22MCIN03	DESIGN SPRINTS				SEMESTER IV
PRE-REQUISITE:	CATEGORY	L	T	P	C
	EE	0	0	2	1

Course Objectives:

1.	Develop key skill areas essential for a product designer from the perspective of design, its inherent complexity and supports them with tools & techniques to prototype rapidly.
2.	To enable the participants to visualize the experience for a user.
3.	To learn the roles & responsibilities of a designer in creating and shaping experiences for the user.
4.	The participants shall learn through the lenses of system thinking of how existing products work.
5.	Learn to select & apply various practice tools to aid them in rapid prototyping

UNIT I	DESIGN FUNDAMENTALS	3	0	0	3

Introduction to Visual Design, History and Modernism, Design Thinking methodology, seven elements of design, principles of design, principles of good design, designing a product and a service

UNIT II	SYSTEM THINKING AND REVERSE ENGINEERING	3	0	0	3

System Thinking for Engineering Problem Solving, Understanding Systems, Examples and Understandings, Complex Systems, Reverse Engineering Methodology, Identify building blocks/Components - Re-Engineering a complex system

UNIT III	USER INTERFACE & USER EXPERIENCE	3	0	0	3

Introduction to UI/UX, Human-Computer interface, user-centered Design Principles, User research techniques, UX Design workflow, Information Architecture, UI Components, need for UI prototyping, Wireframes

UNIT IV	MECHANICAL PROTOTYPING	3	0	0	3

Need for prototyping - Domains in prototyping - Difference between actual manufacturing and prototyping - Rapid prototyping methods - Tools used in different domains - Introduction - Working with Fusion 360 - 3D Modeling - 3D Printing and classification - Laser Cutting and engraving - RD Works - Additive manufacturing

UNIT V	ELECTRONIC & SOFTWARE PROTOTYPING	3	0	0	3

Introduction to Lumped Circuits - Electronic Prototyping - Tinker CAD - Designing in KI CAD - PCB design - Source code management and version control - GitHub - GitHub Actions - GitBash - Continuous Integration - Platform as service - Heroku - Build Packs

Total (15L) = 15 Periods

Text Books:

1.	Thinking in systems - Donella Meadows, 2015
2.	Rapid Prototyping And Engineering Applications: A Toolbox For Prototype Development - Frank W.Liou, 2007
3.	Rapid Prototyping Technology: Selection And Application - COOPER K. G, 2001

Reference Books:

1.	https://thesystemsthinker.com/wp-content/uploads/2016/03/Introduction-to Systems-Thinking-IMS013Epk.pdf
2.	https://formlabs.com/blog/ultimate-guide-to-prototyping-tools-for-hardware-and product-design/
3.	https://docs.kicad-pcb.org/
4.	https://www.tinkercad.com/learn/circuits
5.	https://docs.github.com/en/free-pro- team@latest/actions/guides

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		Bloom's Taxonomy Mapped
CO1	Understand the elements and principles of product and service design	Apply
CO2	Apply system thinking concepts in reverse engineering	Apply
CO3	Apply user research techniques to meet the UX needs of a customer and design a visual prototype	Apply
CO4	Develop prototyping models using the tools from mechanical prototyping models	Apply
CO5	Develop prototyping models using the tools from electrical and software prototyping methods	Apply

COURSE ARTICULATION MATRIX

CO/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	0	1	0	0	0	0	0	2	0	0	0	0	0	2
CO2	2	3	0	0	0	0	0	0	2	0	0	0	0	0	2
CO3	3	0	1	0	0	0	0	1	2	0	0	0	0	0	2
CO4	0	0	3	2	3	0	0	0	2	0	0	0	0	0	2
CO5	2	0	2	0	1	0	0	0	2	0	0	0	0	0	2
Avg	**2**	**0.6**	**1.4**	**0.4**	**0.8**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**

3 / 2 / 1 – indicates strength of correlation (3 – High, 2 – Medium, 1 – Low)