Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– V (New) EXAMINATION – WINTER 2019

Subject Code: 2150305 **Date: 04/12/2019**

Subject Name: Modelling & Simulation of Physiological systems

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Explain need of Physiological system modelling.	**03**
	(b)	Explain "Resistance" in mechanical, Fluidic, Thermal & chemical system	**04**
	(c)	Explain muscle stretch reflex as a physiological control system.	**07**
Q.2	**(a)**	State superposition principle.	**03**
	(b)	Define Grey box model, white box model and black box model.	**04**
	(c)	Distinguish between Engineering control system and physiological control system justify giving an example.	**07**
		OR	
	(c)	Explain linear model of muscle mechanic with necessary figure.	**07**
Q.3	**(a)**	State Starling's Law.	**03**
	(b)	Explain distributed parameter model with an example.	**04**
	(c)	Explain venous return curve illustrating factors that affect Slope and position in the graph.	**07**
		OR	
Q.3	**(a)**	Give difference between time domain analysis and frequency domain analysis.	**03**
	(b)	Explain lumped parameter model with an example.	**04**
	(c)	Describe the model of Cardiac output regulation with the help of neat diagram & derive the necessary differential equations.	**07**
Q.4	**(a)**	Draw graph of steady state closed loop analysis: heart and schematic circulation.	**03**
	(b)	Explain steady state characteristics of the muscle stretch reflex model components.	**04**
	(c)	Explain the model of neuromuscular Reflex Motion with its necessary equations, block diagram & SIMULINK implementation.	**07**
		OR	
Q.4	**(a)**	Draw transient response descriptors graph with necessary labels.	**03**
	(b)	Explain chemical regulation of ventilation.	**04**
	(c)	Describe steady state analysis of glucose regulation under: a) normal condition b) Type-1 diabetes c) Type-2 diabetes	**07**
Q.5	**(a)**	List the types of eye movement.	**03**
	(b)	Explain blood glucose regulation with the help of flow chart.	**04**
	(c)	Explain Wertheimer's saccade eye model.	**07**
		OR	
Q.5	**(a)**	Explain integral control with an example.	**03**
	(b)	Discuss the limitation of west Heimer's model	**04**
	(c)	Describe an Occulomotor Muscle model with necessary diagram.	**07**

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