

I YEAR M. TECH (MACHINE DESIGN) SECOND SEMESTER

17MEMD2T6D

PRODUCT DESIGN

Credits 4

Lecture: 4 periods/week

Internal assessment: 40 marks

Tutorial: - -

Semester end examination: 60 marks

COURSE OBJECTIVES:

- To impart the process of product design;
- To expose the various factors influencing product design.

COURSE OUTCOMES:

After completion of the course, student should be able to

1. Apply various tools of problem solving to arrive at a fruitful design
2. Analyze the factors influencing the design.
3. Determine the risk and reliability aspects associated with product design.
4. Select appropriate manufacturing processes to realize the product design
5. Evaluate various modes of product testing.

UNIT-I

PRODUCT DESIGN PROCESS:

Design process steps, problem-solving process, creative problem solving, invention, brainstorming, morphological analysis, behavioral aspects of decision making, decision theory.

MODELING AND SIMULATION:

Triz, role of models in engineering design, mathematical modeling, similitude and scale models, geometric modeling on computer, finite-element analysis.

UNIT-II

MATERIAL SELECTION:

Material selection for new product design, role of processing in design, design for manufacture, design for assembly.

DESIGN FOR ENVIRONMENT:

Need of Design for Environment, techniques to reduce environment impact.

UNIT-III

RISK AND RELIABILITY:

Risk and society, Hazard analysis, fault tree analysis. failure analysis and quality: causes of failures, failure modes, failure mode and effect analysis, FMEA procedure, Product liability, Intellectual property.

UNIT- IV

PRODUCT TESTING:

Thermal, vibration, electrical, and combined environments, temperature testing, vibration testing, test effectiveness, accelerated testing and data analysis, accelerated factors, Weibull probability plotting, testing with censored data.

Learning Resources

Text Books:

- 1 Engineering Design by George E. Dieter, Mc Graw-Hill.
2. Product Design by Kevin Otto, Pearson Education, 2014.

Reference Books:

1. The Product Management Handbook by Richard S. Handscombe, Mc Graw-Hill.
2. New Product Design and development by Ulrich Eppinger, TMH.
3. Engineering Design Principles by Ken Hurst, Elsevier.
4. Product Integrity and Reliability in Design by John W. Evans and Jillian Y. Evans, Springer