

Program : Diploma in Mechanical Engineering / Tool and Die Engineering / Manufacturing Technology	
Course Code : 6022D	Course Title: Product Design
Semester : 6	Credits: 4
Course Category: Open Elective	
Periods per week: 4 (L:3, T:1, P:0)	Periods per semester: 60

Course Objectives:

- To acquire the basic concepts of product design and development process
- To study the engineering and scientific process in executing a design from concept to finished product
- To study the key reasons for design or redesign
- To study the intuitive and advanced methods used to develop and evaluate a concept

Course Prerequisites:

Topic	Course code	Course name	Semester
Basics of Engineering Graphics		Engineering Graphics	1
Basics of Engineering Mechanics		Engineering Mechanics	2

Course Outcomes:

On completion of the course, the student will be able to:

CO _n	Description	Duration (Hours)	Cognitive Level
CO 1	Describe the basic concepts of product design and development process	15	Understanding
CO 2	Explain the engineering and scientific process in executing a design from concept to finished product	15	Understanding
CO 3	Explain an engineering design and development process.	14	Understanding
CO 4	Discuss the intuitive and advanced methods used to develop and evaluate a concept	14	Understanding
	Series Test	2	

CO – PO Mapping:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2						
CO2	2		2				
CO3	2		2				
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	Describe the basic concepts of product design and development process.		
M1.01	Explain the concept of product and different types of product.	4	Understanding
M1.02	Discuss the product market mix and new product development process.	4	Understanding
M1.03	Describe the Techniques of idea generation methods.	4	Understanding
M1.04	Explain the concept of creative design process and morphological analysis.	3	Understanding

Contents:

Definition of a product; Types of product; Levels of product; Product-market mix; New product development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morphological analysis; Analysis of interconnected decision areas; Brain storming.

CO2	Explain the engineering and scientific process in executing a design from concept to finished product		
M2.01	Explain the concept of product life cycle and challenges of product life cycle.	4	Understanding
M2.02	Discuss the production and marketing aspects	3	Understanding
M2.03	Explain the Characteristics of successful Product development.	4	Understanding
M2.04	Explain the Customer need identification and product development practices	4	Understanding
	Series Test I	1	

Contents:

Product life cycle; The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry - product strategies.

CO3	Explain an engineering design and development process.		
M3.01	Explain the concept of Product design and design by imitation.	4	Understanding
M3.02	Discuss the Factors affecting product design.	4	Understanding
M3.03	Explain the Decision making and iteration	3	Understanding
M3.04	Discuss the design of simple products dealing with various aspects of product development	3	Understanding

Contents:

Product design; Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design. Design of simple products dealing with various aspects of product development; Design starting from need till the manufacture of the product.

CO4	Discuss the intuitive and advanced methods used to develop and evaluate a concept.		
M4.01	Explain the concept of optimization in design and economic factors in design	4	Understanding
M4.02	Explain the concept of modeling and simulation	3	Understanding
M4.03	Discuss the concept of Six sigma and design for six sigma	3	Understanding
M4.04	Explain the concept of Rapid Prototyping (RP) and application of rapid prototyping in product design	4	Understanding
	Series Test II	1	

Contents:

Introduction to optimization in design; Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Prototyping (RP); Application of RP in product design; Product Development versus Design

Text/ Reference:

T/R	Book Title/Author
T1	Engineering Design –George E. Dieter
R1	Product Design and Development, Karl T. Ulrich and Steven D. Eppinger, Tata McGraw–Hill edition.
R2	An Introduction to Engineering Design methods Vijay Gupta
R3	Merie Crawford : New Product management, McGraw-Hill Irwin
R4	Chitale A K and Gupta R C, “Product Design and Manufacturing”, Prentice Hall of India, 2005.
R5	Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pearson education.

Online Resources:

Sl.No	Website Link
1	https://nptel.ac.in/courses/112/107/112107217/
2	https://nptel.ac.in/courses/112104230/
3	https://nptel.ac.in/courses/107103082/
4	https://nptel.ac.in/courses/112107282/