

Register No.: ..... Name: .....

## SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SIXTH SEMESTER B.TECH DEGREE EXAMINATION (R,S), MAY 2024**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**(2020 SCHEME)**

**Course Code: 20EET312**

**Course Name: BIOMEDICAL INSTRUMENTATION**

**Max. Marks: 100**

**Duration: 3 Hours**

### PART A

*(Answer all questions. Each question carries 3 marks)*

1. List out any three design constraints encountered in designing biomedical instruments.
2. Classify and describe each type of surface electrodes with suitable diagrams.
3. With the help of waveforms, explain the method used for listening to heart sounds.
4. Draw the diagram depicting electro-conduction system of heart.
5. Describe how measurements are taken from muscle fibres using suitable block diagram.
6. Explain the working of spirometer with suitable diagram.
7. List out the applications of X-rays.
8. Write a short note on diathermy and its uses.
9. Describe the different types of chemical tests conducted on blood.
10. Explain how to avoid shock hazards from electrical equipment.

### PART B

*(Answer one full question from each module, each question carries 14 marks)*

#### MODULE I

11. a) The cellular level potential measured by an electrode when (10)  
connected to a patient is found to be -60mV and after some time  
measurement using the same electrode gave a different value and it  
is found to be 20mV. Explain in detail the inferences that can be  
deduced from the above observations.  
b) For the case described in 11(a), identify the type of electrode used (4)  
for measurement and also justify its usage.

#### OR

12. a) With the help of a suitable block diagram, explain how a living (10)  
system is connected to a biomedical instrument.  
b) Draw and explain the output waveform of an electrocardiogram. (4)

**MODULE II**

13. Describe the different types of invasive and non-invasive methods of blood pressure measurement. (14)

**OR**

14. a) Write a short note on i) Impedance plethysmograph and ii) Photo electric plethysmograph. (10)  
b) Explain the term Einthoven triangle. (4)

**MODULE III**

15. a) Explain the working of pneumography. (7)  
b) Describe how nerve conduction velocity can be calculated. (7)

**OR**

16. a) Discuss the 10-20 electrode system used in electroencephalography. (7)  
b) Illustrate the working of electroencephalography. (7)

**MODULE IV**

17. a) Describe the procedure done for removing kidney stones from a patient. (7)  
b) Explain a method which can be used for restoring normal heart beat using suitable diagram. (7)

**OR**

18. With the help of a suitable diagram explain the method for controlling blood pressure and balancing of minerals in the body. (14)

**MODULE V**

19. Suggest and describe a method for protecting babies from hypothermia. (14)

**OR**

20. a) Describe the stages involved in monitoring and treatment of a patient at a remote location. (10)  
b) Write a note on medical robotics. (4)

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