ADMISSION YEAR : 2017-18 **ACADEMIC YEAR:2020-21**

SEMESTER : SEVENTH / EIGHTH

COURSE TITLE: PRODUCT DESIGN & DEVELOPMENT (INTER-DEPARTMENTAL / INSTITUTIONAL ELECTIVE)		
Sub Code: MEE04	**No of Credits =4** **L-T-P-SS::4:0:0:0**	**No. of lecture hours/week : 04** **Total Number of Lecture hours : 52**
Exam Duration : 3 hours	**CIE Marks: 50**	**Exam Marks : 100**
Pre-requisites	**Manufacturing process**	

COURSE OBJECTIVES:

1. Impart knowledge of mathematics, basic and applied sciences.
2. Ability to identify, formulate and solve mechanical engineering problems based on data interpretation, design, experiment and analysis of results.
3. Learn effective engineering communication.
4. Ability to work in teams on multi-disciplinary projects in industry and research organizations.
5. Develop awareness of the ethical, professional and environmental implications of work in a global and societal context.

#	CONTENTS	Hrs
UNIT-1	**INTRODUCTION**	**10**
	Characteristics of successful product development, who designs and develops products? Duration and cost of product development, The challenges of product development. **Development process and organizations:** A generic development process, Concept development: the front end process, Adapting the generic product development process, Product development process flows, the AMF development process, product development organizations and AMF organizations.	
UNIT-2	**PRODUCT PLANNING**	**10**
	The product planning process, Identify opportunities, Evaluate and prioritize projects, Allocate resources and plan timing, Complete pre-project planning, Reflect on the results and the process. **Identifying customer needs**: gather raw data from customers, Interpret the 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 and setting the final specifications.	
UNIT-3	**CONCEPT GENERATION**	**10**
	The activity of concept generation, Clarify the problem, Search externally, search internally, explore systematically, reflect on the solutions and the process. **Product Architecture:** What is product architecture? Implications of the architecture, establishing the architecture, Platform planning and Related system level design issues. **Industrial Design :** What is industrial design?, Assessing the need for industrial design, The impact of industrial design, The industrial design process, Management of industrial design process and assessing the quality of industrial design.	
UNIT-4	**DESIGN FOR MANUFACTURING**	**11**
	Overview of the DFM process, estimate the manufacturing costs, reduce the costs of components, assembly, supporting production, and impact of DFM decisions on other factors.	

	Prototyping: Prototyping basics, principles of prototyping, technologies and planning for prototypes. **Robust Design:** What is Robust Design? , design of experiments and the robust design process.	
UNIT-5	**PRODUCT DEVELOPMENT ECONOMICS**	**11**
	Elements of economic analysis, base case financial mode, sensitive analysis, project trade – offs, influence of qualitative factors on project success and qualitative analysis. **Managing Projects**: Understanding and representing task, base line project planning, accelerating projects, project execution and postmortem project evaluation.	

TEXT BOOKS:

1. Karl. T. Ulrich, Steven D Eppinger, Anita Goyal, product Design and development, Tata McGraw Hill Edition 2009

REFERENCES:

1. Kevin Otto, Kristin Wood Product Design, pearson Education in South Asia.
2. Timjones, Butterworth Heinmann, New Product Development, Oxford, UCI, 1997.
3. GeofferyBoothoyd, peter Dewhurst and Winston Knight, Product Design for Manufacture.

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Understand the characteristics of product development and challenges; concept development processes and different types of organisations.

CO2: Prepare Plan for new product development based on the opportunities & allocation of resources; Identification of customer needs and specification of product.

CO3: Generate the concept for the new product and establish the product architecture. Fulfil the aesthetic and ergonomic needs based on industrial design concept.

CO4: Estimation of product cost based on DFM concepts & prepares the prototype of new product.

CO5: Economic analysis of the product to manage different product development projects.

MAPPING OF COs WITH POs												
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	1	1	1	1	1	1	1	1	1
CO2	3	3	2	1	1	1	1	1	1	1	1	1
CO3	3	3	3	1	1	1	1	1	1	1	1	1
CO4	3	3	2	1	1	1	1	1	1	1	1	1
CO5	3	3	3	1	1	1	1	1	1	1	1	1
Strength of correlation: Strongly related-3, Moderately related-2, Weakly related-1, Not related-0												

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

New topics added	No of hours