

# CBCS SCHEME

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18MT752

## Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Mechatronics System Design

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define mechatronics. What are the objectives of mechatronics? (05 Marks)
- b. Explain briefly the key elements of a measuring system, with examples. (05 Marks)
- c. Explain with a block diagram, working of an automatic camera. (10 Marks)

OR

- 2 a. What are the advantages, disadvantages and applications of mechatronics. (07 Marks)
- b. Compare the traditional design approach with that of the mechatronics design approach. (07 Marks)
- c. Explain integrated design issues in mechatronics. (06 Marks)

### Module-2

- 3 a. What is transfer function? What are the procedures for determining the transfer function of a control system? Explain briefly. (10 Marks)
- b. Explain through mathematical equations the building blocks of mechanical system. (10 Marks)

OR

- 4 a. Explain briefly various mathematical equations the building blocks of electrical system. (10 Marks)
- b. Write short notes on:
  - (i) Electrical-mechanical coupling
  - (ii) Fluid systems(10 Marks)

### Module-3

- 5 a. Define actuation system. With a neat schematic diagram, describe the construction and working of a hydraulic system. (10 Marks)
- b. Develop a mathematical model for an armature controlled DC motor with the help of neat block diagram. (10 Marks)

OR

- 6 a. Define Stepper motor. Explain with neat diagram, permanent magnet stepper motor. (10 Marks)
- b. Write short notes on:
  - (i) Piezo electric actuators
  - (ii) Linearization of non-linear system(10 Marks)

### Module-4

- 7 a. Define transducer and classify it, sketch and explain capacitive transducers. (10 Marks)
- b. Differentiate between transducer and sensors. (05 Marks)
- c. Explain: (i) Light sensors (ii) Hall effect sensors (05 Marks)

**OR**

- 8 a. What is data acquisition and control system? Explain with the help of a neat diagram data acquisition board. (10 Marks)
- b. Write short notes on:
- (i) Data conversion process
  - (ii) Application software (05 Marks)
- c. Define signal conditioning. What are the necessities for signal conditioning? (05 Marks)

**Module-5**

- 9 a. How case studies are used for data collection and analysis? How are case studies analysed with examples. (10 Marks)
- b. Discuss hypothesis formulation and continuous analysis of case study method of data acquisition. (10 Marks)

**OR**

- 10 a. How the DAQ systems work for high temperature optical sensors? Discuss with an example. (10 Marks)
- b. With the help of a neat diagram, explain how signal conditioning for DAQ systems. (10 Marks)

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