U.S.N.										

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

Autonomous Institute Affiliated to VTU

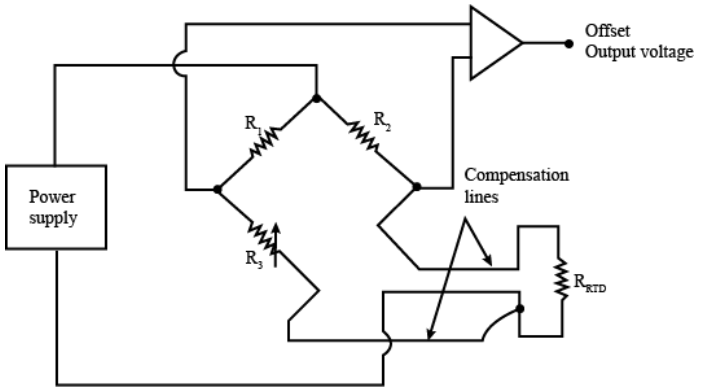
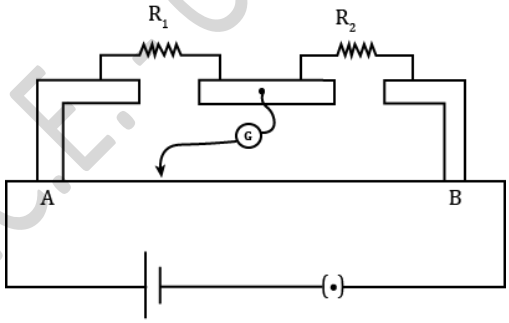
April 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Medical Electronics Engineering **Duration: 3 hrs.**
Course Code: 23MD3PCBSM **Max Marks: 100**
Course: Biomedical Sensors and Measurements

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

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Discuss the Classification of Instruments based on applications and Explain the Performance Characteristics of measuring instruments.	*CO2*	*PO2*	**10**
	b)		Illustrate the first and second order systems principle.	*CO2*	*PO2*	**10**
			UNIT - II			
2	a)		Mention any one sensor to measure physiological pressure measurement and explain its working principle.	*CO2*	*PO3*	**10**
	b)		Illustrate any one application of strain gauge usage.	*CO2*	*PO3*	**10**
			OR			
3	a)		With necessary diagram explain the working principle of piezoelectric sensors	*CO2*	*PO3*	**10**
	b)		Highlight the requirement and principle of bridge circuit in measuring the electrical parameters.	*CO2*	*PO3*	**10**
			UNIT - III			
4	a)		With a diagram ,explain the principle of RTD and mention its preferred application.	*CO3*	*PO3*	**07**
	b)		AD RTD has $\alpha 0=0.005(1/\circ C)$,$R=500\Omega$ and a dissipation constant of PD=30(mW/°C) at 20°C. The RTD is used in a bridge circuit as shown in figure 4C with R1=R2=500 Ω and R3 a variable resistor used to null the bridge. If the supply is 10V and the RTD is placed in a bath at 0°c, find the value of R3 (in Ω) to null the bridge.	*CO3*	*PO3*	**06**

			 Figure 4C			
		c)	Explain any one application of fiber optic Temperature sensor.	*CO3*	*PO3*	**07**
			OR			
	5	a)	Illustrate the application of Photovoltaic sensors and its working principle.	*CO3*	*PO3*	**07**
		b)	Justify at what conditions and situations Thermocouples and p-n junction diodes are preferred for temperature measurements.	*CO3*	*PO3*	**07**
		c)	In the experimental setup of metre bridge shown in the figure 5c, the null point is obtained at a distance of 40 cm from A. If a 10 Ω resistor is connected in series with R1 Ω , the null point is observed to shift by 10 cm from A. Find the resistance that should be connected in parallel with (R1+10)Ω such that the null point shifts back to its initial position  Figure 4c	*CO3*	*PO3*	**06**
			UNIT - IV			
	6	a)	With relevant diagram Illustrate the action potential generation.	*CO3*	*PO3*	**10**
		b)	Discuss the different types of ECG Electrodes used to acquire ECG signal.	*CO3*	*PO3*	**10**
			UNIT - V			
	7	a)	Mention any two applications of optically based chemical sensors	*CO3*	*PO3*	**10**
		b)	Explain with principle under what conditions Immunosensors, and DNA sensors are preferred.	*CO3*	*PO3*	**10**

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