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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
END TERM EXAMINATION - JUN 2023**

**Semester :** Semester VI - 2020

**Course Code :** ECE3034

**Course Name :** Sem VI - ECE3034 - Biomedical Instrumentation

**Program :** ECE

**Date :** 16-JUN-2023

**Time :** 9.30AM - 12.30PM

**Max Marks :** 100

**Weightage :** 50%

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**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. What is a photo transducer and name some of the photo transducers. (CO4) [Knowledge]
2. What is a collimator with respect to CT scan? What is its application in CT scan machines (CO4) [Knowledge]
3. Name the instrument which is specifically used for the measurement of pulse rate (CO2) [Knowledge]
4. Differentiate between resting potential and action potential of a cell (CO3) [Knowledge]
5. State which is correct  
Thermistor is  
a)made up of semi conductor material  
b)compact in size  
c)has negative temperature coefficient of resistance  
d)all of the above (CO1) [Knowledge]

**PART B**

**ANSWER ALL THE QUESTIONS**

**(2 X 15 = 30M)**

6. Phonocardiograph is an instrument used for recording the different sound connected with the pumping action of the heart. These sound provide an indication of the heart rate and its rhythmicity. They also give useful information regarding effectiveness of blood pumping and valve action. With the help of a neat block diagram, explain the process of recording phonocardiogram. (CO4) [Comprehension]

7. Electrodes are the metallic devices used to tap the bio potential generated by body cells. Surface electrodes are non-invasive type and placed on the surface of the skin. Due to dissimilarities between metallic electrodes and skin, there exists a resistance called contact resistance which reduces the potential picked up by the electrodes. In order to reduce this contact resistance, we use an electrolyte (gel) between the electrodes and skin. So there exist two interfaces namely metal electrolyte interface and electrolyte skin interface. Discuss both with bio chemical details.

(CO2) [Comprehension]

### **PART C**

#### **ANSWER ALL THE QUESTIONS**

**(3 X 20 = 60M)**

8. Computed Tomography is a technique of integrating many radiographs of the subject taken at different angles. The instrument used for CT scan is complicated and the procedure is expensive compared to radiograph. This CT system has many components to process the bio potential of a particular organ to a 3-dimensional picture. In this regard discuss the different system components of a CT scan machine.

(CO3) [Application]

9. Transducers are the devices which convert a non electrical or physical variables into corresponding electrical signals. These transducers are classified according to their mode of operation and application. Giving the classification of transducers explain a displacement transducer working on the principle of change in inductance with change in displacement.

(CO5) [Application]

10. Each time the heart muscle contracts, blood is ejected from the ventricles and a pulse of pressure is transmitted through the circulatory system. This pressure pulse when travelling through the vessels causes vessel wall displacement which is measurable at various points of the peripheral circulatory system. Pulse pressure and waveforms are indicators for blood pressure and flow. Instruments used to detect pulse and pulse pressure waveforms in the extremities are called plethysmographs. With the help of a neat block diagram explain the method of recording pulse pressure and waveforms.

(CO3) [Application]