



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 heart 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
- low gain, low input impedance, low CMRR
 - high gain, high input impedance, high CMRR
 - high gain, low input impedance, high CMRR
 - high gain, high input impedance, low CMRR.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

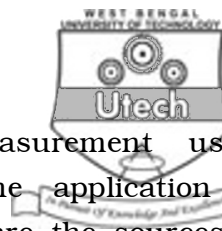
- What is Electroencephalography ? List the brain waves and their frequency. $3 + 2$
- What are the types of measurements of blood pressure ? How is the blood pressure measured in the indirect method ? $1 + 4$
- Explain the principle of sphygmomanometer.
- Give the characteristics of X-ray radiation. What are meant by soft and hard X-ray ? $2 + 3$
- 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. $3 \times 15 = 45$

- 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.
