

GANPAT UNIVERSITY
B.TECH SEM. V BIOMEDICAL & INSTRUMENTATION ENGINEERING
CBCS REGULAR EXAMINATION NOVEMBER/DECEMBER - 2013
2BM501: PHYSIOLOGICAL CONTROL SYSTEMS & MODELING

TIME: - 3 HOURS

TOTAL MARKS: - 70

INSTRUCTION: - 1. Write the answer of each section in separate answer sheet.
 2. Figure to the right indicates full marks.
 3. Assume suitable data if necessary.

SECTION-I

- | | | |
|-------|--|----|
| Que-1 | (a) What is extensive degree of cross coupling among different physiological control system? Draw and explain by using example.
(b) Draw and explain the resistive and capacitive property for mechanical and fluidic system. Compare it with Ohm's law. | 12 |
| OR | | |
| Que-1 | (a) Differentiate engineering and physiological control system.
(b) Mention the name of library for the following blocks in SIMULINK:
i) Saturation ii) Sine Wave iii) Add iv) Gain | 12 |
| Que-2 | (a) Write short note on: Venous Return Curve.
(b) Determine steady state characteristics of the muscle stretch reflex model. | 11 |
| OR | | |
| Que-2 | (a) Show the relationship between lumped parameter and distributed parameter models of passive cable characteristics of an unmyelinated nerve fiber? Explain in detail.
(b) Draw and explain a model of neuromuscular reflex motion. | 11 |
| Que-3 | (a) Draw the linear model of respiratory mechanism.
Derive the mathematical formulation that characterizes the input output properties of respiratory mechanism and draw the SIMULINK model.
(b) Enlist different positive & negative feedback physiological control system. | 12 |

SECTION-II

Que-4

12

- (a) Draw and explain pressures of Respiratory cycle.
- (b) Explain effects of impedance change in peripheral and systemic circulation and LBB on cardiac system.

OR

Que-4

12

- (a) Develop model of circulatory system with hydraulic analogy.
- (b) Explain pneumatic representation of pulmonary mechanics model with suitable description.

Que-5

11

- (a) Draw and explain Glucose –Insulin Regulation model.
- (b) Derive the equations for gain and phase of linearized lung mechanics model.

OR

Que-5

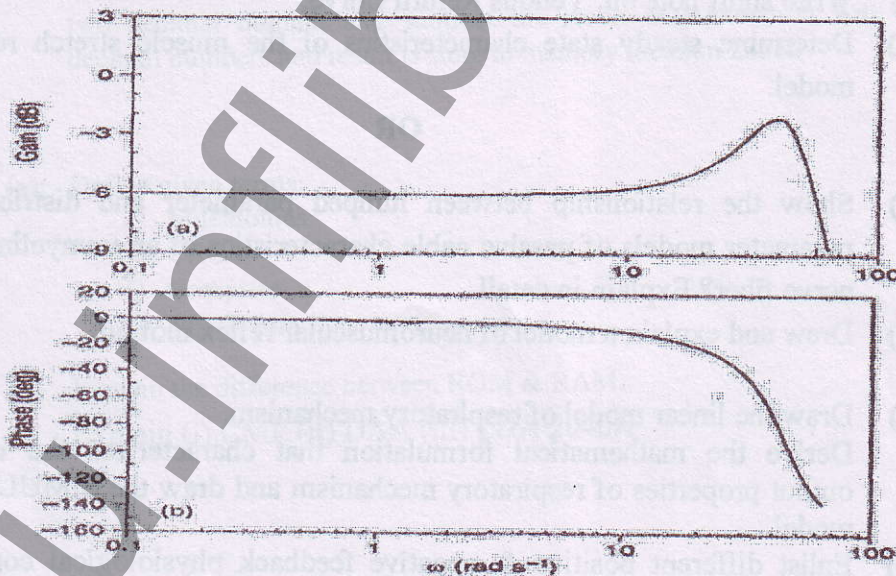
11

- (a) Explain Cheyne stokes breathing and Derive transfer function of model.
- (b) Explain short term cardiac regulation.

Que-6

12

- (a) Give the difference between two compliance model and two spring model.
- (b) Convert following Bode plot to Nicholas chart.



- (c) Explain How the roots of the system determine stability?

END OF PAPER