



B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fourth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U15ECTE06: Biomedical Instrumentation

COURSE OUTCOMES

- CO1:** Explain human physiology and the concept of bio-electric potential (K2).
CO2: Apply the knowledge of basic sciences to measure bio-electric potential (K3).
CO3: Demonstrate the working of different diagnostic equipment (K4).
CO4: Analyze the given bio medical image for diagnosis (K4).
CO5: Illustrate the operation of physiological assist devices and bio telemetry system (K2).
CO6: Identify the different shock hazards to prevent electrical accidents (K2).

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1.

List I	List II
A. ECG	i. Coagulation
B. Plethysmograph	ii. Einthoven
C. Diathermy	iii. Tubules
D. Artificial Kidney machine	iv. Total lung capacity

CO3 [K₂]

- | | A | B | C | D |
|----|-----|----|-----|-----|
| a) | ii | i | iii | iv |
| b) | iii | iv | ii | i |
| c) | ii | iv | i | iii |
| d) | iii | i | ii | iv |

2. Which of the following statements are true: CO3 [K₂]
- In the ECG instrument the calibration signal is 1mV.
 - The AV node delays the spread of excitation for about 0.11S.
 - According to Einthoven triangle cardiac electric field vector is one dimensional one.
 - Frank lead system can be used to study the state of heart three dimensionally.
- a) 1,2 b) 1,2,4
 c) 1,3,4 d) 3,4

3. The chemical balance of body is identified by the measurement of _____ of blood and other body fluids CO2 [K₁]
- a) pO₂ b) pCO₂
 c) pH d) pCHO₃
4. Sympathetic nervous System, CO1 [K₁]
1. Decreases heart rate
 2. Decreases Digestion
 3. fight or flight
 4. rest and digest
- Which of these statements are correct?
- a) 1,4 b) 1,3
 c) 2,4 d) 2,3
5. **Assertion (A):** SA node is called as the Natural pacemaker CO3 [K₂]
- Reason (R) :** It generates the impulses at the normal rate of the heart.
- a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A
 c) A is true but R is false d) A is false but R is true
6. Different substances that make up the cell are collectively called as _____ CO1 [K₁]
- a) Cytoplasm b) Protoplasm
 c) Cell membrane d) Nucleoplasm
7. Sequence the steps involved in urine formation CO5 [K₂]
1. Secretion
 2. Filtration
 3. Reabsorption
- a) 2-3-4-1 b) 1-3-2-4
 c) 3-4-2-1 d) 4-1-3-2
8. Normal pH of blood is _____ CO2 [K₁]
- a) 7 b) 5
 c) 9 d) 3
9. **Assertion (A):** Conduction velocity in muscle is normally 50m/s. CO3 [K₂]
- Reason (R) :** Conduction velocity can be obtained by applying stimulus at various distances.
- a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A
 c) A is true but R is false d) A is false but R is true

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| 10. EMG measures | CO3 [K ₂] |
| a) Electrical activity of heart | b) Electrical activity of brain |
| c) Electrical activity of visual cortex | d) Electrical activity of muscle |

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

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|---|-----------------------|
| 11. Name various bio-electric potentials generated in human body. | CO2 [K ₂] |
| 12. Define residual volume and tidal volume. | CO1 [K ₁] |
| 13. Differentiate between ECG and PCG. | CO1 [K ₃] |
| 14. Give Nernst equation of resting potential. | CO1 [K ₁] |
| 15. What is the purpose of using electrode paste? | CO1 [K ₂] |
| 16. What is angiography? | CO2 [K ₂] |
| 17. What are the limitations of MRI? | CO4 [K ₂] |
| 18. What is the need for pacemakers? | CO5 [K ₂] |
| 19. What the basic requirements of bio-amplifier? | CO2 [K ₂] |
| 20. What is micro shock? | CO6 [K ₂] |

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

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|--|-----------------------|
| 21. Explain in detail the Resting and Action potential. | CO1 [K ₃] |
| 22. Explain in detail about micro electrodes. | CO2 [K ₃] |
| 23. Discuss in detail different shock hazards and also explain how to prevent electrical accidents. | CO6 [K ₃] |
| 24. What are the drawbacks of A.C defibrillators? Explain the working of various D.C defibrillators. | CO5 [K ₃] |
| 25. Explain in detail about various lead system used for measuring ECG. | CO1 [K ₃] |
| 26. Explain the operation of Computer tomography in detail. | CO4 [K ₃] |
| 27. i. Differentiate between internal and external pacemaker.
ii. Explain the various modes of pacemaker. | CO5 [K ₃] |
