Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 170302 **Date: 21/11/2016**

Subject Name: Physiological System Modelling

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.**

Q.1	**(a)**	Give a difference between open-loop verses close-loop systems with necessary examples of physiological systems.	**07**
	(b)	Define: stable dynamic system. Give necessary examples of physiological systems.	**07**
Q.2	**(a)**	Draw and explain linearized dynamic model of the chemoreflex control of ventilation with necessary equations.	**07**
	(b)	Explain the Kao's cross-circulation experiments and its applicability.	**07**
		OR	
	(b)	Describe the artificial brain perfusion setup for separating central and peripheral chemoreflex drive with necessary sketches.	**07**
Q.3	**(a)**	Describe the methods for determination of the steady-state operating point.	**07**
	(b)	Explain the problem of Structural Identifiability with appropriate examples.	**07**
		OR	
Q.3	**(a)**	Explain the problem of Sensitivity Analysis with appropriate examples.	**07**
	(b)	Write a technical note on cardiac output curve.	**07**
Q.4	**(a)**	Draw and explain the schematic block diagram of respiratory control during rebreathing.	**07**
	(b)	Write a technical note on venous return curve.	**07**
		OR	
Q.4	**(a)**	Draw and explain steady-state analysis of glucose regulation.	**07**
	(b)	Explain Steady-state closed-loop analysis of cardiac output regulation with necessary charts.	**07**
Q.5	**(a)**	Describe numerical deconvolution method for nonparametric and parametric model identification.	**07**
	(b)	Explain the minimal model of blood glucose regulation.	**07**
		OR	
Q.5	**(a)**	Describe Least Squares Estimation method for nonparametric and parametric model identification.	**07**
	(b)	Explain the steady-state model of chemical regulation of ventilation.	**07**

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