

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- VIIth SEMESTER-EXAMINATION – MAY/JUNE- 2012****Subject code: 170302****Date: 08/06/2012****Subject Name: Physiological System Modeling****Time: 02:30 pm – 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.

- Q.1** (a) Draw & describe the physiological control system for knee reflex. **07**
(b) What is the need of physiological modeling? Explain with example. **07**

- Q.2** (a) Explain the venous return with necessary equations. Plot the venous return curve. **07**
(b) Plot the responses of the second-order lung mechanics model to a unit impulse under open-loop and closed-loop modes. **07**

OR

- (b) What is the difference between non-parametric & parametric model. **07**

- Q.3** (a) Draw the schematic model of regulation of glucose & insulin. **07**
(b) What is Starling's law for regulation of cardiac output? Explain with necessary equations. **07**

OR

- Q.3** (a) Describe the frequency response of a model for circulatory control with necessary graphs. **07**
(b) Explain Cheyne-Stokes breathing Model. **07**

- Q.4** (a) Draw the SIMULINK model for glucose-insulin regulation. **07**
(b) Explain how to determine the steady-state operating point. **07**

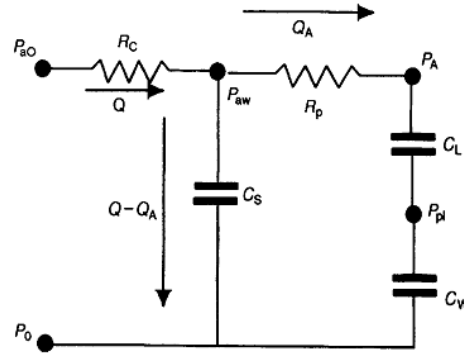
OR

- Q.4** (a) Describe the difference of Distributed Parameter Versus Lumped Parameter. **07**
(b) Explain Westheimer's saccadic eye movement model. **07**

- Q.5** (a) Give equations to explain "Capacitance" in mechanical, Fluidic, Thermal & Chemical systems. **04**

- (b) Develop the mechanical equivalent of the electrical analog of respiratory mechanics shown in below given figure.

10



OR

- Q.5 (a) Give equations to explain "Resistance" in mechanical, Fluidic, Thermal & Chemical systems.

04

- (b) Draw the frequency responses of the systems shown in Figure when:

10

(a) The feedback loop is open

(b) The feedback loop is closed.

In both cases, assume the time delay, T, to be 1 second.

