Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2018

Subject Code:2150305 **Date:16/11/2018**

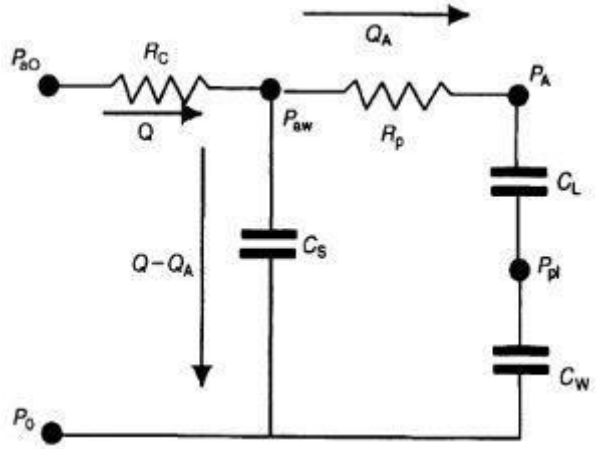
Subject Name:Modelling & Simulation of Physiological systems

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)**	Give an example of physiological system modelling.	**03**
	(b)	State difference between lumped parameter model and distributed parameter model.	**04**
	(c)	Point out difference between engineering control system and physiological control system.	**07**
Q.2	**(a)**	What is muscle stretch reflex?	**03**
	(b)	Explain generalized resistance property of mechanical, fluidic, thermal, and chemical system.	**04**
	(c)	Develop the mechanical equivalent of the electrical analog of respiratory mechanics shown in figure below.	**07**



OR

	(c)	Explain linearized physiological model of skeletal muscle.	**07**
Q.3	**(a)**	Explain determination of steady state operating point.	**03**
	(b)	Give static analysis of closed loop and open loop system.	**04**
	(c)	Draw & explain the curves of Cardiac Output and Venous Return for below given conditions. a) Normal b) Moderate Exercise c) Heart Failure	**07**

OR

Q.3	**(a)**	Explain significance of time domain analysis of linear control systems.	**03**
	(b)	Explain transient response Descriptors.	**04**
	(c)	What is starling's law for regulation of cardiac output? Explain the model for change in cardiac output due to heart rate.	**07**
Q.4	**(a)**	Describe the saccade characteristics.	**03**
	(b)	Explain the agonist & antagonist neurological signals.	**04**
	(c)	Draw & explain the steady-state analysis of glucose regulation for normal, Type- I & II diabetic patients.	**07**

OR

Q.4	**(a)**	Explain glucose-insulin regulation in body.	**03**
	(b)	Explain relationship between transient and frequency responses.	**04**
	(c)	Draw westheimer's saccadic eye movement model.	**07**
Q.5	**(a)**	What are the different types of eye movements executed by the occulomotor system?	**03**
	(b)	Name the "source" and "sink "operator of SIMULINK.	**04**
	(c)	Describe the chemical regulation of ventilation with neat diagrams.	**07**

OR

Q.5	**(a)**	How are frequency response of linear control system represented graphically?	**03**
	(b)	Explain regulation of heart rate and systemic blood pressure.	**04**
	(c)	Explain SIMULINK implementation of neuromuscular reflex model.	**07**

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