

GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (ADVANCE MANUFACTURING SYSTEM) (50)

PRODUCT DEVELOPMENT AND INNOVATION

SUBJECT CODE: 2725003

SEMESTER: II

Type of course: Engineering

Prerequisite: passion to learn the Subject

Rationale: To establish the basic concepts and design guidelines of product development processes.

It is also equally important to understand how new product development processes are to be conducted and how the new concept is selected that reduce number of design process to optimize design without compromising function. Also, current global trends and requirements of environmental design required to be addressed.

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#	2	5	70	30	20	10	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
	PRODC T DESIGN & DEVELOPMENT		
1	Introduction to Product Design Significance of product design, Morphology of design, product design and development process, Product life cycle, Sequential engineering design method, Challenges of product development, Need for product Innovation..	5	11%
2	Product Planning and Project Selection: Identifying opportunities, Evaluate and prioritize projects, allocation of resources.	4	9%
3	Identifying Customer Needs: Gathering of data of customers need. Interpret raw data in terms of customers need, organize needs in hierarchy and establish the relative importance of needs.	4	9%
4	Product Specifications: Introduction to product and target specification. Establish target specifications, setting final specifications. Concept of QFD	6	13%
5	Concept Generation – development : Various steps in concept generation. Activities of concept generation, clarifying problem, search both internally and externally, explore the output.	5	11%
6	Concept Selection: Overview, concept screening and concept scoring, methods of selection.	3	7%
7	Industrial Design: Assessing need for industrial design, industrial design process, management,	4	9%

	assessing quality of industrial design.		
8	Concept Testing: Elements of testing: qualitative and quantitative methods including survey, measurement of customers' response.	3	7%
	INNOVATION		
9	Theory of inventive problem solving (TRIZ): Introduction to TRIZ ,Fundamentals, methods and techniques, General Theory of Innovation and TRIZ, Value engineering Applications in Product development and design, Model-based technology for generating innovative ideas.	7	15%
10	Intellectual Property: Introduction -Study of prior inventions. Elements and outline, patenting procedures, claim procedure. Refining of claims.	4	9%

Reference books:

1. Ulrich K. T, and Eppinger S.D, Product Design and Development, Tata McGraw Hill
2. Otto K, and Wood K, Product Design, Pearson
3. Engineering of creativity: introduction to TRIZ methodology of inventive Problem Solving, By Semyon D. Savransky, CRC Press.
4. G. E. Dieter, Engineering Design, McGraw-Hill International, 2009
5. E. Deborah and Bouchoux, Intellectual Property Rights, Cengage Learning India Pvt., 2008.
6. Product Design and Manufacturing by A.K.Chitale, R.C.Gupta, PHI.
7. Inventive thinking through TRIZ: a practical guide, By Michael A. Orloff, Springer.
8. Systematic innovation: an introduction to TRIZ ; (theory of inventive Problem Solving), By John Terninko, Alla Zusman, CRC Press

Course Outcome:

After learning the course the students should be able to:

1. Understand the quality aspects of product design , development and Innovation.
2. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
3. understand new product development processes as well as useful tools, techniques and organizational structures that support new product development practice in the context of the “triple bottom line” – economic, environmental and societal..
4. Apply the concept of different techniques like brainstorming , QFD for new product development .
5. Identify the design factors and development processes along customer desires for new development.

List of Experiments:

Students are advised to perform experiments/assignments based on following:

1. For a given products/component, collect and identify the customer's need through different way of data collection.
2. Prepare the Benchmarking process for given problem.
3. Establishing and Setting of final Specification for particular product using QFD.
4. Concept Generation & Design
5. Physical Prototyping -Prototyping through CAD model in software.
6. Taguchi Experiment Design.

Design based Problems (DP)/Open Ended Problem:

1. Redesign a given part to make it modular.
2. Case study development for selected product and its life cycle.

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.