

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2125)

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B. Tech 7th Semester Examination
Mechatronics (OS)
ME-7005

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt total five questions. Select one question from each section A, B, C and D. Section E is Compulsory.

SECTION - A

1. Compare the mechatronics design methodology/process with the traditional approach of designing by keeping in view several important life cycle factors. Discuss need and role of mechatronics in design, manufacturing and factory automation. (20)
2. (i) Compare Open loop and Closed loop control system. Give one example of each system.
(ii) What are features and elements of microprocessor based controller? Explain. (10x2=20)

SECTION - B

3. (i) Define sensor. What are the energy domains input, modulated and output by a sensor? Explain with an example the domain graph.
(ii) Give detail classifications of actuators used in mechatronics system. (10x2=20)

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4. (i) Explain the following terms related to transducers: (i) Draft (ii) Linearity (iii) Time Constant (iv) Settling time.
(ii) Distinguish between mechanical and electro mechanical pressure sensors? (10x2=20)

SECTION - C

5. Discuss the basic structure of a Programmable logic controller with the help of a block diagram. Explain the use of the Latching in PLC programming. (20)
6. (i) Discuss in brief the use of operational amplifiers in analog signal processing. What are the characteristics of operational amplifiers?
(ii) Write short note on:
(a) Schmit trigger
(b) D/A converter. (10x2=20)

SECTION - D

7. (i) Explain for a microprocessor the role of (i) accumulator (ii) Status (iii) Memory addresses (iv) Program Counter register.
(ii) Design a vehicle engine management system on the basis of mechatronics system design. (10x2=20)
8. (i) Draw the block diagram of basic microcontroller and explain the function of each element.
(ii) Explain what is meant by memory-mapped system for inputs/outputs. (10x2=20)

SECTION - E

9. Answer the following questions briefly
- (i) How is precision machining achieved in mechatronics systems?
 - (ii) Write the analogous electrical elements in force-voltage analogy for elements of mechanical translational system.
 - (iii) What is shift register? How many data is required for a shift register?
 - (iv) What is microcomputer structure?
 - (v) What is a timed switch? (4x5=20)