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21MT52

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Micro and Smart System Technology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Explain the operation of ADXL50 Accelerometer, with neat schematic diagram. (12 Marks)
- b. Define smart system or smart material and explain typical smart system, with neat block diagram. (08 Marks)

OR

- 2 a. Discuss the application of smart material and microsystem in various fields and explain with application area, smart component and its role of operation. (10 Marks)
- b. Outline Feynman's visions and discuss the needs for miniaturization. (10 Marks)

Module-2

- 3 a. Explain the operation of silicon capacitive accelerometer, with neat diagram and also mention its advantage and application. (10 Marks)
- b. Define piezoelectric effect and explain the operation of piezo electric inkjet actuator with neat diagram. (10 Marks)

OR

- 4 a. Explain the operation of an electrostatic comb-drive with neat diagram as an actuator and sensor. (10 Marks)
- b. Explain micromirror array for video projection with a neat diagram. (10 Marks)

Module-3

- 5 a. Discuss some properties of silicon as a material for micromachining and explain FCC structure of silicon, with a diagram. (10 Marks)
- b. Explain the Thin Film Deposition techniques of chemical vapor disposition technique. (10 Marks)

OR

- 6 a. Explain with neat diagram, the steps involved in the lift-off process of patterning. (10 Marks)
- b. Explain the process of photolithography with neat schematic diagram and relevant details. (10 Marks)

Module-4

- 7 a. Explain the operation of Normal Diode, Schottky diode and with junction diagram VI characteristics and relevant detail. (10 Marks)
- b. Implement inverter, NAND gate using CMOS Logic Circuit and outline the operation using Truth Table of operation. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Draw the circuit and mention the application of non inverting amplifier voltage follower, integrator, differentiator and inverting amplifier along with output equations. (10 Marks)
- b. Explain the operation of Bipolar Junction Transistor (BJT) using basic structure and the circuit symbol. (10 Marks)

Module-5

- 9 a. Implement PID controller using op-amp and bring about the block diagram of PID controller with relevant modes of control. (10 Marks)
- b. Explain with block diagram of digital control controller. (10 Marks)

OR

- 10 a. Explain vibration control in a Glass Epoxy Composite box beam with neat diagram and experimental results. (10 Marks)
- b. Write short notes on: (i) PLC (ii) Microcontroller (10 Marks)
