

CBCS SCHEME

18MT752

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 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. Briefly explain the application areas of mechatronics. (10 Marks)
- b. Explain the general scheme of hardware and software integration issues in mechatronics. (10 Marks)

OR

- 2 a. Explain the hardware in loop simulation. (10 Marks)
- b. Explain the design process of mechatronics system with a neat sketch. (10 Marks)

Module-2

- 3 Compute the block diagram representation for the following mechanical circuit [Fig.Q3].

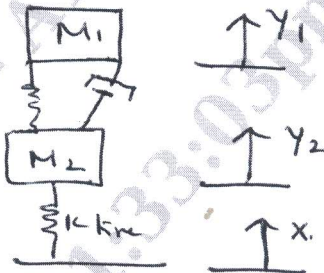


Fig.Q3

(20 Marks)

OR

- 4 a. Compute the loop transfer function LTF, closed loop transfer function CLTF and the return difference, RD, for the following block diagram Fig.Q4(a)(i) and (ii).

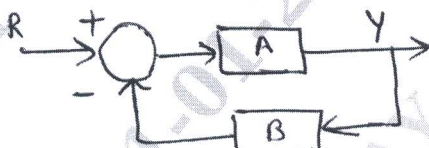


Fig.Q4(a)(i)

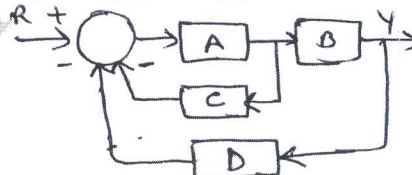


Fig.Q4(a)(ii)

(10 Marks)

- b. Use block diagram manipulation to compute the transfer functions for the following block diagram [Fig.Q4(b)].

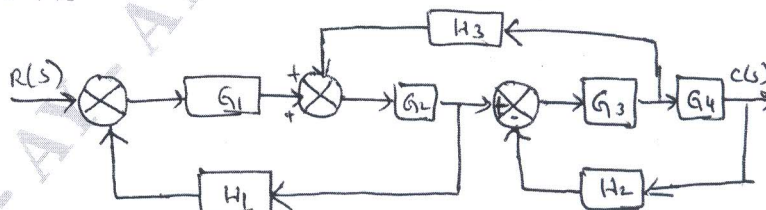


Fig.Q4(b)

(10 Marks)

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.

Module-3

- 5 a. Explain the different control modes of fluid power circuits. (10 Marks)
b. Write short notes on:
(i) Linearization of non-linear system
(ii) Piezoelectric actuation (10 Marks)

OR

- 6 a. Explain with the neat diagram, energy modulation device. (10 Marks)
b. List and explain the major factors to be considered in selection of an actuator of the mechatronics system. (10 Marks)

Module-4

- 7 a. Explain with a neat sketch the working principle of analog to digital converter. (10 Marks)
b. With a neat sketch describe the construction and working principle of instrument amplifier. (10 Marks)

OR

- 8 a. Solve $y(s) = \frac{1}{(s+2)^3(s+3)}$ for $y(t)$. (15 Marks)
b. Explain the elements of Data Acquisition System. (05 Marks)

Module-5

- 9 a. With the help of block diagram, explain the auto control system applied for Green House Temperature Maintenance. (10 Marks)
b. Demonstrate the application of Mechatronics Technology applied for spring-mass-oscillation and damping. (10 Marks)

OR

- 10 a. Define the transducer and explain with a block diagram the transducer calibration system applied for an automotive application. (10 Marks)
b. With the help of block diagram, explain the position controlled of a permanent magnet DC Gear Motor. (10 Marks)

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