

Introduction to Systems Engineering

CourseCode	23EC2702B	Year	IV	Semester	I
Course Category	OE-IV	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Linear algebra
ContinuousInternal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		
Upon successful completion of the course, the student will be able to		BL
CO1	Understand systems engineering concepts, system hierarchy and systems thinking	L2
CO2	Analyze system life cycle stages and technical processes for system development.	L4
CO3	Apply requirements analysis, architecture and design processes	L4
CO4	Identify system integration, verification, validation and operational processes.	L3
CO5	Apply technical management processes including risk, configuration and quality management	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1:Low)													
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2											2	
CO2	3	2										2	
CO3	3	2										2	
CO4	3											2	
CO5	3	2				2	2					2	
Avg.	3	2				2	2					2	

Syllabus		
Unit No.	Contents	Mapped CO
1	Systems Engineering Fundamentals: Introduction to Systems Engineering, Systems Thinking and System Concepts, System Hierarchy and System of Systems, Enabling Systems and Operational Environment. Case Study on the Design of a Smart Traffic Management System integrating sensors, cameras, and central control.	CO1
2	System Life Cycle Processes: Generic Life Cycle Stages, Concept, Development, Production, Utilization, Support, Retirement, V-Model and Iterative Development, Case Study on Lifecycle analysis of an Autonomous Drone Delivery System.	CO2,CO3
3	Technical Processes: Stakeholder Needs and Requirements Definition, System Requirements Definition, Architecture and Design Definition, System Analysis Process. Case Study on Architecture design for an IoT-based Smart Home Automation System	CO4
4	Integration, Verification and Validation: Implementation Process, Integration Process, Verification and Validation, Transition and Operation Processes, Case Study on Integration and testing strategy for an Electric Vehicle Battery Management System	CO4
5	Technical Management Processes: Project Planning, Risk Management, Configuration Management, Quality Assurance and Measurement, case study on Risk management plan for development of a Satellite Communication System.	CO5

Learning Resources	
Text Books	
1	David D. Walden, Esep Garry J. Roedler, Esep Kevin J. Forsberg, Esep R. Douglas Hamelin Thomas M. Shortell, Systems Engineering Handbook - A Guide For System Life Cycle Processes and Activities – Wiley Publications 4 th Ed.,, 2015.
2	Kossiakoff A, Systems Engineering,- Systems Engineering Principles and Practice, Wiley. 4 th Ed.,
Reference Books	
1	Alexander Kossiakoff , William N. Sweet , Samuel J. Seymour, Systems Engineering Principles and Practice, 2 nd Ed., Wiley-Interscience, 2011
2	Lightsey, Bob.Systems Engineering Fundamentals, 2001
e- Resources & other digital material	
1.	https://ocw.mit.edu/courses/16-885j-aircraft-systems-engineering-fall-2005/6128a102c1a9b6dbd30f2fb18c12aa64_sefguide_01_01.pdf
2.	https://onlinecourses.nptel.ac.in/noc25_mg63/preview