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BTECH
(SEM III) THEORY EXAMINATION 2023-24
SENSOR AND INSTRUMENTATION

TIME: 3HRS

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

Qno.	Question	Marks	CO
a.	Name three methods for measuring displacement.	2	1
b.	How does a piezoelectric sensor work?	2	1
c.	What is thermal imaging?	2	2
d.	Differentiate between inductive and capacitive proximity sensors.	2	2
e.	What are the advantages of virtual instrumentation techniques?	2	3
f.	Define structures in the context of virtual instrumentation.	2	3
g.	Name two types of timers used in data acquisition.	2	4
h.	How are data sockets used for networked communication?	2	4
i.	How do smart sensors self-calibrate?	2	5
j.	What is the application of smart sensors in automatic robot control?	2	5

SECTION B

2. Attempt any *three* of the following:

10x3=30

a.	Define sensors and transducers. A quartz piezoelectric crystal having a thickness of 2 mm and voltage sensitivity of 0.055 Vm/N is subjected to a pressure of 1.5 MN/m ² . Calculate the voltage output. If the permittivity of quartz is 40.6×10^{-12} F/m. Calculate its charge sensitivity.	10	1
b.	Explain the concept of thermal imaging and its applications.	10	2
c.	Discuss different data types used in virtual instrumentation and their significance.	10	3
d.	Discuss the basic block diagram of data acquisition systems and their components.	10	4
e.	Describe the applications of smart sensors in automatic robot control and automobile engine control.	10	5

SECTION C

3. Attempt any *one* part of the following:

10x1=10

a.	Describe the principle of displacement measurement using LVDT	10	1
b.	Discuss the principle of force measurement using strain gauges.	10	1

4. Attempt any *one* part of the following:

10x1=10

a.	Discuss the working principles and applications of inductive and capacitive proximity sensors.	10	2
b.	Describe the principle of level measurement using ultrasonic and capacitive level sensors.	10	2



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Subject Code: KOE034

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5. Attempt any *one* part of the following:**10x1=10**

a.	Explain the use of arrays, clusters, and graphs in virtual instrumentation.	10	3
b.	Analyze the advantages of virtual instrumentation techniques over traditional instrumentation methods.	10	3

6. Attempt any *one* part of the following:**10x1=10**

a.	Explain the working principle of R-2R ladder DAC	10	4
b.	Discuss the use of data sockets for networked communication in data acquisition systems.	10	4

7. Attempt any *one* part of the following:**10x1=10**

a.	Explain the general structure of smart sensors and their components.	10	5
b.	Discuss the characteristics of smart sensors	10	5

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