Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH/EIE/SEM-8/EI-801D/2013

2013

BIOMEDICAL AND ECOLOGICAL MEASUREMENTS

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) Bio-potential signal generated from heat muscle along three-dimensional axis of the body is known as

   a) ECG b) VCG

   c) EEG d) none of these.

   ii) Natural pacemaker of the heart is

   a) AV node b) SA node

   c) Bundle of His d) Purkinje's fibres.

   iii) Pumping chamber in the heart is known as

   a) Septum b) Ventricle

   c) Atrium d) Vena cava.

   iv) The no. of electrodes required to record an electrocardiogram is usually

   a) 6 b) 12

   c) 5 d) none of these.

v) Unit of X-ray is

a) curie b) volt

c) farad d) none of these.

vi) The character wavelength of absorption of infrared of CO_2 gas is

a) 4·8 micrometre b) 4·8 mm

c) 8·8 micrometre d) 4·8 nm.

vii) Ventricular inhibited pacemaker means

a) *R* wave triggered pacemaker

b) *R* wave blocked pacemaker

c) Both *R* wave triggered and blocked pacemakers

d) none of these.

viii) The value of let-go current in man is

a) 5 mA b) 9 mA

c) 16 mA d) 21 mA.

ix) The frequency range of ECG waveform is

a) 0·05 Hz – 100 Hz b) 0·05 Hz–160 Hz

c) 1 Hz–160 Hz d) 10 Hz–100 Hz.

x) Computed Axial Tomography (CAT) measures the

a) Transmitted intensity of *X*-ray

b) Attenuation value of *X*-ray

c) Incident intensity of *X*-ray

d) Detector's efficiency.

xi) For cine angiography, we need

a) X-rays

b) ultrasounds

c) both X-rays and ultrasounds

d) none of these.

xii) Bio-potential amplifier should have

a) low gain, low input impedance, low CMRR

b) high gain, high input impedance, high CMRR

c) high gain, low input impedance, high CMRR

d) high gain , high input impedance, low CMRR.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is Electroencephalography ? List the brain waves and their frequency. 3 + 2

3. What are the types of measurements of blood pressure ? How is the blood pressure measured in the indirect method ? 1 + 4

4. Explain the principle of sphygmomanometer.

5. Give the characteristics of *X*-ray radiation. What are meant by soft and hard *X*-ray ? 2 + 3

6. What is air pollution ? What is an air pollutant ? What are the different types of air pollutants ? 1 + 1 + 3

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. What are the different types of electrodes used in ECG, EEG and EMG measurements ? What are the safety considerations to be taken in the use of electrical systems at the time of *invivo* measurements ? Describe the invasive method of blood pressure measurement. 4 + 4 + 7

8. Briefly describe the blood flow measurement using electromagnetic flowmeter. What is the application of defibrillator in biomedical field ? What are the sources of error in Electrocardiograph ? 8 + 3 + 4

9. a) Why are pacemakers used ?

   b) What are the different types of pacemaker ?

   c) Explain the different types of implantable pacemaker.

   4 + 4 + 7

10. a) What are the different components of the patient monitoring system ?

    b) Draw the block diagram of *X*-ray machine and explain each block briefly. 5 + 10

11. Write short notes on any *three* of the following : 3 × 5

    a) Electrostatic precipitator

    b) MRI

    c) Water pollution

    d) Strain gauge and thermistor in biomedical application

    e) Sound level meter

    f) Advantages and disadvantages of Biotelemetry.