**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)* Why cell produces positive potential when it gets excited ? What are the functions of purkinje fibres and delay line ? Explain the cardiovascular system with necessary diagram. 2+2+6=10

*(b)* Explain the operation of resistive transducer in the measurement of any biomedical parameter. 5

*(c)* Describe the functions of the different parts of central nervous system. 5

2. *(a)* Discuss the skin electrolyte interface of electrodes.

Draw the electrical equivalent diagram of two electrodes for the measurement of body potential.

Write the Nernst equation to obtain the biopotential. 3+2+2=7

*(b)* Describe the metal microelectrode and micropipette microelectrode. 5

*(c)* Why instrumentation amplifier is mostly preferred as the preamplifier in the biomedical equipment ?

With the help of circuit diagram derive the output voltage of instrumentation amplifier. 1+7=8

3. *(a)* What does einthoven triangle signify ?

Draw the unipolar vector leads with the traces.

Give a description of electroencephalogram with the help of block diagram. 2+2+8=12

*(b)* What are the different methods to measure pulse rate ?

Explain a method to measure the pulse rate. 1+7=8

4. *(a)* Describe how systolic and diastolic blood pressure can be determined using sphygmomanometer. 8

*(b)* Explain a method to measure respiratory rate. 5

*(c)* Describe the thermal dilution method for the measurement of stroke volume. 7

5. *(a)* Explain how the X-ray image intensifier +v system works ? 9

*(b)* Discuss the infrared imaging technique with the help of block diagram. 9

*(c)* What are the different types of biotelemetry system ? 2

6. *(a)* Briefly explain how the irregularity in heart beating can be controlled using pacemaker. 3

*(b)* Describe the working of short wave diathermy machine. 7

*(c)* Define tidal volume and lung compliance. Describe the different modes of ventilation. 2+8=10

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

*(i)* Dialyzer

*(ii)* DC defibrilator

*(iii)* Isolation amplifier

*(iv)* CT scan machine

*(v)* EMG.

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