2012

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 Question)

1.   Choose the correct alternatives for the following: 10 x 1 = 10

   i)   Diastole refers to the

      a)   Maximum blood pressure

      b)   Minimum blood pressure

      c)   Maximum blood flow

      d)   Minimum blood flow.

   ii)   The velocity range of Purkinje fibre is

      a) $50 - 60$ m/s   b) $2 - 4$ m/s

      c) $10 - 20$ m/s   d) $0.5 - 0.6$ m/s.

   iii)   The node where pacemaker cells are there known as

      a)   AV node   b)   SA node

      c)   cathode   d)   anode.

iv) No. of electrons used by Einthoven to record ECG was usually

a) 6   b) 12

c) 5   d) none of these.

v) x-ray imaging combined with computer technique is known as

a) EMG   b) CT

c) USG   d) EEG.

vi) Natural pacemaker of the heart is

a) AV node   b) SA node

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

vii) Aircraft noise is in the range of

a) $70 - 80$ dB   b) $130 - 140$ dB

c) $100 - 110$ dB   d) $80 - 90$ dB.

viii) The valve at right ventricle is known as

a) Mitral   b) Pulmonary

c) Aortic   d) Tricuspid.

ix) Impedance of tissue under the skin is of the order of

a) a few ohms   b) a few kilo-ohms

c) 0 ohm   d) mega-ohm.

x) Half-cell potential is formed due to

   a) metal-electrolyte interface

   b) skin-electrolyte interface

   c) electrolytic impedance

   d) skin impedance.

xi) "Radio Pill" is used to monitor

   a) Stomach pressure

   b) Cardiovascular pressure

   c) Arterial pressure

   d) Veinous pressure.

xii) Computed Axial Tomography (CAT) measures the

   a) Transmitted intensity of X-ray

   b) Attenuated value of X-ray

   c) Incident intensity of X-ray

   d) Detector's efficiency.

GROUP – B

(Short Answer Type Questions)

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

2. What is Telemetry? Describe it with a neat sketch. Write the applications of it in the biomedical field.   1 + 2 + 2

3. Draw and describe an equivalent model of heart as a two stage pump.

4. Define noise pollution and L_{10} (18 hours) index. Express the measuring unit of sound intensity level in mathematical form.   2 + 3

5. What are the factors to be considered during biomedical measurements? What are physiological effects of electric current? $2\frac{1}{2} + 2\frac{1}{2}$

6. What is biopotentials? Draw an equivalent circuit for electrode-tissue interface and explain it.   2 + 3

GROUP – C

(Long Answer Type Questions)

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

7. What is the significance of measuring ECG? Describe the 12 lead system of ECG. What are the functions of SA and AV nodes? If any one of them will work then what are the possible problem a heart will face?   2 + 8 + 3 + 2

8. What is pacemaker? Briefly describe the working principles of an asynchronous pacemaker with a neat sketch. What is fibrillation? How will you overcome it? Which fibrillation is more dangerous and why?   2 + 5 + 2 + 2 + 4

9. What is air pollution? What are the sources of air pollutant? Briefly describe about the criteria of pollutants. What is Greenhouse effect?   1 + 3 + 6 + 5

10. Describe the process for generation of X-ray with a neat sketch. Mention the important control system of X-ray generation. What are the applications of computer in medicine? Describe the data acquisition system of CT?

4 + 5 + 2 + 4

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

    a)   Ozone Depletion

    b)   Electrostatic precipitation

    c)   MRI

    d)   Strain gauge and thermistor is biomedical application.

    e)   Patient care monitoring unit

    f)   Water pollution.

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