CLASS: B.TECH   SEMESTER : IV
BRANCH: ALL (OE)   SESSION : SP/2023

SUBJECT: EC259 SENSORS AND TRANSDUCERS

TIME: 3 Hours   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Define the terms accuracy, precision, and resolution of an instrument. A 0-50 A ammeter has an accuracy of ±1%. What is its accuracy when measuring a current of 20A?	[5]	1	2
Q.1(b)	Distinguish between "systematic" and "random" errors in a measurement and how they are usually minimized.	[5]	1	2
Q.2(a)	Describe the operation of a strain gauge. Explain how the temperature compensation can be achieved in strain gauge.	[5]	2	3
Q.2(b)	(i) Describe the operation of change in self-inductance due to change in number of turns. (ii) What is LDR? Explain its work.	[5]	2	2
Q.3(a)	Explain the working of a variable permittivity capacitive sensor.	[5]	3	2
Q.3(b)	A quartz crystal of thickness 2 mm is used for pressure measurement and is subjected to a static pressure 1.5 kN/m^2. If the voltage sensitivity is 0.05 V-m/ N, determine the output voltage of the crystal. If the absolute permittivity of the quartz is 4.06 x 10^{-11} F/m, determine the quantity of the charge developed on the crystal.	[5]	3	3
Q.4(a)	What is smart sensor? What are the essential components present in smart sensor? Explain with diagram.	[5]	4	2
Q.4(b)	Write short notes on HART protocol and Smart Sensors interface.	[5]	4	2
Q.5(a)	What is digital transducer? Explain with example.	[5]	5	2
Q.5(b)	Explain the working of any Fiber Optic Sensor and MEMS Sensor briefly.	[5]	5	3