CBCS SCHEME

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17MT54

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.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. Outline Feynman's vision and Discuss the needs for Miniaturization. **(08 Marks)**

b. Explain the operation of ADXL50 Accelerometer, with neat schematic diagram. **(12 Marks)**

OR

2 a. Define Smart system or Smart material and explain typical smart system, with neat block diagram. **(08 Marks)**

b. Discuss the Applications of Smart Materials and Microsystems in various fields and explain with Application area, smart component and its role of operation. **(12 Marks)**

Module-2

3 a. Define a Transducer, a sensor and an Actuator, with an example. **(06 Marks)**

b. Explain the operation of an Electrostatic Comb-Drive with neat diagram as an actuator and sensor. **(14 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. **(08 Marks)**

b. Define Piezoelectric effect and explain the operation of Piezo electric inkjet Actuator with neat diagram. **(12 Marks)**

Module-3

5 a. Discuss some properties of Silicon as a material for micromachining and explain FCC structure of Silicon, with a diagram. **(08 Marks)**

b. Explain Chemical Vapor Deposition (CVD) technique with reaction chamber and relevant chemical reactions. **(12 Marks)**

OR

6 a. Explain the process of photolithography with neat schematic diagrams and relevant details. **(10 Marks)**

b. Discuss the Applications of Polymers and ceramics as specialized materials for Microsystems with properties of interest. **(10 Marks)**

Module-4

7 a. Explain the operation of Normal Diode, Schottky Diode and Tunnel Diode with Junction diagrams, VI characteristics and relevant detail. **(10 Marks)**

b. Implement Inverter, Nandgate using CMOS Logic circuits and outline the operation using Truth Table of operation. **(10 Marks)**

OR

8 a. Discuss Six Examples of Op-Amp based circuits with circuit diagram and applications. **(12 Marks)**

b. Explain the working of differential charge measurement analog circuit with neat diagram. **(08 Marks)**

Module-5

9 a. Discuss design considerations of Piezoresistive pressure sensor and derive an expression for output voltage of Wheat Stone Bridge arrangement for the applied pressure. **(14 Marks)**

b. Implement PID controller using Op-Amp and bring about the Block diagram of PID controller with relevant parameters. **(06 Marks)**

OR

10 a. Discuss performance parameters of pressure sensor relevant to sensitivity, non-linearity with neat characteristic curves. **(10 Marks)**

b. Explain vibration control in a Glass Epoxy composite box beam with neat diagram and experimental results. **(10 Marks)**

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