PAPER ID-310953

Subject Code: BEC052

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM V) THEORY EXAMINATION 2024-25

BIO-MEDICAL SENSORS & INSTRUMENTATION

TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 07 = 14**

Q no.	Question	CO	Level
a.	Define static characteristics of a measurement system.	1	K1
b.	What are the implications of inaccurate calibration in a measurement system?	1	K4
c.	Explain the concept of the man-instrument system.	2	K2
d.	What challenges are encountered when measuring bioelectric signals?	2	K4
e.	Describe the function of a pacemaker.	3	K2
f.	What is GSR and how is it measured?	4	K2
g.	Describe the function of a tonometer.	5	K2

SECTION B

2. Attempt any *three* of the following: **07 x 3 = 21**

a.	List and describe the different types of transducers and their applications in measurement systems.	1	K1
b.	Explain the concept of the man-instrument system and describe the components involved in this system.	2	K2
c.	How would you measure blood pressure using modern measurement systems? Explain the procedure and the equipment used.	3	K3
d.	Explain the process of respiration and how various instruments are used to test and monitor the mechanics of breathing.	4	K2
e.	Define non-invasive diagnostic instrumentation and provide examples of such instruments used in clinical settings.	5	K1

SECTION C

3. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Explain the general input-output configuration of a measurement system and discuss its significance.	1	K2
b.	Analyze the role of standards and calibration in maintaining the accuracy and reliability of measurement instruments.	1	K4

4. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Define the concept of bioelectric potentials and list the various sources of bioelectric potentials in the human body.	2	K1
b.	Analyze the challenges encountered when measuring a living system and discuss the precautions that need to be taken to minimize errors.	2	K4

5. Attempt any *one* part of the following: **07 x 1 = 07**

a.	Explain how ECG (electrocardiogram) works and its role in diagnosing heart conditions.	3	K2
b.	Analyze the various factors that can affect the measurement of cardiac output and discuss how these factors can be controlled.	3	K4

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6. Attempt any *one* part of the following: 07 x 1 = 07

a.	Define the physiological principles behind the respiratory system and describe the structure of the somatic nervous system.	4	K1
b.	Describe how EEG (electroencephalogram) and EMG (electromyography) are used to monitor brain and muscle activity.	4	K3

7. Attempt any *one* part of the following: 07 x 1 = 07

a.	Explain the working principle of ultrasound and thermography in medical diagnostics.	5	K2
b.	How would you use an MRI (Magnetic Resonance Imaging) scanner for diagnosing a brain tumor? Describe the procedure and the necessary equipment.	5	K3