53 (IE 801) BMIS

2014

BIOMEDICAL INSTRUMENTATION

Paper : IE 801

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* What is absolute refractory and relative refractory period ? Describe how action potential and resting potential is generated in the cell. 2+6=8

   (b) With the help of a neat diagram explain how exchange of gas takes place in the lungs. 6

   (c) Describe an application of inductive transducer in biomedical instruments. 6

2. *(a)* Describe the metal electrolyte and skin electrolyte interface of electrodes. 6

(b) Explain the operation of chopper amplifier and optical isolation amplifier. 8

(c) Why differential amplifier is needed in most of the biomedical equipment ? Explain the operation of differential amplifier in the removal of common mode noises. 2+4=6

3. *(a)* Explain about electromyography with its trace patterns. 5

(b) Draw a bipolar and unipolar chest leads with their waveform patterns. 6

(c) What are the functions of delay line and bundle of His in heart ?

What does the QRS complex of ECG signify ? Explain the circulation of blood in heart with necessary diagram. 2+2+5=9

4. *(a)* Describe *any two* direct methods of blood pressure measurement. 6

(b) With the help of block diagram, explain plethysmography. 6

(c) Describe the dye dilution method for the measurement of cardiac output. 8

5. (a) Explain how the X-rays are generated in stationary anode tube. 5

(b) Describe the functional parts of an X-ray machine with the help of block diagram. 8

(c) Write the working principle of a CT scan machine. 7

6. (a) Describe the thermal imaging technique with the necessary block diagram. 8

(b) Write the working principle of *dc* defibrillator. 6

(c) What do you mean by positive pressure ventilation procedure ? Explain briefly how cutting and coagulation process occurs in diathermy machine. 3+3=6

7. Write short notes on ***any four*** of the following : 4×5=20

(i) P^{O_2} sensor

(ii) Electroretinograph

(iii) Ventilator

(iv) Thermistor method of respiratory rate measurement

(v) Ultrasonography.