

# CONCURRENT AND VALUE ENGINEERING

ENIE 302

**Lecture** : 3  
**Tutorial** : 1  
**Practical** : 0

**Year** : III  
**Part** : I

## Course Objectives:

The objective of this course is to provide students with a comprehensive understanding of concurrent engineering and value engineering, with a focus on modern digital tools, sustainability, and cost-effective product development. Students will learn to integrate concurrent and value engineering principles in industrial settings, aiming to enhance manufacturing competitiveness, optimize processes, and apply value-driven design strategies through case studies and practical industry applications.

### **1 Concurrent Engineering (4 hours)**

- 1.1 Historical evolution
- 1.2 Basic principles and components
- 1.3 Benefits and challenges
- 1.4 Systems of concurrent engineering

### **2 New Development and Methods (5 hours)**

- 2.1 Requirements engineering
- 2.2 Collaborative engineering
- 2.3 Systems engineering
- 2.4 Knowledge-based engineering
- 2.5 Reverse engineering

### **3 Manufacturing Competitiveness (8 hours)**

- 3.1 Product and service
- 3.2 Process and methodology
- 3.3 Balancing elements
- 3.4 Performance indicators
- 3.5 Green-lean manufacturing
- 3.6 Introduction to Industry 4.0 and 5.0

### **4 System Engineering (6 hours)**

- 4.1 System thinking
- 4.2 Approaches to system view

- 4.3 System dynamics
- 4.4 Components of system engineering process model
- 4.5 Problem area and solution system
- 4.6 Model-based systems engineering

**5 Reengineering (6 hours)**

- 5.1 Business crisis and reengineering
- 5.2 Reengineering: The path to change
- 5.3 Actors of reengineering
- 5.4 Rethinking of business process
- 5.5 Terms and concepts in enterprise modeling

**6 Value Engineering (4 hours)**

- 6.1 Genesis, goals and definitions
- 6.2 The value equation
- 6.3 Value innovation and ways to add value
- 6.4 Achieving excellence: Principles and models
- 6.5 Value engineering job plan
- 6.6 Change management

**7 Functions (8 hours)**

- 7.1 Introduction to function
- 7.2 Types of functions and governing rules
- 7.3 Functional analysis system technique (FAST)
- 7.4 FAST logic and reading FAST
- 7.5 FAST diagrams and FAST model
- 7.6 Process overview
- 7.7 Syntax used to create and read a FAST model
- 7.8 Key elements of FAST model building process

**8 Industrial Applications (4 hours)**

- 8.1 Applications in production, automotive, aerospace, and electronics
- 8.2 Success stories and insights
- 8.3 Emerging trends and future directions

**Tutorial (15 hours)**

- 1. Case study of nearby real-life industries: Identify the concurrency, potential gaps and way for further process improvement
- 2. Presentation on the case study report
- 3. Preparation of FAST model, its analysis and ways for optimization
- 4. Value analysis of any machine component and its analysis

## Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

| Chapter      | Hours     | Marks distribution* |
|--------------|-----------|---------------------|
| 1            | 4         | 5                   |
| 2            | 5         | 5                   |
| 3            | 8         | 12                  |
| 4            | 6         | 8                   |
| 5            | 6         | 8                   |
| 6            | 4         | 5                   |
| 7            | 8         | 12                  |
| 8            | 4         | 5                   |
| <b>Total</b> | <b>45</b> | <b>60</b>           |

\* There may be minor deviation in marks distribution.

## References

1. Ullman, D.G. (2020). The mechanical design process. McGraw-Hill Education.
2. Evans, J.W., Evans, J.Y. (2019). Value engineering: Analysis and methodology. CRC Press.
3. Otto, K., Wood, K. (2021). Product design: Techniques in reverse engineering and new product development. Pearson.
4. Pecht, M. (2022). Product reliability, maintainability, and supportability handbook. CRC Press.
5. Prasad, B. (1996). Concurrent engineering fundamentals (Vols. 1–2). Prentice Hall.