

**B. Tech. Sem – VIII (Biomedical Engg.) (2014 COURSE) (CBCS) :
SUMMER - 2019**

SUBJECT-Elective-III: BIOLOGICAL MODELING OPTIMIZATION

Date: Tuesday
Day: 28/05/2019

Time: 02.30 PM TO 05.30 PM
Max. Marks: 60

S-2019-2935

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.

- Q.1**
- a) Explain the graphical analysis of pressure control by renal body fluid mechanism. (07)
 - b) Write the electrolytes present in body and their ionic concentration. (03)
- OR**
- a) Explain the genesis of RBC with diagram. (05)
 - b) How the acid-base regulation is done in body? (05)

- Q.2**
- a) Describe electrical cell model with the help of neat diagram. (05)
 - b) What is the importance of lumped parameter model of human body? (05)
- OR**
- Explain the circulatory system models used to define the functioning of heart. (10)

- Q.3** A membrane has the following concentrations: (10)

Ion	Inside (mM)	Outside (mM)
Cl ⁻	52	340
K ⁺	?	04
Na ⁺	41	276

Find the unknown concentration of K⁺ if the resting membrane potential is -52 mV at room temperature. Also find the Nernst potential for Cl⁻ & Na⁺.

The ratio of the permeabilities of the ion is as follows:

Cl⁻ : K⁺ : Na⁺ : 0.412: 0.1: 0.017

OR

Derive Donnan's equilibrium equation for Na⁺, K⁺ and Ca⁺⁺. (10)

- Q.4** Explain how the heat is generated in the body with neat sketches. (10)

OR

- a) Draw and explain thermoregulatory plant. (05)
- b) Explain the various heat losses from the body into the environment with diagram. (05)

- Q.5** Explain neuromuscular control system with the addition of gamma fiber inputs. Draw the diagram showing various inputs in order to control neuromuscular system. (10)

OR

- a) Give a note on "Parkinson's Syndrome". (05)
- b) What is the role of muscle spindle in stretch reflex? Explain it with diagram. (05)

- Q.6**
- a) Discuss the importance of four eye movements. (05)
 - b) What do you mean by quantitative and qualitative eye movement models? (05)

OR

Write short note on : (10)

- i) Parameter estimation
- ii) Linearising model

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