CBCS SCHEME

USN 1 AT 19 EE 403

18EE732

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023
Micro and Nano Scale Sensors and Transducers

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Briefly explain capacities pressure sensors and its structure. **(08 Marks)**

b. With a neat graph explain the experimental result of total pressure acting on the capacitive pressure sensors. **(08 Marks)**

c. Comparison between capacities and piezo-resistive sensors. **(04 Marks)**

OR

2 a. With a block diagram explain interface circuit used to measure the inductance. **(08 Marks)**

b. Explain the theory behind the ultrahigh sensitivity pressure sensors. **(10 Marks)**

c. Write a short note on Inductive Pressure Sensors. **(02 Marks)**

Module-2

3 a. With a neat sketch explain the principle of operation of the new acceleration sensor. **(08 Marks)**

b. Explain in detail the experimental results of physical parameters of the sensor in dynamic range. **(06 Marks)**

c. Explain the measurement of the capacitance constant 'k' as a function of acceleration. **(06 Marks)**

OR

4 a. Discuss the structure of CO gas sensor and write its characteristic advantages. **(06 Marks)**

b. With an expression describe the theory CO gas sensor based nanotechnology. **(08 Marks)**

c. With a neat sketch explain the principle of operation of smoke detectors. **(06 Marks)**

Module-3

5 a. Explain the theory of moisture sensors with expression. **(08 Marks)**

b. With a neat graph explain auxiliary experimental results of moisture sensors. **(08 Marks)**

c. Write short note on moisture sensors. **(04 Marks)**

OR

6 a. Briefly explain the principle of operation of optoelectronic microphone. **(08 Marks)**

b. Explain briefly optoelectronic and photonic microsensors. **(08 Marks)**

c. Comparison of new microphone with interferrometry based microphone and light intensity based microphones. **(04 Marks)**

Module-4

7 a. With a neat flow chart explain the general structure of lab on a chip sensors. **(08 Marks)**

b. Explain the theory on Bending radius of the generated free electrons of magnetic field sensors. **(08 Marks)**

c. List the disadvantage of magnetic field sensor. **(04 Marks)**

OR

8 a. Briefly explain the introduction and fundamental principle of magnetic sensor. **(10 Marks)**
b. Derive the electrons path in the horizontal direction of magnetic field sensor. **(10 Marks)**

Module-5

9 a. Determine the turn ON conduction of the MOSFET with the expression. **(10 Marks)**
b. Explain the principle of operation of the α- particle icing detector and present prototype with a neat circuit diagram. **(10 Marks)**

OR

10 a. Explain the experimental results of testing with dry air, lost particles, large condensed water droplets and small crystals of ice. **(10 Marks)**
b. Explain the load line and the operating points of the MOSFET. **(06 Marks)**
c. Write short note on Aircraft icing detectors. **(04 Marks)**

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