GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology	Branch/Spec.	Mechanical Engineering/ AMS
Semester	I	Version	2.0.0.0
Effective from Academic Year	2021-22	Effective for the batch Admitted in	July 2021
Subject code	**3ME1102**	Subject Name	**Product Design**

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

- Material Technology
- Fundamentals of Machine Design
- Design of Machine Elements
- Design of Mechanical Systems

Course Objective:

- To Understand the basics of product design, Morphology of Design, Challenges of Product Development.
- To Learn the basics of the economical aspect of the product cycle.
- To Understand the importance of value engineering in product design
- To learn the basics of design for manufacturing (DFM), rapid prototyping and rapid tooling.
- To get aware of case studies of product design.

Theory syllabus

Unit	Content	Hrs
1	**PRODUCT DESIGN:** Asimow's model, Design Requirements, Essential Factors of Product design, The Morphology of Design, Product Strategies, Sources of new product design, Analysis of The Product, Product Characteristics, Characteristics of successful Product Development, Product Development, Challenges of Product Development, Product Development Process, Product Planning and its process, Identifying Customer Needs & Functional Structure, Analysis of Need, Specification and Standards of Performance, Product Specification, Concept Generation and Concept Selection, Types and Organization of Design, Economic Analysis, Aesthetics and Ergonomics in Product Design, Modern approaches to product design. Material selection– Importance, classification material performance characteristic, selection criteria Ashby Material selection chart.	9
2	**ROLE OF VALUE ENGINEERING IN PRODUCT DESIGN:** Value Engineering, Objective, Concept and Types of Value, Nature and measurement of value, Components of values and Reasons for poor value, Techniques to build or add value, The value analysis job plan	9
3	**DESIGN FOR MANUFACTURING (DFM):** Introduction, Guide line for DFM, DFM Method, Role of DFM in Product Specification and Standardization, Design, development and functional requirement, Material selection, Process selection.	8
4	**COMPONENTS OF DFM:** Design for assembly Performance, Quality, Bio-Compatibility, Recycling etc, Design to cost, Design rules for selection of materials and processes, Part Geometry and tolerance, Shape factor, Prototyping, Computer aided material and functional modeling, Mathematical optimization, Formation of Objectives and constraint Functions, Factorial analysis.	8

5	**RAPID PROTOTYPING, RAPID TOOLING AND RAPID MANUFACTURING PROCESSES:** Stereo-lithography (SLA), Fused deposition modeling (FDM), 3-Dimensional printing (3DP), Solid laser sintering (SLS), Layered manufacturing (LM), Laminated object manufacturing (LOM), Comparison between methods of Rapid Prototyping	8
6	**Case Studies on Product Design Development , Value Engineering and Rapid prototyping**	3
Practical content		
The term work shall be based on experimental and analytical work on the topics mentioned above and will be defended by the candidates.		
Text Books		
1	A. K. Chitale, R.C. Gupta, 'Product design & Manufacturing' 6th Edition, PHI Learning 2013.	
2	Ulirich Karl T., Eppinger Steven D, 'Product Design and Development',5th Edition, McGraw Hill 2011.	
Reference Books		
1	J.G.Bralla, 'Handbook of Product Design for Manufacture' McGraw Hill, 1986	
2	BoothroydG.,Dewhurst P, and Knight N, 'Product Design for manufacture and assembly', New York, Marcel Dekkar,1994.	
3	M.F. Ashby and K Johnson, 'Material and Design the art and science of Material Selection in product design', Butterworth Heinemann 2003.	
4	G.E Dieter, 'Engg. Design, A materials and processing approach', McGraw Hill-2000.	
5	Harry Peck, 'Design for Manufacturing', Pitman Publication London, 1973.	
MOOC Links		
1	https://nptel.ac.in/courses/112/104/112104230/	
2	https://www.mooc-list.com/course/product-design-udacity	
Course outcomes		
1.Understand the basics factor consideration of product design, Morphology of Design, Challenges of Product Development. 2.Learn the basics of the economical aspect of the product cycle. 3.Understand the importance of value engineering. 4.Learn the basics of design for manufacturing (DFM), rapid prototyping and rapid tooling.		