QPC: RA20BTECH865 AY 20 **Reg. No.** | | | | | | | | | | |

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Eight Semester – Regular) Examinations, April – 2024

BOEBT8020 – Biomedical Instrumentation

(Biotechnology)

Time: 3 Hours **Maximum: 70 Marks**

The figures in the right-hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 × 10 = 10 Marks)**

Q1. Answer ***ALL*** questions. [CO#] [PO#]

a. Movement of the chest wall in accordance with respiratory activity gives rise to [CO1] [PO1]
i) bio-acoustic signal ii) bio-electric signal
iii) bio-mechanical signal iv) bio-optical signal

b. The value of resting potential is [CO1] [PO1]
i) 20 mV ii) 0.2 mv
iii) -90 mV iv) -60 mV

c. Use of pad electrode is in [CO1] [PO1]
i) ECG ii) EEG
iii) EMG iv) PCG

d. The degree of agreement within a group of observation is called as [CO2] [PO1]
i) Accuracy ii) Error
iii) Precision iv) Resolution

e. The linear potentiometer is an example of [CO2] [PO1]
i) Zero-order system ii) First-order system
iii) Second-order system iv) Higher-order system

f. _____ is an analytical device for detecting any chemical constituent that combines a biological component with a physio-chemical detector component. [CO2] [PO1]
i) Smart sensor ii) Biosensor
iii) Microcontroller iv) None of the above

g. In _____, the amplifier boosts the level of input signal to match with the range of A/D converter. [CO3] [PO1]
i) Signal amplification ii) Frequency response
iii) Filtering iv) Isolation

h. _____ is used to reduce the amplitude of artefact and count the artefacts as beats. [CO3] [PO1]
i) Low pass filter ii) High pass filter
iii) QRS matched filter iv) Slew rate limit average

i. Respiration rate is measured by [CO3] [PO1]
i) Rheo-graphic method ii) Oscillometric measurement method
iii) CO_2method iv) Doppler shift method

j. The current flowing through the body of the subject results in [CO4] [PO6]
i) Gross shock ii) Micro-current shock
iii) Both ross shock and micro-current shock iv) Neither gross shock and micro-current shock

PART – B: (Short Answer Questions) **(2 × 10 = 20 Marks)**

Q2. Answer ***ALL*** questions. [CO#] [PO#]

a. Write few parameters which are being measured using a biomedical instrumentation system. [CO1] [PO1]

b. Mention two important factors, which determine the design of a medical measurement instrument. [CO4] [PO6]

c.	What is the purpose of using electrodes in biomedical instrumentation?	[CO1]	[PO1]
d.	Write few advantages of using floating electrodes.	[CO1]	[PO1]
e.	List important factors that decide the choice of a particular transducer to be used for the measurement of a specific parameter of a phenomenon.	[CO2]	[PO1]
f.	List names of commonly employed pressure transducers used in biomedical instrumentation.	[CO2]	[PO3]
g.	Suggest methods for providing protection against leakage currents.	[CO3]	[PO3]
h.	Write a few important biomedical usefulness of Patient Monitoring System.	[CO3]	[PO3]
i.	List various types of Electromagnetic Blood Flowmeter.	[CO3]	[PO3]
j.	Define Gross Shock and Micro-Current Shock.	[CO4]	[PO6]

PART – C: (Long Answer Questions) **(10 × 4 = 40 Marks)**

Answer ***ALL*** questions.		Marks	[CO#]	[PO#]
3. a.	Name five types of bio-signals and explain their origin.	5	[CO1]	[PO1]
b.	Explain the difference between a 'Standard' and a 'Code'. What are the different types of standards? Name two international agencies associated with standardization activity.	5	[CO4]	[PO6]
	(OR)			
c.	Explain the origin of electrical activity of the heart with the help of a diagram. Draw a typical ECG waveform and label it.	5	[CO1]	[PO1]
d.	Where do we use microelectrodes? What are the types of microelectrodes? Describe the construction of a typical metal microelectrode.	5	[CO1]	[PO1]
4. a.	What is a Thermistor? Write the expression of Resistance-Temperature relationship. Write few advantages of using a Thermistor for body temperature measurement.	5	[CO2]	[PO3]
b.	Describe the principle of pressure measurement using Strain Gauge.	5	[CO2]	[PO3]
	(OR)			
c.	Explain the purpose of using the following functional units in signal conditioners. (i) Filtering (ii) Isolation	5	[CO3]	[PO1]
d.	With suitable examples, distinguish the objectives of using (i) Signal Analysis Techniques and (ii) Signal Processing Techniques.	5	[CO3]	[PO1]
5. a.	What is an electrocardiograph? Describe the major building blocks of an electrocardiograph machine.	5	[CO3]	[PO3]
b.	Briefly describe principles of methods of Heart Rate measurement.	5	[CO3]	[PO3]
	(OR)			
c.	What are the performance characteristics of transducers? List them out and define them.	5	[CO2]	[PO1]
d.	Explain the principle of a direct writing galvanometric recorder.	5	[CO3]	[PO3]
6. a.	Briefly explain the principle of Blood Flow measurement using an Ultrasonic Blood Flowmeter. Derive a necessary expression for Blood Flow measurement.	5	[CO3]	[PO3]
b.	Briefly describe types of Leakage Current and their paths of flow. What are the precautions to minimize Electric Shock Hazards?	5	[CO4]	[PO6]
	(OR)			
c.	Briefly describe a method of measurement of Skin-Contact impedance.	5	[CO1]	[PO1]
d.	What is a biosensor? Describe with the help of a diagram the construction of a blood glucose biosensor.	5	[CO1]	[PO1]

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