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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - NOV 2023**

Semester : Semester V - 2021

Course Code : ECE3034

Course Name : Sem V - ECE3034 - Biomedical Instrumentation

Program : B. TECH

Date : 3-NOV-2023

Time : 11:30AM - 1:00PM

Max Marks : 50

Weightage : 25%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Name the apparatus that measures how much air you can breathe in and out of your lungs, as well as how easily and fast you can the blow the air out of your lungs.
(CO1,CO2) [Knowledge]
2. The blood flow should be proper so that each organ receives proper nutrition so that various diseases due to flow obstruction can be averted. Recall the apparatus that measures the velocity of the blood using motional emf.
(CO1,CO2) [Knowledge]
3. Transducers are devices whose function is to convert physical signals to electric signals. Identify the active and passive transducers in biomedical instrumentation with examples.
(CO2,CO1) [Knowledge]
4. In order to measure the biological signals and design a medical instrument, understanding of electronics and measurement techniques are essential. List the essential components of a biomedical instrumentation system?
(CO1,CO2) [Knowledge]
5. The sounds coming from the valves shutting on the blood inside the heart are lub and dub sounds. Name the diagnostic technique that creates a graphic record of the sounds and murmurs produced by the contracting heart, including its valves and associated great vessels.
(CO2,CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

6. a. Sketch a neat diagram and equivalent circuit of a Variable Area Parallel Plate capacitance pressure transducer and briefly explain its operation to illustrate that the Sensitivity of the transducer is the change in the capacitance to the change in length (displacement)
- b. A certain thermistor has a $10\text{ k}\Omega$ resistance at 25°C and $4\text{ k}\Omega$ resistance at 100°C . Find the value of β .
(CO1) [Comprehension]
7. Blood flowmeters are used to measure blood flow in blood vessels throughout the circulatory system. List out the different methods of flow monitoring techniques in flowmeters. Explain the principle of an electromagnetic flowmeter with the help of a neat diagram.
(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. The apparent change in the frequency of a wave caused by relative motion between the source of the wave and the observer is known as the Doppler Effect. Illustrate the principle of ultrasonic Doppler-shift flow-velocity meter. Explain the working of Doppler-shift blood flowmeter with the help of a block diagram. Summarize how the relationship between the velocity of blood and the frequency of the signal used.
(CO1,CO2) [Application]