| Programme | Bachelor of Technology in Mechanical Engineering | | | | | Year of Regulation | | | 2018 |
| Department | Mechanical Engineering | | | | | Semester | | | IV |

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
ME 218	Concepts In Engineering Design	3	0	0	3	50	50	100	200

Course Objectives		Course Outcomes	
To introduce the basic structure of Product Design, Product Development Process and Scope.		CO1	Interpret basic structure of Product Design, Product Development Process and Scope of Product Development .(Understanding)
To Explain the techniques of Product Function, Product Teardown And Experimentation and its uses in product development		CO2	Explain the techniques of Product Function, Product Teardown And Experimentation (Understanding)
To develop an ability to use Benchmarking, Establishing Engineering Specifications and Product Architecture in product design.		CO3	Apply the knowledge of Benchmarking, Establishing Engineering Specifications and Product Architecture in product design(Application)
To develop an ability and skill to use Brainstorming, Morphological Analysis and Concept Variants for concept selection and embodiment.		CO4	Apply the knowledge of Brainstorming, Directed Search, Morphological Analysis and Concept Variants for concept selection and embodiment. (Application)
To analyse life cycle assessment and Justify physical prototype in line with design for robustness.		CO5	Analysis of Product Metrics and life cycle assessment.(Analysis)
		CO6	Justify the use of physical prototype in line with design for robustness.(Evaluation)

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs	
		PO1	PO2	PO3	PO4	PO5.	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	CO1	0	1	1	1	0	2	2	1	2	2	2	1	0	1
2	CO2	0	0	1	2	0	0	2	0	2	2	2	2	0	2
3	CO3	0	0	0	2	2	3	3	0	3	3	3	3	0	3
4	CO4	0	0	0	0	0	2	2	0	3	3	3	3	0	3
5	CO5	0	0	0	0	0	2	3	3	3	3	3	3	0	3
6	CO6	1	2	2	2	2	2	3	3	3	3	3	3	0	3

SYLLABUS

No.	Content	Hours	COs
I	**introduction to Product Design , Product Development Process Tools and Scope of Product Development:** An introduction to Product Design, Modern Product Development, Example of Product Development Processes, Theories and Methodologies in Design , Product Development Teams, Product Development Planning, Determining What to Develop, Basic Method: Mission Statement and Technical questioning, Advance Method: Business Case Analysis,	06	CO1
II	**Understanding Customer Needs, Establishing Product Function, Product Teardown And Experimentation:** Customer Satisfaction, Gathering Customer Needs, Organizing and Prioritizing Customer Needs, Why Functional Decomposition?, Modelling Process, A Simple Approach : Function Trees, Establishing System Functionality: Creating a Function Structure, Augmentation: From Simple Function Trees to Complete Models, Tear down Process, Tear down Methods, Post Tear down Reporting,	07	CO2
III	**Benchmarking, Establishing Engineering Specifications and Product Architecture:** Background: Know Your Enemy to Know Yourself, A Bench-marking Approach, Support Tools for the Bench-marking Process, Setting Product Specification, Product Architectures, Product Modularity: Background, Modular Design: Basic Clustering Method, Modular Design	07	CO2 CO3
IV	**Generating Concepts, Concept Selection, Concept Embodiment:** Concept Generating Process, Basic Methods: Information Gathering and Brainstorming, Advance Methods: Directed Search, Morphological Analysis, Combining Solution Principles (Concept Variants), Estimating Technical Feasibility, A Concept Selection Process, A Basic Method: Pugh Concept Selection Charts, Concept Embodiment: Overview and Context, Basic Methods.	06	CO3 CO4
V	**Modelling Of Product Metrics, Design For Manufacture And Assembly, Design For The Environment,** Introduction: Model Selection by Performance Specification, Mathematical Modelling versus Physical Prototyping, Constructing Product Models: basic Method. Basic method For Manufacture And Assembly: Design Guidelines , Why DFE?, Environmental Objectives, Basic DFE Methods: Design Guidelines, Life Cycle Assessment,	06	CO5
VI	**Physical Prototypes and Design For Robustness:** Prototyping Essentials, Types of Prototypes, Uses of Prototypes, Rapid Prototyping Technique, Scale, Dimensional Analysis, and Similitude, Quality Design Theory, Basic Method: Taguchi's Method, Advanced Analysis: Probability Theory	04	CO6
	Total Hours	36	

Essential Readings

1. Kevin N. Otto, Kristin L. Wood, "Product Design: Techniques in Reverse Engineering and New Product Development" , Pearson Education India; 1 edition, January 2003

2. Karl Ulrich and Steven Eppinger, "Product Design and Development" |5th Edition, July 2017