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PRODUCT DESIGN AND DEVELOPMENT

(Elective IV)

(Code : 402050C)

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Mandar M. Bidwe

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Product Design and Development

(Elective IV)

(Code : 402050C)

Semester VIII - Mechanical Engineering
(Savitribai Phule Pune University)

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Dr. Yithalrao Vikhe Patil College of Engg, Ahmednagar

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**UNIT 1****Chapter 1 : Introduction to Product Design and Development 1-1 to 1-17**

Syllabus : Definition of product design, Essential Factors for product design, Modern approaches to product design, standardization, simplification and specialization in product design, product development, product development versus product design, modern product development process, product testing and validation.

✓	Syllabus Topic : Definition of Product Design	1-1
1.1	Definition of Product Design (May 16)	1-1
✓	Syllabus Topic : Essential Factors for Product Design	1-1
1.2	Essential Factors for Product Design	1-1
	(Aug. 15 (In Sem.), May 16, Oct. 16 (In Sem.), May 18)..	1-1
1.3	Product Design Phases (Seven Phases of Product Design Or Morphology of Product Design)	1-4
	(Aug. 15 (In Sem.))	1-4
✓	Syllabus Topic : Modern approaches to Product Design	1-5
1.4	Modern Approaches to Product Design	1-5
1.4.1	Concurrent Design (Dec. 16)	1-5
1.4.2	QFD (Quality Function Deployment)	1-6
1.4.2.1	Procedure for Documenting Information in QFD	1-7
1.4.3	Rapid Prototyping	1-7
✓	Syllabus Topic : Standardization, Simplification and Specialization in Product Design	1-9
1.5	Standardization, Simplification and Specialization in Product Design	1-9
	(Oct. 16(In sem.), Aug. 17(In Sem.))	1-9
1.5.1	Standardization	1-9
1.5.1.1	Advantages of Standardization	1-10
1.5.1.2	Disadvantages of Standardization	1-10
1.5.2	Simplification	1-10
1.5.2.1	Features of Simplification	1-10
1.5.3	Specialization	1-10
1.5.3.1	Advantages of Specialization	1-10
1.5.3.2	Disadvantages of Specialization	1-10
✓	Syllabus Topic : Product Development	1-11
1.6	Product Development	1-11
1.6.1	Steps in Product Development	1-11
1.7	Product Development Versus Product Design (Oct. 16 (In sem.))	1-11
1.8	Product Development Team (Dec. 15, Dec. 16)	1-12
1.9	Product Development Planning	1-13
1.9.1	Steps involved in Planning Process	1-13
✓	Syllabus Topic : Modern Product Development Process	1-14

1.10	Modern Product Development Process With Reference to ISO Standard	1-14
	(Oct. 16(In Sem.), Dec. 16)	1-14
✓	Syllabus Topic : Product Testing	1-15
1.11	Product Testing (Aug. 15(In sem.))	1-15
1.11.1	Objectives of Product Testing	1-15
1.11.2	Uses of Product Testing	1-16
✓	Syllabus Topic : Product Validation	1-16
1.12	Product Verification and Product Validation (Aug. 15(In Sem.), Dec. 16)	1-16
1.13	Exam Pack (University and Review Questions)	1-16

UNIT 2**Chapter 2 : Product Development : Technical and Business Concerns 2-1 to 2-18**

Syllabus : Mission Statement and Technical Questioning, Technology Forecasting and S Curve, Customer Needs and Satisfaction, Customer Needs - Types and Models, tools for Gathering Customer Needs, Customer Population and Market Segmentation.

✓	Syllabus Topic : Mission Statement and Technical Questioning	2-1
2.1	Mission Statement and Technical Questioning (Dec. 15, May 17, Dec. 17)	2-1
2.1.1	Mission Statement (May 17, Aug. 17 (In Sem.))	2-1
2.1.2	Technical Questioning (May 17)	2-2
2.1.3	Role of Mission Statement and Technical Questioning (May 17)	2-2
✓	Syllabus Topic : Technology Forecasting and S-Curve	2-3
2.2	Technology Forecasting and S-Curve	2-3
2.2.1	Forecasting (May 16, Dec. 16, Aug. 17 (In Sem.))	2-3
2.2.1.1	Purpose of Technology Forecasting (May 16, Aug. 17 (In Sem.))	2-3
2.2.2	Methods/ Classification of Technology Forecasting (May 16)	2-4
2.2.3	Technology of S-Curve (Aug. 15 (In Sem.), May 16, Oct. 16 (In Sem.))	2-4
✓	Syllabus Topic : Customer Needs and Satisfaction	2-6
2.3	Customer Needs and Satisfaction	2-6
2.3.1	Customer Needs (Aug. 15 (In Sem.), Aug. 17 (In Sem.))	2-6
2.3.2	Customer Satisfaction	2-7
✓	Syllabus Topic : Customer Needs - Types and Models	2-7
2.4	Customer Needs - Types and Models (Aug. 15(In Sem.), Aug. 17 (In Sem.))	2-7
2.4.1	Different Type of Customer Needs (May 16)	2-7
2.4.2	Customer Need Models (May 16)	2-8
2.4.2.1	Kano Model (May 16)	2-8

