Exam Date & Time: 20-Jun-2022 (09:00 AM - 12:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH END SEMESTER EXAMINATIONS, JUNE 2022 SENSOR TECHNOLOGY [ICE 4304]

A

Marks: 50

Duration: 180 mins.

Answer all the questions.

Ins	tructions to	Candidates: Answer ALL questions Missing data may be suitably assumed	
1)		Define drift, threshold value and dead band of a measuring system and give an example for each.	(2)
	A)		
	B)	Distinguish between static and dynamic characteristics of a measuring system and state the relevance of each in a measuring system.	(3)
	C)	Draw and explain the basic building blocks of an optical measurement system. Design a sensing system for any application of your choice using these components	(5)
2)		A Hall effect element is used for the measurement of magnetic field of 0.8 Wb/m ² . The thickness of the element is 2 mm and is of Bismuth material. If the current passed through the element is 4A, calculate the Hall emf	(2)
	A)		
	B)	With the help of neat diagrams, circuits and expression demonstrate the use of an avalanche photodiode for potential single photon detection. What are the considerations for cut-off of this device?	(5)
	C)	Illustrate the vortex shredding effect. Can this be used for measurement of flow? Devise a system for the same and explain the correlation mathematically. Can an RTD be used in this system to achieve this end? If yes, illustrate mathematically.	(3)
3)		Illustrate the biasing scheme for an LED and a photodiode for practical use.	
			(5)
	A)		
	B)	Explain the working of capacitive humidity sensor with its schematic.	(3)
	C)	What is calibration? List different calibration methods carried out for a sensor	(2)
4)		Piezo elements configured as transceivers are placed diametrically opposite and axially perpendicular to the cross section of a pipe. Arrive at an expression of flow through the	(2)

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	A)	pipe	
	B)	A simple method of determination of glucose in blood would be to determine its refractive index with respect to suitable controls. Design a sensor to this effect. Illustrate the basic building blocks, their interconnections and circuitry with suitable mathematical expressions.	(5)
	C)	With the schematic explain different architecture of wireless sensor network	(3)
5)		Explain the function of soft sensor with necessary diagram	
			(3)
	A)		
	B)	Explain four main functions of smart sensor. With a block diagram explain the functions of each part of smart sensor.	(4)
	C)	Explain the working of each component of Wireless Sensor Network with relevant block diagram.	(3)

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