

Register No: .....

Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**EIGHTH SEMESTER B.TECH DEGREE EXAMINATION(R), MAY 2024****Electronics and Communication Engineering****(2020 SCHEME)**

**Course Code** : **20ECT412**  
**Course Name** : **Biomedical Engineering**  
**Max. Marks** : **100**

**Duration:3 Hours****PART A***(Answer all questions. Each question carries 3 marks)*

1. Explain ERG and EOG signals.
2. Illustrate the various stages of EEG waves.
3. Explain the basic theory behind bio-potential electrodes and their role in recording biological signals.
4. Describe the construction and application of any two skin surface electrodes in bio-potential measurements.
5. How does oscillometric measurement work, and what are its advantages in clinical practice?
6. Define phonocardiography and explain its significance in the evaluation of heart function.
7. What is the primary function of an electroencephalogram (EEG), and how does it contribute to the study of neuronal communication?
8. Explain various respiratory parameters of lungs.
9. List out the application of MRI.
10. Give the limitations of ultrasonic imaging.

**PART B***(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. a) Explain the importance of preprocessing techniques, such as filtering and artifact removal, in enhancing the quality of biomedical signals before analysis. 7  
b) Discuss the role of feature extraction in biomedical signal analysis and how it helps in identifying relevant patterns or characteristics for diagnostic purposes. 7

**OR**

12. a) What are the main components of the cardiovascular system? 7  
b) How does the heart function as a pump in the cardiovascular system? 7

**MODULE II**

13. a) How do invasive electrodes differ from non-invasive electrodes in terms of their application and the level of tissue penetration required for signal acquisition in biomedical monitoring? 7  
b) Explain the role of specialized cardiac cells, such as the sinoatrial node, atrioventricular node, and Purkinje fibers, in generating and propagating electrical impulses within the heart? 7

**OR**

14. a) Describe the significance of isolation amplifiers in biomedical applications, particularly in the context of maintaining signal integrity and patient well-being. 7  
b) With a neat circuit diagram, explain the working of chopper amplifiers in biomedical instrumentation. 7

**MODULE III**

15. a) Compare and contrast the accuracy and ease of use between direct and indirect blood pressure measurement techniques. 7  
b) How can you analyse the health condition of a normal human heart from cardiac output measurement? 7

**OR**

16. a) Discuss the factors that can affect the accuracy of oscillometric and ultrasonic method of blood pressure measurements and how they can be minimized. 8  
b) Explain with neat diagram body plethysmography. 6

**MODULE IV**

17. a) What is the purpose of a pacemaker, and how does it regulate the heart's rhythm? 7  
b) Explain the function of heart lung machine. 7

**OR**

18. a) Explain the function of defibrillators in restoring normal heart rhythm and their role in emergency medical care. 7  
b) Explain how hemodialysis removes waste products and excess fluids from the blood to restore electrolyte balance. 7

**MODULE V**

19. a) Explain Pulse Echo System used in ultrasound imaging. 7  
b) With neat diagram, explain the working of X-ray machine. Enumerate the uses of X-rays in medicine. 7

**OR**

20. a) Explain the concept of functional MRI (fMRI) and its applications in mapping brain activity and studying neurological disorders. 7  
b) Discuss the potential future trends and advancements in telemedicine technology and its impact on healthcare delivery. 7

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