Exam Date & Time: 23-May-2022 (10:00 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

SIXTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, MAY 2022

SMART SENSOR [ICE-4305]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Missing data may be suitably assumed

1) With the help of neat diagram, explain the different components of MCU that is needed for smart sensor interface. (4)

A)

B) Describe the important components of IEEE 1451 smart sensor standard and their working relationship with block diagram representation. (4)

C) State any four features that differentiate a smart sensor from a normal sensor. (2)

2) Discuss the different components of process control network and differentiate between the two topologies of process control network. (4)

A)

B) Explain the working of surface acoustic wave device and digital micro-mirror device with respective diagrams. (4)

C) Differentiate between the active and passive RF-ID systems. (2)

3) A) You are working as a data-engineer in process-based industry where your primary job is to analyse the data that is extracted from smart sensors that are placed in different parts of the process plant. Once the data is received at your end, there are two steps that are needed to treat the data a) before filtering and b) after filtering. Explain both these steps in detail. (4)

B) Explain the important features of the different types of wireless sensor networks. (4)

C) Why is sensor based fault detection important in modern industries? State any four points. (2)

4) Discuss the important features of smart transportation system with a suitable diagramatic representation. (4)

A)

B)	Assume that you are working in an Intelligent Transportation System application where the data recorded from smart sensors for traveller information details. Since the data may come with rich noise, a robust filtering technique is needed for accurate extraction of features from time and frequency domain simultaneously. Which filtering technique can be used here and how is it different from its predecessors? Describe the working principle of this filtering technique.	(3)
C)	What is the need for designing soft sensors in modern industrial applications? Discuss the industrial applications of software sensors.	(3)
5)	Imagine that you are an engineer of a very top firm and have been appointed for development of a city under the "Smart City project" by the local development authorities. Mention any five important features that you would like to have for the smart city and explain the same in detail.	(5)
A)		
B)	Explain the iris and speech recognition techniques with respect to the biometric sensors.	(3)
C)	Describe the different steps involved in internet of things (IOT) system with an example.	(2)

-----End-----