U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Biotechnology **Duration: 3 hrs.**
Course Code: 19BT5DE2BBI **Max Marks: 100**
Course: Biosensors and Bioinstrumentation **Date: 23.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) What is a transducer? Discuss the static and dynamic characteristics of a transducer. **10**

b) With the help of a schematic diagram discuss the construction and working of LVDT transducer. **10**

OR

2 a) Explain the working principle of photovoltaic transducers with a neat diagram. What are its advantages and limitations? **10**

b) Describe in detail about the conduction of impulses through heart. Substantiate the use, significance and interpretation of electrical activity of heart using ECG waveform. **10**

UNIT - II

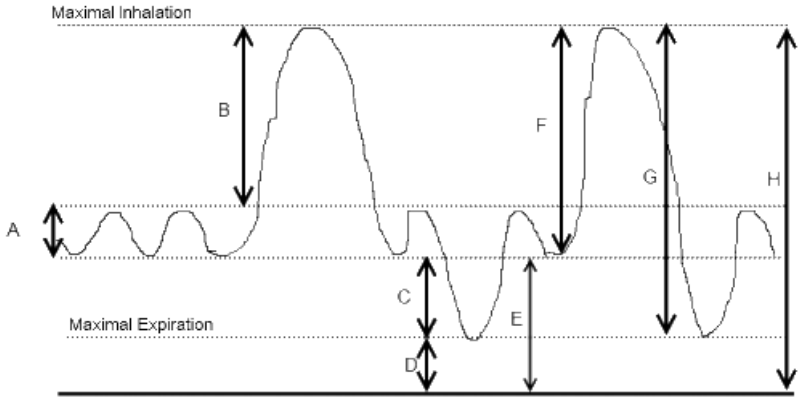
3 a) Draw and explain the construction and working principle of pO_2 electrodes. **10**

b) The cardiac cycle refers to the sequence of mechanical and electrical events that repeats with every heartbeat. It includes the phase of relaxation and contraction. Substantiate the statement by explaining the different stages and steps in cardiac cycle with neat sketch. **10**

UNIT - III

4 a) Sketch and explicate the working principle of open circuit Nitrogen wash-out method for measuring FRC. **10**

b) For the following spirometer output of a male person aged 27 years, identify and compare the different types of lung volumes and lung capacities in the below diagram. Calculate the values of E, F, G, and H if A=0.5L, B=3.1 L, C=1.2 L and D= 1.2 L. **10**



UNIT - IV

5	a)	Describe the major tasks in developing a biosensor for a target analyte. Recognize the necessary skills involved in it.	**10**
	b)	Discuss the steps involved in DNA chip design. Explain the inkjet and photolithography methods for creating DNA array.	**10**

UNIT - V

6	a)	With suitable diagram, explain the working principle of Blood - Glucose non-invasive biosensor.	**10**
	b)	Explain any five biosensors for testing aquatic and soil samples for heavy metal detection and quality monitoring.	**10**

OR

7	a)	Explicate the significance and mechanism involved in detecting concentration of urea using Urease biosensor.	**08**
	b)	Describe in detail the steps for fabrication of MEMS.	**12**

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