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4.3	Tear Down Methods	4-4
✓	Syllabus Topic : Force Flow Diagrams.....	4-4
4.3.1	Force Flow Diagrams (Dec. 15, May 16, Dec. 16, May 17)	4-4
✓	Syllabus Topic : Measurement and Experimentation.....	4-5
4.3.2	Measurement and Experimentation (May 17, Dec. 17).....	4-5
✓	Syllabus Topic : Applications of Product Teardown.....	4-7
4.4	Application of Teardown Process	4-7
✓	Syllabus Topic : Benchmarking Approach and Detailed Procedure.....	4-10
4.5	Benchmarking Approach and Detailed Procedure (Dec. 15, May 16, May 17, Dec. 17)	4-10
4.5.1	Benchmarking of Competitors (May 17).....	4-11
✓	Syllabus Topic : Tools used in Benchmarking	4-12
4.6	Tools used in Benchmarking	4-12
✓	Syllabus Topic : Indented Assembly Cost Analysis.....	4-12
4.6.1	Indented Assembly Cost Analysis (May 17, May 18)	4-12
✓	Syllabus Topic : Function - Form Diagrams	4-13
4.6.2	Function - Form Diagrams (Dec. 15, May 16, May 17)	4-13
✓	Syllabus Topic : Trend Analysis	4-14
4.6.3	Trend Analysis (May 18)	4-14
✓	Syllabus Topic : Setting Product Specifications	4-14
4.6.4	Setting Product Specifications.....	4-14
4.6.4.1	Specification Process (Dec. 16, May 18).....	4-14
4.6.4.2	Functional Requirements Versus Constraints (Dec. 16, May 18).....	4-15
4.6.4.3	Value Analysis (Dec. 16, May 18).....	4-15
✓	Syllabus Topic : Introduction to Product Portfolio	4-16
4.7	Introduction to Product Portfolio (Dec. 15)	4-16
4.7.1	Portfolio Architecture Types	4-16
4.7.2	Mass Customization	4-17
✓	Syllabus Topic : Introduction to Product Architectures.....	4-18
4.8	Introduction to Product Architectures (Dec. 16)	4-18
4.8.1	Types of Product Architecture	4-18
4.9	Product Modularity.....	4-18
4.9.1	Types of Modularity	4-19
4.9.1.1	Function Based Modularity.....	4-19
4.9.1.2	Manufacturing Based Modularity.....	4-19
4.10	Exam Pack (University and Review Questions)	4-20

UNIT 5

Chapter 5 : Design For X

5-1 to 5-25

Syllabus : Design for manufacture, Design for assembly, Design for robustness, Design for safety, Design for reliability, Design for environment, Design for piece part production, manufacturing cost analysis. Local, Regional and Global issues. basic life cycle assessment - basic method, weighted sum assessment method (Numerical), Design Failure mode effect analysis.

✓	Syllabus Topic : Design for Manufacture	5-1
5.1	Design for Manufacture (Dec. 15, May 16, May 17)	5-1
5.1.1	Design for Manufacturability Considerations (DFM Guidelines) (Dec. 15, May 16, May 17).....	5-2
✓	Syllabus Topic : Design For Assembly (DFA)	5-3
5.2	Design For Assembly (DFA) (Dec. 15, Dec. 16)	5-3
✓	Syllabus Topic : Design for Robustness.....	5-4
5.3	Design for Robustness (May 16, Dec. 16, May 17, May 18).....	5-4
✓	Syllabus Topic : Design for Safety.....	5-6
5.4	Design for Safety (May 17, May 18).....	5-6
5.4.1	Fail-Safe Design (May 17, May 18).....	5-6
5.4.2	Guidelines for Design for Safety (May 17, May 18).....	5-7
✓	Syllabus Topic : Design for Reliability	5-8
5.5	Design for Reliability	5-8
5.5.1	Fail-safe Approach.....	5-8
5.5.2	Absolute Worst Case Approach.....	5-8
5.5.3	Causes of Unreliability	5-8
5.6	Cost of Reliability	5-9
✓	Syllabus Topic : Design for Environment (DFE)	5-9
5.7	Design for Environment (DFE) (Dec. 15, May 18)	5-9
5.7.1	DFE Guidelines (Environmental Objectives) (Dec. 15, May 18).....	5-10
5.7.2	Design for Recycling	5-12
5.7.3	Design for Remanufacturing	5-12
✓	Syllabus Topic : Design for Piece Part Production.....	5-12
5.8	Design for Piece Part Production (May 17)	5-12
5.8.1	Cast Part Design Guidelines (May 17, May 18)	5-12
5.8.2	Machined Part Design Guidelines (May 18)	5-13
✓	Syllabus Topic : Manufacturing Cost Analysis.....	5-13
5.9	Manufacturing Cost Analysis (May 17, May 18).....	5-13
✓	Syllabus Topic : Local, Regional and Global Issue	5-15
5.10	Local, Regional and Global Issue (Dec. 15, May 16, May 17).....	5-15
5.10.1	Local Regional Issues.....	5-15
5.10.2	Global Issues	5-16

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PRODUCT DESIGN AND DEVELOPMENT (Elective-IV)

Mandar M. Bidwe

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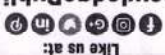
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