May 2024

B. Tech. (RAI) (Fourth Semester)

Mechatronics System Design (PCC-RAI-405-21)

Time : 3 Hours]   [*Maximum Marks :* 75

Note : It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

Part A

1. (a)   What is meant by system in mechatronics ?

    (b)   Obtain the basic function of control system.

    (c)   Give example for closed loop system and open loop system.

    (d)   State the dynamic characteristics of simplified measuring system.

    (e)   What are the types of strain gauge ?

    (f)   What is tachogenerator ?

    (g)   What are the types of bimetallic sensors ?

(h) Mention some instruments that measure angular velocity.

(i) Name few materials used in binding of strain gauge.

(j) State the purpose of using potentiometer in displacement sensor. **10×1.5=15**

Part B

2. (a) Explain briefly the information system used in Mechatronics.

   (b) Write a note on Automatic controls. **15**

3. (a) Explain sensors and actuators.

   (b) Discuss the integrated design issues in Mechatronics. **15**

4. (a) Write a note on advanced approaches in Mechatronics.

   (b) List the types of design process. Explain Mechatronics design with flow chart. **15**

5. (a) Explain testing of transportation bridge surface material with suitable block diagram.

   (b) Explain the transducer calibration systems for automotive application. **15**

6. (a) With the help of control diagram, explain pick and place robot.

   (b) What is PID Controllers ? Explain with suitable examples.

   (c) Briefly describe the concept of PLC and Ladder programming. **15**

7. (a) What are the Low pass and High pass filters ? Explain with suitable examples.

   (b) List any *five* microsensors with one application of each. **15**