

فيزياء حيوية

Tanta University- Faculty of Science-Department of Physics
Examination for Senior (Fourth level) Students of Biophysics

Course title	Communication and control of biophysics	course code:	BP4285
Date:	27/ 5/ 2015	term:	2st
		Total assessment marks:	100
		Time allowed:	2hours

First question

Complete the following (25 marks)

- 1- A collection of interconnected components to achieve a desired response in the face of external disturbances (control regulation response) system.
- 2- The Laplace transform of the function e^{-at} is $(1/(s-a) - (s-a) - (s-a)^2)$
- 3- (Steady state equilibrium constant) condition is a condition that does not change over time.
- 4- (Hemoglobin homeostasis equilibrium) is the maintenance of steady states in the body by coordinated physiological mechanisms
- 5- (optical - nerve audible cutaneous) receptors include Meissner's corpuscles, Merkel's disks, Ruffini cylinders, and free nerve endings
- 6- What of the following is a temperature-increasing mechanism? (Vasodilation of skin blood vessels - Piloerection - heating)
- 7- What of the following is a temperature-decreasing mechanism? (Sweating Increase in thermogenesis - cooling)
- 8- The retina is considered as (audioreceptor nerve receptors photoreceptors)
- 9- (Lesion - histological - anatomical) studies have provided fundamental information about which parts of the brain are involved in various sensory and perceptual functions.
- 10- (Hypothalamus - energy hyperthalamus) is responsible for regulating of body temperature

Second question (25 marks)

Describe with drawings how using resistance and capacitor to model biophysical systems and then provide a linear model for description the lung mechanics?

Third question (25 marks)

- a) Compare between the servomechanism and the regulator as a control systems? (5 marks)
- b) Compare with drawings between different modes of communication and signaling in living? (20 marks)

Fourth question (25 marks)

- a) Prove a mathematical relation using drawings between the closed-loop gain (CLG) of the feedback system and the corresponding open-loop gain? (15 marks)
- b) Draw a schematic diagram of the Smith model of pulsatile luteinizing hormone release and describe the undelined mathematical model? (10 marks)

Good luck.....Dr. Reda Morsy

