

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## New Scheme Based On AICTE Flexible Curricula

### Mechanical Engineering, VII-Semester

#### Open Elective ME-703(C) Systems Engineering

This course in systems engineering examines the principles and process of creating effective systems to meet application demands.

The course is organized as a progression through the systems engineering processes of analysis, design, implementation, and deployment with consideration of verification and validation throughout.

COURSE OUTCOME: After successful completion of the course, students would be able to

- \* Plan and manage the systems engineering process
- \* Examine systems from many perspectives (such as software, hardware, product, etc.)
- \* Distinguish critical functions, diagnose problems, and apply descoping strategies and judge the complexity of production and deployment issues.
- \* Know about the complexity in modern systems such as in missiles, rocket engines, modern automobiles etc.
- \* Solve real complex problems

#### **Syllabus:**

##### **Unit 1: Overview of Systems Engineering:**

Introduction, Origin, Examples of Systems requiring systems engineering, Systems Engineer Career Development Model, Perspectives of Systems Engineering, Systems Domains, Systems Engineering Fields, System Engineering Approaches.

##### **Unit 2: Structure of Complex Systems:**

System Building Blocks and Interfaces, Hierarchy of Complex Systems, System Building Blocks, The System Environment, Interfaces and Interactions, Complexity in Modern Systems.

##### **Unit 3 Concept Development and Exploration:**

Originating a New System, Operational Analysis, Functional Analysis, Feasibility, System Operational Requirements, Implementation of Concept Exploration. Exploration in system life cycle, Concept definition phase, Activities involved in concept definition phase.

##### **Unit 4: Engineering Development:**

Reducing Program Risks, Requirements Analysis, Functional Analysis and Design, Prototype Development as a Risk Mitigation Technique, Development Testing, Risk Reduction. Place of engineering design phase in system life cycle, Various activities involved in engineering design phase.

##### **Unit 5: Integration and Evaluation:**

Integrating, Testing, And Evaluating The Total System, Test Planning And Preparation, System Integration, Developmental System Testing, Operational Test And Evaluation, Engineering For Production, Transition From Development To Production, Production Operations. operation and support phase.

**Books:**

1. Alexander Kossiakoff, William N Sweet, "System Engineering Principles and Practice, Wiley India
2. Blanchard Fabrycky, Systems engineering and analysis, Pearson
3. Dwivedi Krishna K, Pandey M., Fundamentals of Systems Engineering , Wiley Precise Text book Series, Wiley India. ISBN: 978-265-6654-9
4. Dennis M. Buede, William D. Miller, "The Engineering Design of Systems: Models & Methods" Wiley India
5. Jeffrey L. Whitten, Lonnie D Bentley, "System Analysis and Design Methods" 6. Richard Stevens, Peter Brook, " System Engineering – Coping with complexity, Prentice Hall of India.
7. Eisner, H. Essentials of Projects and Systems Engineering Management, 2nd edition. John Wiley & Sons, New Jersey, USA.
8. Buede, D. M.. The Engineering Design of Systems, Models and Methods. John Wiley & Sons, New Jersey, USA.

**Evaluation:**

Evaluation will be continuous and integral part of the class as well as through external assessment