



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 101606

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15
**PHYSIOLOGICAL CONTROL SYSTEM &
SIMULATION MODELING**

Time : 3 Hours]

[Total Marks : 100

Note : Answer all five questions.

1 Answer any four parts of the following : **4×5=20**

- (a) Define open loop and close loop control systems with suitable examples.
- (b) What are the advantages of state space techniques.
- (c) Define Eigen values and Eigen vectors.
- (d) Define controllability and observability.
- (e) What is state transition matrix ?
- (f) Define biophysical tools for calculating transmembrane potential.

2 Answer any four parts of the following : **4×5=20**

- (a) Give limitations of compartmental modeling.

- (b) Briefly explain about Fick's Law of diffusion.
- (c) Compute e^{At} when

$$A = \begin{bmatrix} 0 & 1 \\ -3 & -4 \end{bmatrix}$$

- (d) Define Homeostasis with examples.
- (e) Give a brief account on different types of eye movements.
- (f) Give examples of positive and negative feedback physiological control system.

3 Answer any four parts of the following : **4×5=20**

- (a) What is respiratory control system ?
- (b) Derive the resultant equation of pulse input model.
- (c) Give details about applications of pharmacokinetics.
- (d) Define biological receptors and their characteristics.
- (e) Define thermoregulation and its process.
- (f) Differentiate between cold bloodedness and warm bloodedness.

4 Answer any two parts of the following : **10×2=20**

- (a) What is compartmental modelling ? Differentiate between single and multiple compartment models with help of transfer equations.
- (b) What is iron wire model ? Explain its similarities with nerve impulse propagation and conduction system.
- (c) Explain the thermoregulation control model of human system. How model validation is done ? What are its industrial applications ?

5 Answer any two parts of the following : **10×2=20**

- (a) Explain the role of inter neurons and gama fibres in Human Neuro muscular control.
- (b) Write short notes on :
 - (i) Cardio vascular control
 - (ii) Zero order chemical kinetic behaviour in the biological system.
- (c) What is stretch reflex ? Explain with help of diagram.
