Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI EXAMINATION – WINTER 2025

Subject Code:3161013 Date:19-11-2025

Subject Name:Systems Engineering

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	What is Systems Engineering? State two contrast between systems engineering and traditional engineering.	**03**
	(b)	Explain any one example of complex system where system engineering is needed in brief.	**04**
	(c)	Explain all phases of System Life Cycle in detail with a block diagram.	**07**
Q.2	**(a)**	Explain complex system hierarchy in brief.	**03**
	(b)	Explain Interfaces and Interactions in reference to complex systems.	**04**
	(c)	List the activities included under all four stages of needs and requirement analysis.	**07**
		OR	
	(c)	Write a short note on Model Based Systems Engineering (MBSE).	**07**
Q.3	**(a)**	Explain system environment and system boundaries in brief.	**03**
	(b)	Explain types of system requirement in detail..	**04**
	(c)	Explain Systems Engineering Management Plan. (SEMP)	**07**
		OR	
Q.3	**(a)**	Explain following terms in brief; also state its importance in life cycle system engineering. (i) PERT (program Evaluation and Review Technique) (ii) PDR (Preliminary Design Review) (iii) CDR (Critical Design Review)	**03**
	(b)	Briefly discuss concept exploration phase in the system life cycle.	**04**
	(c)	Explain Work breakdown structure (WBS). List the benefits and need of WBS.	**07**
Q.4	**(a)**	Justify the need of prototype development for risk mitigation.	**03**
	(b)	Discuss role of hypothesis testing in Systems Engineering.	**04**
	(c)	Explain the model for engineering development phase.	**07**

OR

Q.4	**(a)**	Write a note on Trade-off Analysis.	**03**
	(b)	Write a short note on Systems Modeling Languages.	**04**
	(c)	Explain design synthesis processes in detail.	**07**
Q.5	**(a)**	Explain concept of redundancy in design engineering design.	**03**
	(b)	Discuss transition from development to production.	**04**
	(c)	Explain the concept of system integration in detail.	**07**

OR

Q.5	**(a)**	Explain concept of predictability in design engineering design.	**03**
	(b)	Explain System Maintenance Process in brief.	**04**
	(c)	Explain Verification and Validation of a system in detail.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3161013 Date:28-11-2024

Subject Name: Systems Engineering

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	State three definitions of Systems Engineering.	**03**
	(b)	List the essential characteristics of a successful Systems Engineer professional.	**04**
	(c)	Justify the importance of requirement and need analysis in complex system engineering. List all activities done under this phase.	**07**
Q.2	**(a)**	Justify the role of Critical Path Method in project scheduling.	**03**
	(b)	Explain types of interface elements in complex systems with necessary examples.	**04**
	(c)	Describe System Life Cycle with a block diagram. Discuss major activities done under each of the phases in brief.	**07**
		OR	
	(c)	Explain the concept of hierarchy in complex systems using a detailed example of any signal and data System.	**07**
Q.3	**(a)**	Define ‘MOE’ and ‘MOP’.	**03**
	(b)	Write a short note on design synthesis processes.	**04**
	(c)	Explain Work breakdown structure (WBS). List the benefits and needs of WBS.	**07**
		OR	
Q.3	**(a)**	Define Preliminary Design Review (PDR) and Critical Design Review (CDR).	**03**
	(b)	Briefly discuss activities under each substage of the concept development stage.	**04**
	(c)	Explain Systems Engineering Management Plan. (SEMP).	**07**
Q.4	**(a)**	Write a short note on Trade-off Analysis.	**03**
	(b)	List four pros and cons (two of each) of incorporating some of the latest technology into the development of a new complex system.	**04**
	(c)	Write a detailed note on Model Based Systems Engineering (MBSE) approaches.	**07**
		OR	
Q.4	**(a)**	What is rapid prototyping? Discuss prototype development as a risk mitigation technique.	**03**
	(b)	List differences between Unified Modelling Language (UML) and SysML (Systems Modelling Language).	**04**
	(c)	Explain (i) risk assessment (ii) risk likelihood and (iii) risk criticality with reference to risk management in systems engineering.	**07**

