Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(EIE-N)/SUPPLE/SEM-8/EI-801D/2010

2010

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) What is the range of resting potential ?

a) – 60 μV to – 100 μV

b) – 600 μV to – 1000 μV

c) – 60 mV to – 100 mV

d) – 600 mV to – 1000 mV.

ii) What is the pH level for arterial blood of normal human body ?

a) 6·90 b) 7·00

c) 7·40 d) 7·80.

iii) In EEG measurement what is the frequency range for θ band ?

a) Below 3·5 Hz b) 3·5 Hz to 8 Hz

c) 8 Hz to 13 Hz d) Above 13 Hz.

iv) Systolic blood pressure of a normal person is

a) 20 to 70 mm of Hg b) 40 to 90 mm of Hg

c) 60 to 110 mm of Hg d) 80 to 130 mm of Hg.

v) Bradycardia means

a) relatively slower heart rate

b) relatively faster heart rate

c) normal heart rate

d) not related to heart.

vi) How many leads are used for standard ECG measurement ?

a) 4 b) 6

c) 9 d) 12.

vii) What is the typical voltage for *R* peak of electrocardiac wave ?

a) 0.25 mV b) 0.40 mV

c) 0.80 mV d) 1.60 mV.

viii) What is the range for 'Let-go' current in biomedical application ?

a) 1 to 5 mA b) 5 to 8 mA

c) 8 to 20 mA d) More than 20 mA.

ix) Which gas is responsible for acid rain ?

a) SO_2 b) CO_2

c) CO d) Methane.

x) What is the frequency range for diagnostic *X*-ray ?

a) 10^4 MHz b) 10^6 MHz

c) 10^8 MHz d) 10^{10} MHz.

xi) Spirometer is used to measure

a) lung volume

b) lung capacity

c) both lung volume and capacity

d) none of these.

xii) What is impedance of pH electrode ?

a) 5 K to 500 K b) 500 K to 5 M

c) 5 M to 50 M d) 50 M to 500 M.

GROUP – B

(Short Answer Type Questions)

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

2. Define and explain Nernst equation.
3. What are the types of electrodes for *in vivo* measurement ?
4. Describe the characteristics of ECG amplifier with circuit schematic.
5. Where from the normal action potential in the heart originates ? Describe the characteristics of each part of a cardiac wave rhythm with a neat diagram. 1 + 4
6. What are the different types of air pollution ? Describe their measurement schemes in brief. 2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. a) What is Pacemaker ? Discuss the classifications of pacemaker. What are the different pacing modes ?

   b) How can computer be utilized in biomedical application ? 5 + 10

8. How is X-ray generated ? Explain the principle of CAT and compare its method of visualization with conventional X-ray methods. Explain with neat sketch the arrangement and operation on image intensifier. 5 + 5 + 5

9. a) What is fibrillation ? State different types of fibrillation.

   b) Explain *ac*-defibrillation and *dc*-fibrillation with diagrams.

   c) Discuss the merits and demerits of *ac*-defibrillation and *dc*-fibrillation. 4 + 7 + 4

10. a) What are the different types of data processed in biotelemetry ?

    b) In biotelemetry why is FM system preferred ?

    c) What are subcarrier and carrier and what are frequency ranges ?

    d) Describe with block diagrams one of the transmitting systems as well as receiving systems. 3 + 2 + 4 + 6

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

    a) Severinghas electrode

    b) Sphygmomanometer

    c) Los Angeles Smog

    d) Doppler application in blood flow measurement

    e) Global warming

    f) Phonocardiogram.