Total number of printed pages: 02

UG/7/UIE712

2023

BIOMEDICAL INSTRUMENTATION

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions

1.	a)	Define EEG, EMG and ERG	3
	b)	Explain surface biopotential electrode and its types.	5
	c)	Design a circuit to measure ECG using Lead III configuration with an amplification of 1500.	12
2.	a)	Draw all limb lead configurations in ECG measurements.	6
	b)	With a neat diagram, explain a method to measure tidal volume during breathing.	7
	c)	Explain the arrangement and working of a sphygmomanometer.	7
3.	a)	Describe the basic principles and applications of ultrasound imaging. How does it use sound waves to generate images of internal organs and structures?	5+5 =10
	b)	Briefly describe the different modes of ultrasound imaging? How do they differ in terms of image display, information content, and clinical utility?	5+5=10
4.	a)	Describe the fundamental principle behind Computed Tomography (CT) imaging. Highlight the key differences between CT imaging and X-ray imaging.	5+5 =10
	b)	Describe the fundamental principles of Magnetic Resonance Imaging (MRI). Discuss clinical applications where CT and MRI are preferred.	5+5 =10
5.	a)	What are the uses of blood cell counting in the diagnosis of diseases? Name a few techniques of blood cell counting. Explain the working principle of clinical flame photometer with the help of a neat diagram	2+1+5=8
	b)	What are the applications of biotelemetry in medical science? Describe a method of measurement of blood pressure using biotelemetry system.	2+5+5=12

How the chassis leakage current in a biomedical equipment is measured?

6. Write short notes on any four of the following: $4 \times 5=20$

i) pCO2 electrode
ii) Endoradiosonde
iii) Effects and stages of electric shock in body
iv) GSR measurement
v) Audiometer

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