

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V(New) • EXAMINATION – WINTER 2016

Subject Code:2150305

Date:19/11/2016

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.

Q.1	Short Questions	14
1	Give the difference between poikilothermic & homeothermic animals.	
2	What is positive feedback signal?	
3	Difference between open loop and closed loop system.	
4	Difference between parametric and nonparametric model.	
5	State the different system properties that can be characterized using Mathematical expression.	
6	What do you understand by distributed parameter model?	
7	State principle of superposition.	
8	Give starling's law.	
9	In control engineering by which methods graphical representation of frequency response can be represented ?	
10	Which are the basic problems in physiological system analysis?	
11	What is Cheyne-Stokes Breathing?	
12	List the types of eye movement.	
13	Need of physiological system analysis?	
14	What do you understand by steady state analysis?	
Q.2	(a) What is SIMULINK?	03
	(b) Explain the system properties with an example.	04
	(c) Difference between engineering and physiological control system?	07
	OR	
	(c) Explain physiological control system with an example.	07
Q.3	(a) Explain viscoelasticity in terms of lung tissue.	03
	(b) Explain linear model of muscle mechanics.	04
	(c) Derive heart as an electrical analogy with appropriate equations.	07
	OR	
Q.3	(a) What is determination of steady state operating point?	03
	(b) Describe generalized second order closed-loop model.	04
	(c) Draw and explain the SIMULINK model of simple lung mechanics. Justify the results of model.	07
Q.4	(a) Draw the steady state model for chemical regulation of ventilation.	03
	(b) What is the respiratory controller?	04
	(c) Draw and explain the responses of glucose-insulin model with necessary graphs.	07
	OR	
Q.4	(a) What do you understand by nonlinearity in model?	03
	(b) Explain relationship between transient and frequency response.	04
	(c) Draw & explain the curves of Cardiac Output and Venous Return for below given conditions.	
	1. Normal	
	2. Moderate Exercise	

	3. Heart Failure	07
Q.5	(a) Describe the saccade characteristics.	03
	(b) Briefly explain Distributed Parameter Versus Lumped Parameter.	04
	(c) Derive all the equations showing the dynamics of the neuromuscular reflex motion with suitable diagrams.	07

OR

Q.5	(a) What do you understand by system identification?	03
	(b) Explain briefly agonist & antagonist neurological signals.	04
	(c) Draw and explain Westheimer's saccadic eye movement model.	07
