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IC-702/EC-011

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

**PAPER ID : 3014**Roll No. **B. Tech.****(SEM. VII) EXAMINATION, 2007-08****BIO-MEDICAL ELECTRONICS***Time : 3 Hours]**[Total Marks : 100**Note : Attempt all questions.***1 Attempt any four parts of the following : 5×4=20**

- (a) Discuss the problems encountered in measuring the parameters of a living system.
- (b) Explain the principle of operation and working of a capacitance-pressure transducer. Give one of its advantages.
- (c) List the types of transducers used for temperature measurement. Draw the diagram of GaAs crystal temperature sensor and explain its working.
- (d) Under what condition does a living cell develop action potential? Explain the sequence of events of an action potential.
- (e) Giving their relative merits and demerits explain various types of metal micro-electrodes used for studying the electrical activity of individual living cells.
- (f) Draw the diagram of a micro capillary glass electrode and explain how blood pH is measured with its help.

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2 Attempt any **four** parts of the following :  $5 \times 4 = 20$

- (a) Draw a neat block schematic of an isolated amplifier used in modern ECG machines and explain its principle of operation and working.
- (b) What types of lead connections are employed in ECG machines? Describe various types of unipolar leads.
- (c) Draw a block schematic of square wave electromagnetic blood flow meter and explain its principle of working. List its advantages over sine wave flow meter.
- (d) What are the long term objectives of a patient monitoring system? How are these objectives fulfilled?
- (e) What are the basic requirements for an implantable pacemaker ? Describe one type of implantable pacemaker.
- (f) Give the performance aspects of various types of wave forms tried out in D.C. defibrillators.

3 Attempt any **two** parts of the following :  $10 \times 2 = 20$

- (a) Define the terms  
Tidal volume  
Residual volume and  
Functional Residual Capacity  
What is a spirometer? Describe the principle of operation of an ultrasonic spirometer. List the problems associated with this technique.
- (b) What is the importance of respiratory gas analyzers employed in pulmonary clinics?  
Draw the block schematic of an infra-red gas analyzer and explain how it measures the amount of  $\text{CO}_2$  present in respired air.

aktuonline.com (c) Discuss the importance of humidifiers and nebulizers with reference to the health of a person's respiratory system. aktuonline.com

4 Attempt any **two** parts of the following :  $10 \times 2 = 20$

- (a) How does ultrasonic diagnosis differ from radiological diagnosis? Draw the block diagram of an ultrasonic echocardiograph and explain how it can measure the movements of anterior mitral valve of heart.
- (b) What is CAT? Explain how image of the brain is obtained with the help of CAT scanning. Describe a method for image reconstruction.
- (c) Describe the basic principle of Magnetic Resonance Imaging (MRI). What is the significance of Bloch equation in MRI parlance?

5 Attempt any **two** parts of the following :  $10 \times 2 = 20$

- (a) What advantage is derived through double modulation in bio-telemetry? Draw the circuit diagram of a frequency modulator using varactor diode and explain its principle of operation.
- (b) Draw the block schematic of FM-FM modulated radiotelemetry transmitter for ECG and respiration activities simultaneously and explain its principle of working. Give typical sensitivity of subcarrier modulation system for ECG and respiration signals.
- (c) Distinguish between gross shock and microcurrent shock. Discuss various effects of electric current on the human body.