College of Engineering, Pune

END SEMESTER EXAM (2013-14)

BI533 - (Physiological Modeling)

Year: First Year M. Tech | Branch: Biomedical Instrumentation

Max. Marks-60 | Duration – 3hr

Instructions:

1. All questions are compulsory
2. Number given at right indicates marks.
3. Use of programmable calculator is not allowed.

Q. 1	A	What is the normal core body temperature? Explain the process of thermoregulation when core temperature increases or decreases. Suggest a suitable method to model the thermoregulation.	10
	B	What are the different ways to model biological signal? Derive mathematical model of ECG wave to analyze R-peak amplitude.	10
Q. 2	A	Explain the physiology of muscle contraction. State force-length property and force velocity property of muscle. Suggest a suitable model for agonist muscle to incorporate these above mentioned properties. Represent this model for antagonist muscle.	15
	B	What are the steps in sample design? State the criteria of selecting a sampling procedure.	5
Q. 3		Solve any four	20
	A	Write a short note on Hodgkin-Huxley model with ion pump for neuron.	
	B	Explain physiology of heart. Design electrical analog model of blood circulation.	
	C	What is compartmental modeling? Explain compartmental model of drug response.	
	D	State and define following basic bio-physics tools. A) Fick's law for diffusion of charged particles b) Ohm's law for drift of charged particles c) Einstein's relationship d) space charge neutrality	
	E	State the model of urine formation with renal physiology.	
	F	What is minimum spanning tree? Explain Prim's algorithm with example.	