Q.5	**(a)**	Write a short note on User Interface Design (UID)	**03**
	(b)	Explain System Maintenance Process in brief.	**04**
	(c)	Discuss the concept of integration testing and its importance in complex systems. List the activities done under integration testing.	**07**

OR

Q.5	**(a)**	Explain Verification and Validation of a system in brief.	**03**
	(b)	Discuss transition from development to production phase.	**04**
	(c)	Explain the concept of availability, redundancy, and predictability in the engineering design stage.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – WINTER 2023

Subject Code:3161013 Date:07-12-2023

Subject Name:Systems Engineering

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define system engineering and give example of it.	**03**
	(b)	Give the comparison between following two systems perspectives: systems thinking and systems engineering.	**04**
	(c)	Explain the project life cycle in detail.	**07**
Q.2	**(a)**	Which are three basic entities that constitute media on which systems operate?	**03**
	(b)	What are the sub divisions of information elements? Explain those divisions.	**04**
	(c)	What do you understand by system design hierarchy? Explain it with example.	**07**
		OR	
	(c)	Explain the spiral model of system life cycle.	**07**
Q.3	**(a)**	What is rapid prototyping?	**03**
	(b)	List out the most common methods of dealing with program risk.	**04**
	(c)	Write a note on system engineering management plan (SEMP).	**07**
		OR	
Q.3	**(a)**	Briefly explain need analysis phase.	**03**
	(b)	Explain the analysis pyramid used for analysis purpose.	**04**
	(c)	Write a note on work breakdown structures (WBS).	**07**
Q.4	**(a)**	Explain briefly about model based systems engineering (MBSE).	**03**
	(b)	What is test and evaluation master plan (TEMP)?	**04**
	(c)	Draw and explain the concept exploration phase flow diagram.	**07**
		OR	
Q.4	**(a)**	What is risk reduction?	**03**
	(b)	Explain prototype development as a risk mitigation technique.	**04**
	(c)	Draw and explain the concept definition phase flow diagram.	**07**
Q.5	**(a)**	Define modular maintainability, availability and redundancy.	**03**
	(b)	Which are the techniques to increase reliability?	**04**
	(c)	Give the parallels between the system development and test & evaluation planning.	**07**
		OR	
Q.5	**(a)**	What do you understand by in service support?	**03**
	(b)	Which are the key elements of production plan?	**04**
	(c)	Give the essential features of effective operational evaluation.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3161013 Date:15-12-2022

Subject Name:Systems Engineering

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define a system.	**03**
	(b)	Describe the difference between traditional Engineering. and Systems	**04**
	(c)	Explain all phases of System Life Cycle.	**07**
Q.2	**(a)**	What is lifecycle integration?	**03**
	(b)	Explain complex system hierarchy in brief.	**04**
	(c)	Explain Work breakdown structure (WBS).	**07**
		OR	
	(c)	Explain in brief Systems Engineering Management.	**07**
Q.3	**(a)**	What is requirement analysis?	**03**
	(b)	Describe Systems risk management.	**04**
	(c)	Explain the concept stage of system lifecycle.	**07**
		OR	
Q.3	**(a)**	What is need analysis?	**03**
	(b)	Explain functional analysis in brief.	**04**
	(c)	Explain Model based Systems Engineering (MBSE)	**07**
Q.4	**(a)**	What are trade studies?	**03**
	(b)	Explain Product Implementation process in brief.	**04**
	(c)	Explain the model for engineering development phase.	**07**
		OR	
Q.4	**(a)**	What is specialty engineering?	**03**
	(b)	Explain Product Validation process in brief.	**04**
	(c)	Explain design synthesis processes in detail.	**07**
Q.5	**(a)**	What is design synthesis?	**03**
	(b)	Explain System Maintenance Process in brief.	**04**
	(c)	Explain Integration, Verification and Validation of a system	**07**
		OR	
Q.5	**(a)**	What is system integration?	**03**
	(b)	Explain System Operation Process in brief.	**04**
	(c)	Explain Product Verification process in detail.	**07**

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