PAPER ID-310938

Subject Code: KEE052

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM V) THEORY EXAMINATION 2024-25
SENSORS AND TRANSDUCERS

TIME: 3 HRS **M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q.no.	Question	CO	Level
a.	What is a transducer?	CO1	K2
b.	What is the primary function of a load cell?	CO1	K2
c.	What is the principle of operation of a thermocouple?	CO2	K3
d.	Name one advantage of using an RTD over a thermocouple.	CO2	K3
e.	Define image processing.	CO3	K2
f.	What are the applications of machine vision in robotics.	CO3	K2
g.	Define a timer in the context of data acquisition.	CO4	K3
h.	Why is signal amplification important?	CO4	K3
i.	Mention challenges in implementing smart sensors.	CO5	K4
j.	What is self-calibration in smart sensors?	CO5	K4

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a.	What is an optical encoder? Explain its operation and applications in displacement measurement.	CO1	K3
b.	Describe the construction and operation of a thermocouple. How is it used for temperature measurement?	CO2	K3
c.	Describe the process of object recognition in a machine vision system.	CO3	K2
d.	Describe the different types of amplifiers used in signal conditioning.	CO4	K3
e.	Describe the process of self-testing in smart sensors and its significance in critical applications.	CO5	K4

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Discuss the use of strain gauges for force measurement. Include the working principle and applications.	CO1	K3
b.	Define a transducer. Explain the classification of transducers with suitable examples.	CO1	K3

4. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Describe the working principle of inductive proximity sensors and their applications.	CO2	K3
b.	Explain the working of ultrasonic flow sensors and their advantages in flow measurement.	CO2	K3

5. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Describe the role of lighting and optics in improving the performance of machine vision systems.	CO3	K2
b.	Define machine vision and explain its significance in industrial applications.	CO3	K2

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6. Attempt any *one* part of the following: 10 x 1 = 10

a.	Explain the role of counters and timers in data acquisition systems.	CO4	K3
b.	Differentiate between analog and digital input/output in a data acquisition system.	CO4	K3

7. Attempt any *one* part of the following: 10 x 1 = 10

a.	Discuss the characteristics of smart sensors, focusing on self-calibration, self-testing, and self-communicating features.	CO5	K4
b.	Explain the use of smart sensors in electric vehicles for monitoring and control.	CO5	K4