; Identifying Customer Needs: Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process; Product Specifications: What are specifications, when are specifications established, establishing target specifications, setting the final specifications.	13	25%
3	<b>Concept Generation, Selection and Testing:</b> The activity of concept generation clarify the problem, search externally, search internally, explore systematically, reflect on the results and the process; Overview of selection methodology, concept screening, and concept scoring; Define the purpose of concept test, choose a survey population, choose a survey format, communicate the concept, measure customer response, interpret the result, reflect on the results and the process.	8	20%
4	<b>Product Architecture:</b>	3	7%

	What is product architecture, implications of the architecture, establishing the architecture, variety and supply chain considerations, platform planning, related system level design issues.		
<b>5</b>	<b>Industrial Design:</b> Assessing the need for industrial design, the impact of industrial design, industrial design process, managing the industrial design process, assessing the quality of industrial design.	<b>3</b>	<b>7%</b>
<b>6</b>	<b>Prototyping:</b> Prototyping basics, principles of prototyping, technologies, planning for prototypes.	<b>2</b>	<b>6%</b>
<b>7</b>	<b>Product Development Economics and Project Management:</b> Elements of economic analysis, base case financial mode, Sensitive analysis, project trade-offs, influence of qualitative factors on project success, qualitative analysis; Understanding and representing task, baseline project planning, accelerating projects, project execution, post-mortem project evaluation.	<b>4</b>	<b>15%</b>

#### Reference Books:

1. Product Design and Development, Ulrich K. T, and Eppinger S.D, McGraw Hill .
2. Product Design, Otto K, and Wood K, Pearson.
3. Engineering Design: A materials and Processing Approach, Dieter, G.E, McGraw Hill.
4. Product Design and Manufacturing - A C Chitale and R C Gupta, PHI

#### Course Outcome:

After learning the course the students should be able to:

1. Use a set of tools and methods for product design and development.
2. Understand role of multiple functions in creating a new product.
3. To coordinate multiple, interdisciplinary tasks in order to achieve a common objective.
4. Enhanced team working skills.

#### List of Experiments:

1. To Understand Capacity and Capability of the existing facility of the college.
2. To identify the need of customer needs for a selected engineering product.
3. To set the specification of an engineering product.
4. Develop product architecture of an engineering product.
5. Establish the extent of producibility built into a given assembly and its components.

#### List of Tutorials:

1. Study and understand the basics of Product Design and Development.
2. Study the Concept of Product Development process.
3. Understand the process of Product Concept Generation, Selection and Testing.
4. Product Prototyping and its need in practice.
5. To understand product Development Economics and Project Management concepts.

#### Design based Problems (DP)/Open Ended Problem:

1. Develop an alternative product for an existing one.

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate

the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website