INSTITUTE OF DESIGN
Nirma University
Product and Interaction Design, Semester VI

Institute:	**Institute of Design**
Name of Programme:	**Bachelor of Design**
Course Code:	**3DD111MC26**
Course Title:	**Design for Manufacturing and Assembly**
Course Type:	(■ Core/ ☐ Value Added Course/ ☐ Departmental Elective/ Institute Elective/ University Elective/(Open Elective Any other)
Year of introduction:	**Academic Year 2026-27**

L	**T**	**Practical component**				**C**
		LPW	**PW**	**W**	**S**	
1	1	4				4

Course Learning Outcomes (CLO):

At the end of the course, the student will be able to:

1. Explain basic relationships between materials, manufacturing processes, product construction and assembly (BL2)
2. Analyse products through teardown to understand components, materials, joining methods and assembly sequence (BL4)
3. Apply principles of Design for Manufacturing and Assembly while developing product form, construction and internal details (BL3)
4. Develop a manufacturable product using appropriate CAD models, assembly details and prototypes (BL6)

Syllabus: **Total Teaching hours: 90 Hrs.**

Units	Content	Teaching hours
Unit 1	**Fundamentals of DFMA and Product Teardown** • Principles of Design for Manufacturing and Assembly and their relationship with Product design • Introduction to A-surfaces, B-surfaces, components and sub-assemblies • Product teardown to understand materials selection, manufacturing processes, components, joining and assembly sequence • Basic considerations of environmental factors, maintenance, servicing and relevant product standards • Experiential learning through physical product teardown and exposure manufacturing and assembly of processes	**12 Hrs.**
Unit 2	**Materials, Manufacturing and Product Detailing** • Selection of materials and manufacturing processes for plastics, metals, wood, engineered wood, composites and multi-material products • Basic manufacturable detailing including wall thickness, draft, ribs, bosses, fillets, parting lines,	**18 Hrs.**

	supports and clearances • Common joining, fastening and locating methods for product assembly • Design for assembly, disassembly, maintenance and servicing • Introduction to additive manufacturing, digital manufacturing, automation and contemporary production methods	
Unit 3	**Applied DFMA Project** • Selection of a suitable product category/design brief • Development of product form, Part Architecture, A-surfaces and B-surfaces • Integration of components, joining methods and assembly/disassembly requirements • Review and refinement for material, manufacturing, maintenance and production feasibility • Final communication through CAD models, sections, exploded views and physical/functional prototypes	**60 Hrs.**

Self-Study	**Maintain a journal of the following:** • Observe construction and assembly of commonly used products • Study product teardowns and manufacturing demonstrations • Identify common joining methods, fasteners and internal product features • Practice CAD modelling of shells, supports and assembly features • Explore appropriate additive-manufacturing methods for functional prototypes
Class Test	**1**
Suggested Readings/ References	**Books** 1. Boothroyd, G., Dewhurst, P., & Knight, W. A. (2010). *Product design for manufacture and assembly* (3rd ed.). CRC Press. 2. Thompson, R. (2007). *Manufacturing processes for design professionals*. Thames & Hudson. 3. Lefteri, C. (2012). *Making it: Manufacturing techniques for product design* (2nd ed.). Laurence King Publishing. 4. Ulrich, K. T., Eppinger, S. D., & Yang, M. C. (2020). *Product design and development* (7th ed.). McGraw-Hill Education. 5. Malloy, R. A. (2010). *Plastic part design for injection molding: An introduction* (2nd ed.). Hanser Publishers. 6. Bralla, J. G. (Ed.). (1999). *Design for manufacturability handbook* (2nd ed.). McGraw-Hill. **Online Resources** 1. SOLIDWORKS learning resources on part modelling, shelling, assemblies and interference checking 2. Protolabs introductory design guidelines for plastic parts, machining and 3D printing 3. Xometry introductory Design for Manufacturing resource 4. Manufacturer catalogues for standard screws, inserts, fasteners and joining components 5. Relevant BIS/IS/ISO engineering standard sheets and manufacturer/tool data sheets for threads, fasteners, inserts, fits, clearances, drill/tap sizes and standard components 6. Manufacturer and industry design guides for plastic materials, injection-

	moulded component detailing and plastic-part manufacturability 7. Online product teardown, repair and assembly documentation resources **Suggested Filed Visits** 1. Product manufacturing and assembly facilities 2. 3D-printing and prototyping facilities 3. Tool rooms and fabrication workshops 4. Product repair and service centers 5. Consumer-product manufacturing units