KUMARAGURU
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B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fourth Semester

MECHATRONICS ENGINEERING

U18MCI4202: Sensors and Instrumentation

COURSE OUTCOMES

CO1: Classify the transducers and instruments based on their working principles, characteristics and order of the system.

CO2: Describe the working principle and characteristics of non-electrical transducers.

CO3: Discuss about medical sensors. The construction, working principles and characteristics of biomedical sensors

CO4: Generate appropriate design procedure, suitable for signal conversion to interface with computer.

CO5: Design appropriate circuits by using conventional formulas used in signal conditioning and conversion.

CO6: Use sensors and transducers to create simple Mechatronics applications using data logging software

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	List any two desirable static characteristics of a measurement System.	CO1	[K1]
2.	What are the causes of instrumental errors?	CO1	[K1]
3.	Mention any two sensors which can be used to measure linear and angular displacement.	CO2	[K1]
4.	What is the difference between a thermocouple and a resistance temperature detector (RTD)?	CO2	[K2]
5.	What is the principle behind the operation of a McLeod gauge?	CO2	[K2]
6.	How can temperature changes in a strain gauge measurement systems compensated?	CO2	[K3]
7.	What is EEG?	CO2	[K1]
8.	Differentiate Unipolar and Bi polar electrode configurations.	CO2	[K2]
9.	What is the principle of operation of a digital-to-analog converter (DAC)?	CO2	[K1]
10.	Differentiate single channel and multi channel DAQ.	CO5	[K2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Explain the generalized performance of first order systems in terms of their static and dynamic characteristics with any one real-world example.	CO1	[K2]
	b)	Explain the difference between systematic and random errors in a measurement system.	CO1	[K2]
12.	a)	Discuss the principles and applications of optical encoders in the context of bottle cap sealing process.	CO2	[K2]
	b)	Explain the working principle and advantages of Resistance Temperature Detectors (RTDs).	CO2	[K2]
13.		Define gauge factor. Explain in detail the types of strain gauge with neat sketch.	CO3	[K2]
14.		Explain brief about the ECG lead measurement and its signal conditions.	CO3	[K2]
15.		Explain the components of signal conditioning, in detail manipulation in a wide range of applications, such as data acquisition and digital communication systems.	CO5	[K2]
16		Illustrate how a data is acquired from a sensor and how it is process and conditioned using labview.	CO6	[K3]

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