Course Code	Course Name	Credits
MELO8062	**Design for X**	**03**

Objectives:

1. To acquaint the learners with the concept of designformanufacturing and assembly
2. To acquaint the learners with the concept ofdesignfor reliability and maintainability
3. To study the product development economics.

Outcomes: Upon successful completion of this course, the learner will be able to

1. Applydesignconcepts and guidelines formanufacturing and assembly.
2. Demonstrate the concept of value analysis and its relevance.
3. Understand the economics of product development
4. Applydesignconceptsforreliability and maintainability

Module	Contents	Hours
1.	**DESIGNFORMANUFACTURE**: General design principles for manufacturability-strength and mechanical factors, mechanisms selection, evaluation method, Processcapability-Feature tolerances-Geometrictolerances-Assembly limits—Datum features-Tolerance stacks	05
2.	**DESIGN FOR ASSEMBLY:** Assembly processes-Handling and insertion process-Manual, automatic and robotic assembly-Cost of Assembly-Number of Parts-DFA guidelines	08
3.	**VALUEENGINEERING:** Introduction to Value Engineering and Value Analysis, Valuetypes-functional—operational—aesthetic, Value engineering in product design; Advantages, Applications in product design, Problem identification and selection, Analysis of functions, Anatomy of function. Primary versus secondary versus tertiary/unnecessary functions, Functional analysis: Functional Analysis System Technique (FAST), Case studies.	08
4.	**PRODUCTDEVELOPMENTECONOMICS:** Elements of Economics Analysis-Quantitative and qualitative analysis-Economic Analysis Process-Estimating magnitude and time of future cash inflows and outflows-	08

	Sensitivity analysis-Projecttrade-offs-Trade-offs rules-Limitation of quantitative analysis-Influence of qualitative factors on project success		
5.	**CONCEPTOFRELIABILITY:** Introduction:The study of Reliability and Maintainability, Concepts, Terms and Definitions, Applications, The Failure Distribution:The reliability Function, Mean Time to Failure, Hazard Rate Function, Bathtub Curve, Conditional Reliability	05	
6.	**MAINTAINABILITY:** Analysis of down time, Report Time Distribution, Stochastic Point Processes, Reliability under Preventive Maintenance, State-Dependant System with Repair, Design for Maintainability.	05	

Assessment:

Internal Assessment for 20 marks:

Consisting **Two Compulsory Class Tests**

First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination:

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total **six questions, each carrying 20 marks.**
2. Question 1 will be compulsory and should cover maximum contents of the curriculum.
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only **Four questions need to be solved**.

References:

1. HarryPeck,DesigningforManufacture,PitmanPublications,1983.
2. GeorgeEDieter,EngineeringDesign,McGraw-HillInt Editions,2000
3. S.S.Iyer,ValueEngineering,NewAgeInternational, 2000
4. CharlesE.Ebeling,AnIntroductiontoReliabilityandMaintainabilityEngineering,TMH2000.