

CBCS SCHEME

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21MT54

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Control Theory and Virtual Instrumentation

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Obtain differential equations, describing the mechanical system shown in Fig.Q1(a) and draw electric circuit based on F-V and F-I analogy.

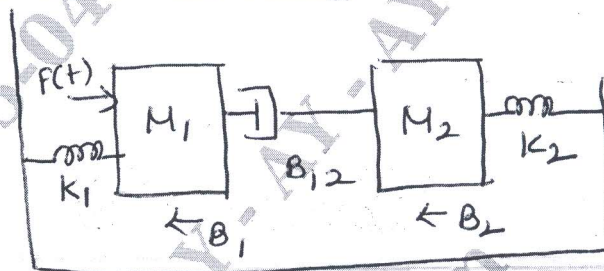


Fig.Q1(a)

(10 Marks)

- b. Differentiate between open loop and closed loop system. Explain suitable example for open loop and closed loop. (10 Marks)

OR

- 2 a. Write the differential equation of the mechanical system shown and also draw the torque voltage and torque current electrical analogues.

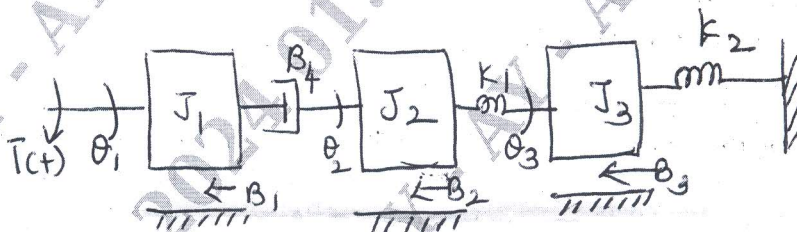


Fig.Q2(a)

(12 Marks)

- b. Draw the force voltage analogous mechanical system for electrical circuit shown in the Fig.Q2(b).

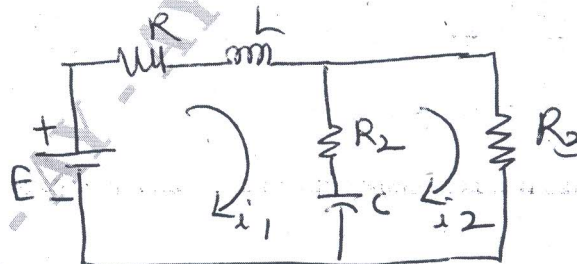


Fig.Q2(b)

(08 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-2

- 3 a. Find the ratio $C(s)/R(s)$ for the block diagram shown in Fig.Q3(a) using block diagram reduction technique.

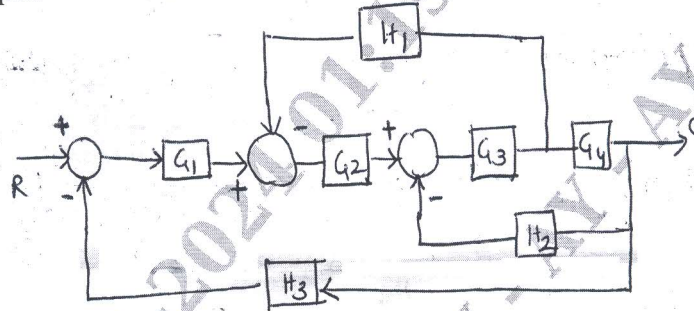


Fig.Q3(a)

(10 Marks)

- b. Find the transfer function for the given network shown in Fig.Q3(b).

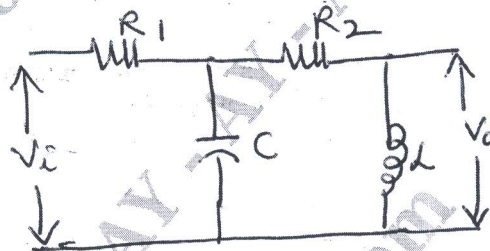


Fig.Q3(b)

(10 Marks)

OR

- 4 a. Using SFG technique, find the transfer function for the system shown in Fig.Q4(a).

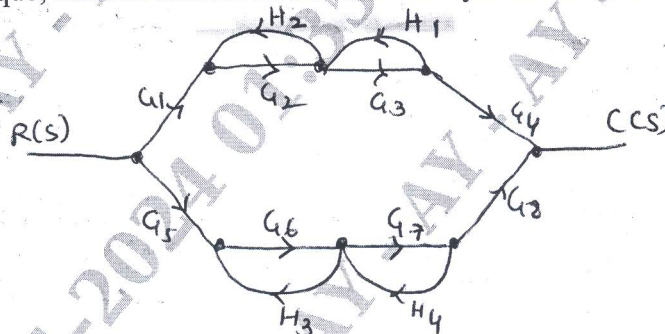


Fig.Q4(a)

(10 Marks)

- b. Explain the terms related to signal flow graph:
 (i) Forward path (ii) Self loop (iii) Forward path gain
 (iv) Non touching loops (v) Source node

(10 Marks)

Module-3

- 5 a. Define Virtual Instrumentation (VI). Explain the architecture of VI. (10 Marks)
 b. Explain the operating single ended input and differential ended inputs with neat diagram. (10 Marks)

(10 Marks)

OR

- 6 a. Define sampling. Explain the process of sampling theorem. (10 Marks)
 b. Comparison between conventional programming and graphical programming with examples. (10 Marks)

(10 Marks)

Module-4

- 7 a. Explain concept of sub VI's with flow chart: (i) for loop (ii) while loop (10 Marks)
b. Define a structure. Explain the different types of structures with suitable diagram. (10 Marks)

OR

- 8 a. Define an array. Explain the operation of 1-D array and 2-D array with an example. (10 Marks)
b. Describe the working operation of file input/output system with example. (10 Marks)

Module-5

- 9 a. Explain interfacing of external instrument PC using RS 232. (10 Marks)
b. Write a brief description on USB and its advantages. (10 Marks)

OR

- 10 a. Explain CAN bus in detail/architecture of CAN controller with neat diagram. (10 Marks)
b. Explain the architecture of IEEE-488 bus system with neat diagram. (10 Marks)
