



**B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2024**

(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 (Displacement, velocity, Temperature, Radiation Pyrometer, Humidity measurement)
- CO3:** Discuss brief about the Non-electrical transducers of another measurements (Force, strain gauge, Vacuum, Light, Acoustics and Nuclear radiation measurement)
- CO4:** Discuss about the construction, working principles and characteristics of biomedical sensors.
- CO5:** Brief the signal conditioning parameters used in measurement system.
- CO6:** Illustrate the importance of data acquisition system

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 2 = 20 Marks)**

**(Answer not more than 40 words)**

- |   |     |                   |
|---|-----|-------------------|
| 1. Draw the functional block diagram of a measurement system.                           | CO1 | [K <sub>2</sub> ] |
| 2. Mention the purpose of the measurement.  | CO1 | [K <sub>2</sub> ] |
| 3. What are the test inputs of the transducer?  | CO2 | [K <sub>2</sub> ] |
| 4. How self-heating error of thermometer is identified and eliminated?                  | CO2 | [K <sub>2</sub> ] |
| 5. Compare bounded and unbounded type strain gauge with neat sketch                     | CO3 | [K <sub>2</sub> ] |
| 6. Give the principle of electrical tachometer  | CO3 | [K <sub>2</sub> ] |
| 7. Write about the electrode locations perimeters in EEG electrode placement            | CO4 | [K <sub>2</sub> ] |
| 8. Write a note on PQRSTU wave origin, amplitude and duration                           | CO4 | [K <sub>2</sub> ] |
| 9. Illustrate the necessity of Sample and Hold?   | CO5 | [K <sub>2</sub> ] |
| 10. List the step to connect MYDAQ with thermocouple and draw the LABVIEW block diagram | CO6 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART B (5 x 16 = 80 Marks)**

**(Answer not more than 400 words)**

- |  |   |     |                   |
|--|---|-----|-------------------|
| 11. a) Explain the static and dynamic characteristics of an measurement system | 8 | CO1 | [K <sub>2</sub> ] |
| b) Explain in detail about the error and its types                             | 8 | CO1 | [K <sub>2</sub> ] |

12.	a)	Describe in detail about the signal conditioning of RTD	8	CO2	[K <sub>2</sub> ]
	b)	Discuss the working principle of smoke detector and its application.	8	CO2	[K <sub>2</sub> ]
13.	a)	Describe the microphone basics and types in detail with neat sketch.	16	CO3	[K <sub>2</sub> ]
14.	a)	Discuss in brief about the electrode placement and the ECG recording set up	16	CO4	[K <sub>2</sub> ]
15.	a)	Brief about the ADC types with neat sketch.	16	CO5	[K <sub>2</sub> ]
16.	a)	What is data acquisition? How the data is logged and converted to an actuating signal.	16	CO6	[K <sub>2</sub> ]

\*\*\*\*\*