

CS/B.Tech/ECE/Odd/Sem-7th/EC-704C/2014-15

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EC-704C**BIOMEDICAL INSTRUMENTATION**

Time Allotted: 3 Hours

Full Marks

*The questions are of equal value.**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. Answer any ten questions.

(i) Faster heart rate is known as

- (A) tachycardia
(C) draiycardia

- (B) bradycardia
(D) none of these

(ii) The velocity range of purkenjee fibre is

- (A) 50–60 m/s
(C) 100–20 m/s

- (B) 2–4 m/s
(D) 0.5–0.6 m/s

(iii) Impedance of tissue under the skin is of the order of

- (A) a few ohms
(C) zero ohms

- (B) a few kilo-ohms
(D) mega ohms

(iv) Half-cell potential is formed due to

- (A) metal electrolyte interface
(C) electrolytic impedance

- (B) skin electrolyte interface
(D) skin impedance

(v) The node where pacemaker cells are there known as

- (A) AV node
(C) cathode

- (B) SA node
(D) anode

(vi) The frequency range of ECG waveform is

- (A) 0.05–100 Hz
(C) 1–160 Hz

- (B) 0.05–160 Hz
(D) 10–100 Hz

(vii) Unit of X-ray is

- (A) Curie
(C) Farad

- (B) Volt
(D) none of these

(viii) The function of electrode is

- (A) convert ionic potential to electronic potential
(B) convert electronic potential to ionic potential
(C) convert ionic potential to electromechanical potential
(D) none of these

(ix) The full form of ICU is

- (A) Interface Care Unit
(C) Invigilate Care Unit

- (B) Intensive Care Unit
(D) Immunity Care Unit

(x) The tip diameter of a micropipette is

- (A) 0.01–0.1 m
(C) 10–100 m

- (B) 0.1–10 m
(D) none of these

(xi) The process of changing from action potential to resting potential are called

- (A) depolarization
(C) defibrillators

- (B) repolarization
(D) fibrillators

(xii) The action potentials have an amplitude of about

- (A) 40 mV
(C) 20 mV

- (B) 30 mV
(D) 10 mV

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GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

3×5 = 15

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|----|---|---|
| 2. | Explain the principle of sphygmomanometer. | 5 |
| 3. | What is biopotential? Draw an electrical equivalent circuit between the electrode and the skin via electrolyte paste. | 5 |
| 4. | Describe the Evoked potential activity in Bio-medical system. | 5 |
| 5. | Explain the characteristics of resting potential, with reference to Nernst equation. | 5 |
| 6. | Discuss about the transducers for blood pressure measurement. | 5 |

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.

3×15 = 45

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|--------|---|---------------|
| 7. | What is silver-silver chloride electrode? How is it prepared? What are the different types of electrodes used in ECG, EEG and EMG measurement? What is the significance of measuring ECG? Describe the 12 lead system of ECG. | 3+3+4
+1+4 |
| 8. (a) | Discuss the different ways of transport of ions through the cell membrane. | 9 |
| (b) | Explain the generation and propagation of electrical action potential from sinoatrial node to the atrioventricular node of the heart. | 6 |
| 9. | Describe the working principle of an asynchronous pacemaker with a neat sketch. What do you mean by fibrillation? What are the different types of fibrillation? What are the disadvantages of AC defibrillator? How can these be removed by using DC defibrillator? Explain with corresponding circuit. | 5+1+2
+2+5 |

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(Turn over)

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|---------|--|-----------------|
| 10. | Give the characteristics of X-Ray radiation. What is the principle of generation of X-ray? Mention the important control system for X-ray generation. What are the main limitations of 1 st , 2 nd and 3 rd generation? How is it over come in 4 th generation? What are the applications of computer in Medicine? | 2+3+3+2
+3+2 |
| 11. (a) | Draw the block diagram of a CT and explain the different blocks of it. | 9 |
| (b) | Differentiate between reference electrodes, PH electrodes, and Blood Gas electrode. | 6 |
| 12. | Write short notes on any <i>three</i> of the following: | 3×5 |
| (a) | Endoscopy | |
| (b) | MRI system | |
| (c) | Isolation amplifier | |
| (d) | PET | |
| (e) | Ultrasonography | |
| (f) | Biomaterials | |

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