Register Number: ..……..

KUMARAGURU
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M.E / M. TECH DEGREE EXAMINATIONS: NOV/ DEC 2024

(Regulation 2024)

First Semester

DEFENCE TECHNOLOGY

24DTE009: System Engineering and Analysis

COURSE OUTCOMES

CO1: Understand the system design requirements, architecture, functional requirements.

CO2: Generate the system requirements documents as per the requirement analysis.

CO3: Understand the system reliability, maintainability, usability issues.

CO4: Carry out the system reliability analysis.

Time: 3 Hours **Maximum Marks: 100**

PART - A (4*20 = 80 Marks)

1.	a)	Explain how systems engineering contributes to the success of a defence project.	4	CO1	[K_2]
	b)	Explain the role of system architecture in the development of complex defence systems.	4	CO1	[K_2]
	c)	How do the ISO/IEEE/IEC 15288 standards help in the development of complex systems?	4	CO1	[K_2]
	d)	Write down business outcomes of ISO /IEEE/IEC 15288 standards.	4	CO1	[K_2]
	e)	How would you apply systems analysis and design to develop a new defence system?	4	CO1	[K_3]
2.	a)	What is the purpose of requirements analysis in defence projects?	4	CO2	[K_1]
	b)	What is the purpose of functional analysis in defence projects?	4	CO2	[K_1]
	c)	Explain the difference between verification and validation in the context of defence projects.	4	CO2	[K_2]
	d)	How would you apply the system engineering process model to develop a new defence technology?	4	CO2	[K_3]
	e)	What is Model Based System Engineering?	4	CO2	[K_1]

3.	a)	How do key performance metrics impact the design and operation of landing gear systems?	4	CO3	[K_2]
	b)	What is Reliability-Centered Maintenance (RCM)?	4	CO3	[K_1]
	c)	Describe Failure Modes and Effects Analysis (FMEA) with example.	4	CO3	[K_1]
	d)	How would you apply the CDIO model to the development of a specific defence technology or system?	4	CO3	[K_3]
	e)	How does operational feasibility impact the development and deployment of defence technologies?	4	CO3	[K_2]
4.	a)	Describe the different phases of the bathtub curve for aircraft components.	4	CO4	[K_2]
	b)	Explain how reliability analysis contributes to improving operational efficiency in airlines.	4	CO4	[K_2]
	c)	Analyze how the application of redundancy in aerospace design contributes to fault tolerance and ensures system reliability in critical operations.	4	CO4	[K_3]
	d)	Develop key metrics for measuring airline reliability.	4	CO4	[K_3]
	e)	Develop a plan for implementing key aspects of fault tolerance in aircraft systems to enhance safety and operational reliability.	4	C04	[K_3]

Answer any ONE question
PART- B (1*20 = 20 Marks)

5.	a)	Design and develop an improved requirement analysis process for a landing gear system that integrates more advanced safety and performance features, based on ISO/IEC 15288 standards.	5	CO1	[K_6]
	b)	Analyze the development and evolution of systems engineering process standards over time.	5	CO2	[K_4]
	c)	Evaluate how supportability engineering practices contribute to reducing life cycle costs in aerospace projects.	5	CO3	[K_5]
	d)	Design a reliability program for an airline that incorporates the FAA advisory circular's guidelines and meets regulatory standards.	5	CO4	[K_6]

(OR)

6.	a)	Analyze different systems engineering standards, highlighting how each has adapted to changing aerospace technological needs.	5	CO1	[K_4]
	b)	Evaluate the requirement analysis process for a landing gear system in accordance with ISO/IEC 15288 engineering standards.	5	CO2	[K_5]
	c)	Choose the key techniques used for reliability assessments in aerospace industries and assess how well they address system complexity and operational risks.	5	CO3	[K_6]
	d)	Design a system that incorporates FAA techniques for detecting performance deviations and ensures timely corrective actions in an airline.	5	CO4	[K_6]

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