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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

B.Tech-II Semester (Open Elective)

COURSE CODE (CREDITS): 21B1WPH831(03)

MAX MARKS: 25

COURSE NAME: Biosensors

COURSE INSTRUCTOR: Dr. Ragini Raj Singh

MAX. TIME: 1 Hour 30 Min

*Note: (a) All questions are compulsory.*

*(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*

*(c) Use of calculator is allowed*

Q.No	Question	CO	Marks
Q1	(a) Define <i>dispersion</i> and explain why it is also called <i>spread</i> or <i>scatter</i> . How does the measure of dispersion from the mean indicate the consistency (precision) of a dataset? With reference to two curves where: <ul style="list-style-type: none"> <li>• Curve 1 varies from <math>x_1</math> to <math>x_2</math></li> <li>• Curve 2 varies from <math>x_3</math> to <math>x_4</math></li> </ul> compare their dispersion and state which curve represents greater precision. Give a proper explanation.	1	2
	(b) The following current measurements were recorded by eight students during an electrical experiment: 2.45 A, 2.52 A, 2.48 A, 2.50 A, 2.55 A, 2.47 A, 2.49 A and 2.51 A. Calculate: <ol style="list-style-type: none"> <li>1. Arithmetic mean</li> <li>2. Deviations from the mean</li> <li>3. Average deviation</li> <li>4. Standard deviation</li> <li>5. Variance</li> <li>6. Probable error of the recorded current data</li> </ol>	2	3
Q2	Explain the classification of standards based on their functions and applications. Describe the following types of standards in detail: <ol style="list-style-type: none"> <li>1. International standards</li> <li>2. Primary standards</li> <li>3. Secondary standards</li> <li>4. Working standards</li> </ol> Also, discuss the relationship between these standards and how they ensure accuracy and uniformity in measurements.	2	3
Q3	(a) Classify transducers on the basis of transduction form and describe the following types with suitable examples: <ol style="list-style-type: none"> <li>1. Primary and Secondary Transducers</li> </ol>	3	2

	<p>2. Active and Passive Transducers  3. Analog and Digital Transducers  4. Transducers and Inverse Transducers</p> <p>Also, discuss the significance of each classification in practical measurement systems.</p> <p>(b) What are the important characteristics to be considered for the selection of a transducer? Explain each characteristics. Also, discuss how these characteristics influence the performance and suitability of a transducer in practical measurement systems.</p>	3	3
Q4	<p>Explain:  Semiconductor strain gauges  Piezoelectric active transducer  Photo voltaic cell</p>	3	3
Q5	<p>Differentiate between NPN and PNP transistors with the help of neat diagrams. Explain their construction, working principle, and current flow in each case.</p> <p>Also, compare the biasing conditions and typical applications of NPN and PNP transistors in electronic circuits.</p>	3	3
Q6	<p>(a) Classify biopotential electrodes and explain different types such as surface electrodes, needle electrodes, and microelectrodes. Discuss their applications and limitations in recording biological signals.</p> <p>(b) Define <i>half-cell potential</i>, <i>resting potential</i>, and <i>action (active) potential</i>. Explain the origin and significance of each in bioelectric phenomena. Also, compare resting potential and action potential in terms of their generation, magnitude, and role in nerve signal transmission.</p>	4	3