



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (BME)/SEM-4/BME-403/2010

2010

BIOPHYSICS

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 the following : $10 \times 1 = 10$

- i) Magnetic field effects on human body due to the
 - a) presence of carbon element inside the body
 - b) presence of K^+ inside the body
 - c) presence of H^+ inside the body
 - d) presence of water inside the body.
- ii) A radioisotope has a/an
 - a) stable atomic nucleus
 - b) unstable atomic nucleus
 - c) floating atomic nucleus
 - d) none of these.



- iii) Skin impedance is
- a) lower than tissue impedance
 - b) lower than muscle impedance
 - c) lower than fluid impedance
 - d) highest impedance in body.
- iv) Cryogenics in medical use refers to treatment at
- a) high temperature
 - b) low temperature
 - c) ambient temperature
 - d) ultralow temperature.
- v) The frequency range of ECG signal is
- a) 150 — 200 Hz
 - b) 100 — 150 Hz
 - c) 0.05 — 100 Hz
 - d) 50 — 100 kHz.
- vi) Alpha block occurs in
- a) ECG
 - b) PCG
 - c) EMG
 - d) EEG.
- vii) Approximate value of let go current is
- a) 5 mA
 - b) 10 mA
 - c) 20 mA
 - d) 40 mA.
- viii) A radioactive element changes into its isotope by emitting
- a) one β particle
 - b) one β & two α particles
 - c) one α & two β particles
 - d) one α particle.



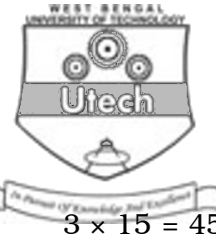
- ix) An abnormal *P* wave shows
- a) Atrial dysfunction
 - b) Ventricular dysfunction
 - c) Ventricular hypertrophy
 - d) Bundle Branch Block.
- x) An application of photochemical reaction is
- a) respiration
 - b) dialysis
 - c) Vitamin D_3 synthesis
 - d) none of these.

GROUP – B

(Short Answer Type Questions)

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

2. Define ultrasound. How does it differ from electromagnetic waves ? 3 + 2
3. State the frequency bandwidth of microwave. What are the applications of microwaves ? 2 + 3
4. State the applications of ultrasound for therapeutic treatment.
5. What do you understand by Nerve Conduction Velocity study ? What is its significance ? 3 + 2
6. Briefly discuss the skin-electrode interface and draw an equivalent electrical circuit of this system.
7. Briefly describe the procedures for production of ultralow and low temperatures in medical use.



GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. Explain with neat sketch, the multi-path phenomena in reflected ultrasound. Write an equation for intensity of reflection coefficient when sound waves are travelling from medium 1 to medium 2. $8 + 7$
9. What is meant by exponential attenuation of X-rays & gamma rays in an object ? Derive an equation for the attenuation coefficient considering the incident radiation, transmitted radiation and thickness of the object. $6 + 9$
10. State the laws of Photochemistry. What are the different processes involved with a photochemical reaction ? Explain with examples. Describe fluorescence & phosphorescence. $3 + 5 + 4 + 3$
11. With the help of a block diagram, explain the functioning of a visual colorimeter. What is Flame photometry ? Describe with a neat sketch, the functioning of a flame photometer. $6 + 4 + 5$
12. What is 'Let go current' ? Explain in detail what are electrical Macroshock and Microshock. What precautions are to be taken for electrical safety to patient and connected equipment ? $2 + 7 + 6$
13. Briefly describe the procedure of 12-leads ECG recording. What is the medical significance (diagnostic importance) of ECG waveform ? $10 + 5$