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SF-7787

B. E. - IV (Instrumentation & Control) (Sem. - VIII) Examination

May/June – 2011

Biomedical Instrumentation

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 4 (INSTRUMENTATION & CONTROL) (SEM. - 8)

Name of the Subject :

☛ BIOMEDICAL INSTRUMENTATION

☛ Subject Code No. : 7 7 8 7 ☛ Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

(2) Answer to each section must be written in separate answer books.

(3) Figure to the right indicate maximum marks.

(4) Draw neat figure wherever required.

SECTION - I

1 Answer the short questions :

(i) Define Acoustic impedance. **2**

(ii) Draw structure of cell. **2**

(iii) How Wilson terminal is formed ? **2**

(iv) Draw a structure of single neuron. **2**

(v) Brief about working of heart. **3**

(vi) How liquid potential is generated ? **3**

2 Attempt any **three** : **18**

(a) For frog skeletal muscle, typical values for the intracellular and extracellular concentrations of the

major ion species (n millimoles per litre) are as follows ?

Species	Intracellualar	Extracellular
Na^+	40	160
K^+	170	10
CI^-	10	140

Assume room temperature 38°C and typical values of permeability co-efficient for skeletal muscle $P_{na}=2\times10^{-8}$cm/s, $P_K=2\times10^{-6}$cm/s and $Pcl=4\times10^{-6}$cm/s Calculate the equilibrium resting potential for this membrane, using Goldman equation.

(b) Explain the 6 frontal plane ECG leads.

(c) Short note : Motion Artifact

(d) Draw and explain equivalent circuit model of a bipotential electrode.

3 Attempt any **three** : **18**

(a) Draw structure of metal microelectrode. Explain electrical properties of metal microelectrode using equivalent electrical circuit.

(b) Discuss medical measurement constraints in detail.

(c) Explain working of Silver/silver chloride electrode. State it's fabrication process. Also discuss it's advantages and limitations.

(d) Brief about different types of body surface electrodes.

SECTION - II

4 Answer the short questions :

(i) What is Einthoven triangle ? **2**

(ii) What is base line drift in context of ECG measurement ? **2**

(iii) Draw a diagram of reflex arc. **2**

(iv) Define Acoustic impedance **2**

(v) Write a short note on beam width of ultrasound waves 3

(vi) What is the difference between A-scan and M-mode in diagnosis technique used in ultrasound imaging system. 3

5 Attempt any three : 18

(a) Explain multichannel telemetry with block diagram.

(b) What are the macroshocks hazards ?

(c) Explain helium-dilution estimate of lung volume.

(d) What are the basic requirements of biopotential amplifier ?

6 Attempt any **three** : 18

(a) Discuss external pacemaker and differentiate it with Implantable pacemaker.

(b) List and describe the major parameters of respiration.

(c) Discuss the requirement of Laser surgery and explain the principle of operation of laser.

(d) Draw block diagram of any X-Ray machine and explain the working of X-Ray machine.