

CBCS SCHEME

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17MT54

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 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 blocks of a typical smart systems. (10 Marks)
b. Classify Integrated Microsystems and explain each category. (10 Marks)

OR

- 2 a. Outline the applications of smart materials and Microsystems. (10 Marks)
b. Explain the need of miniaturization of devices. (10 Marks)

Module-2

- 3 a. Explain silicon capacitive accelerometer along with its applications. (10 Marks)
b. Describe the principle of operation and application of conductometric Gas Sensor. (10 Marks)

OR

- 4 a. Explain the working of a magnetic microrelay. (10 Marks)
b. Discuss the construction and working of Piezoelectric inkjet print head. (10 Marks)

Module-3

- 5 a. Explain chemical vapor deposition technique. (10 Marks)
b. Describe the lift-off technique of patterning. (10 Marks)

OR

- 6 a. Enumerate the steps in the fabrication of Microsystems. (10 Marks)
b. Explain the process of surface micro machining to realize a cantilever structure. (10 Marks)

Module-4

- 7 a. Describe the characteristics of MOSFET, their modes of operation along with V-I plot. (10 Marks)
b. Define Opamp, list the ideal characteristics of Opamp and define each characteristic. (10 Marks)

OR

- 8 a. Draw the circuit and mention the applications of non inverting amplifier, voltage follower, integrator, differentiator and transimpedance amplifier along with output equations. (10 Marks)
b. Derive the output equation for a Opamp difference amplifier. (10 Marks)

Module-5

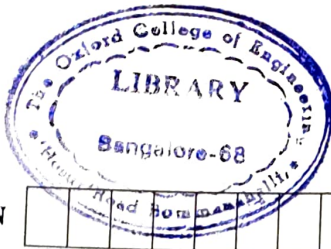
- 9 a. Explain microcontrollers used in digital control. (10 Marks)
b. Describe a PID controller. (10 Marks)

OR

- 10 a. Explain with block diagram a digital control controller. (10 Marks)
b. Explain the design methodology in implementation of controllers. (10 Marks)

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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.



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17MT54

Fifth Semester B.E. Degree Examination, Aug./Sept. 2020 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. With neat diagram, explain the components of MEMS. (10 Marks)
b. Define Smart Materials. Explain the applications of Smart Materials. (10 Marks)

OR

- 2 a. Give Comparison between micro systems and MEM's. (10 Marks)
b. Outline Feynman's vision and discuss he needs for Miniaturization. (10 Marks)

Module-2

- 3 a. Explain the salient features of sensors and actuators. (10 Marks)
b. With a neat sketch, explain piezoresistive pressure sensor. (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. (10 Marks)

Module-3

- 5 a. Explain the steps involved in photolithography. (10 Marks)
b. Explain the process of thermal oxidation of silicon dioxide. (10 Marks)

OR

- 6 a. With a neat sketch, explain Dry Etching process. (10 Marks)
b. Explain the application of polymers and ceramics as specialized materials for micro system with properties of interest. (10 Marks)

Module-4

- 7 a. Explain Six different examples of OP-AMP based circuits. (10 Marks)
b. Explain the working of n-channel MOSFET. (10 Marks)

OR

- 8 a. Write a short note on PID controllers. (10 Marks)
b. Explain the working of differential charge measurement analog circuit with neat diagram. (10 Marks)

Module-5

- 9 a. Explain the advantages of PID controllers over other controllers. (10 Marks)
b. Explain digital and microcontrollers for MEMS. (10 Marks)

OR

- 10 a. Briefly explain the vibration control in Beams. (10 Marks)
b. Write a short note on:
i) Architecture of PLC ii) Design consideration of piezoresistive pressure sensor. (10 Marks)

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18MT55

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Micro and Smart Systems Technology

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What is a Micro system? Discuss the needs for miniaturization. (10 Marks)
- b. List the classification of Integrated Microsystems. Explain the operation of ADXL50 Accelerometer, with neat schematic diagram. (10 Marks)

OR

- 2 a. Define Smart material and explain typical smart system, with neat block diagram. (10 Marks)
- b. Discuss the application of smart materials and Microsystems in various fields and explain with application area, smart component and its role of operation. (10 Marks)

Module-2

- 3 a. Explain the operation of Silicon Capacitive Accelerometer, with neat diagram and also mention its advantages and applications. (10 Marks)
- b. Explain the operation of Electrostatic comb drive, with neat diagram as an actuator and sensor. (10 Marks)

OR

- 4 a. Define a relay. Discuss different types of relays with their features and explain the operation of Magnetic micro relay, with neat diagram. (10 Marks)
- b. Explain the operation of Piezoelectric Inkjet Actuator, with neat diagram and mention its applications. (10 Marks)

Module-3

- 5 a. Explain Chemical Vapor Deposition (CVD) technique, with neat diagram and list the parameters that significantly influence the rate of CVD. (10 Marks)
- b. Explain the process of Photolithography, with neat schematic diagram. (10 Marks)

OR

- 6 a. Explain with neat diagram, the steps involved in the Lift-off process of patterning. (10 Marks)
- b. Discuss the applications of Polymers and Ceramics as specialized materials for Microsystems. (10 Marks)

Module-4

- 7 a. Explain the operation of Normal diode and Tunnel diode with junction diagram and VI characteristics. (10 Marks)
- b. Explain the operation of a Bipolar Junction transistor using basic structure, circuit symbols and the output characteristics. (10 Marks)

OR

- 8 a. Implement Inverter, Nand gate using CMOS logic circuits and outline the operation. (10 Marks)
b. Discuss six examples of Op – amp based circuits with circuit diagram and application. (10 Marks)

Module-5

- 9 a. With neat block diagram of a PID controller, explain the design methodology of a PID controller. (10 Marks)
b. Write short notes on :
i) Digital controller
ii) Microcontroller. (10 Marks)
- OR**
- 10 a. Discuss Performance parameters of pressure sensor relevant to sensitivity, non – linearity with neat characteristic curve. (10 Marks)
b. Explain Vibration control in a glass Epoxy Composite box beam, with neat diagram and experimental results. (10 Marks)
