Exam Date & Time: 05-Jan-2024 (09:30 AM - 12:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

THIRD SEMESTER B.TECH END SEMESTER MAKEUPN EXAMINATIONS, JANUARY 2024

CONTROL SYSTEMS ENGINEERING [MIE 2128]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates:
Answer ALL questions
Missing data may be suitably assumed

1) With a neat sketch explain the closed loop control system. (4)

A)

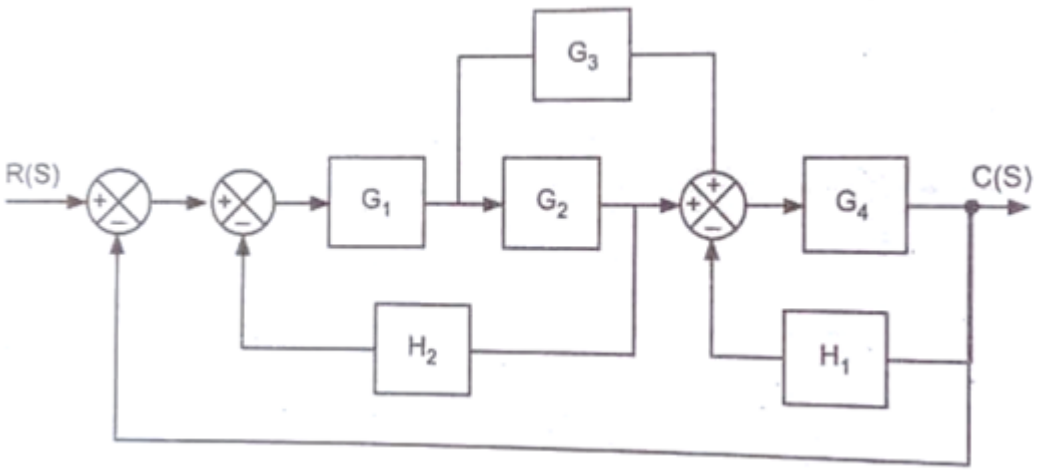
B) With a neat sketch explain block diagram representation of a DC motor speed control system. (3)

C) With a neat sketch explain control system components of a system. (3)

2) Draw the schematic diagram of armature controlled DC motor and obtain its transfer function. (4)

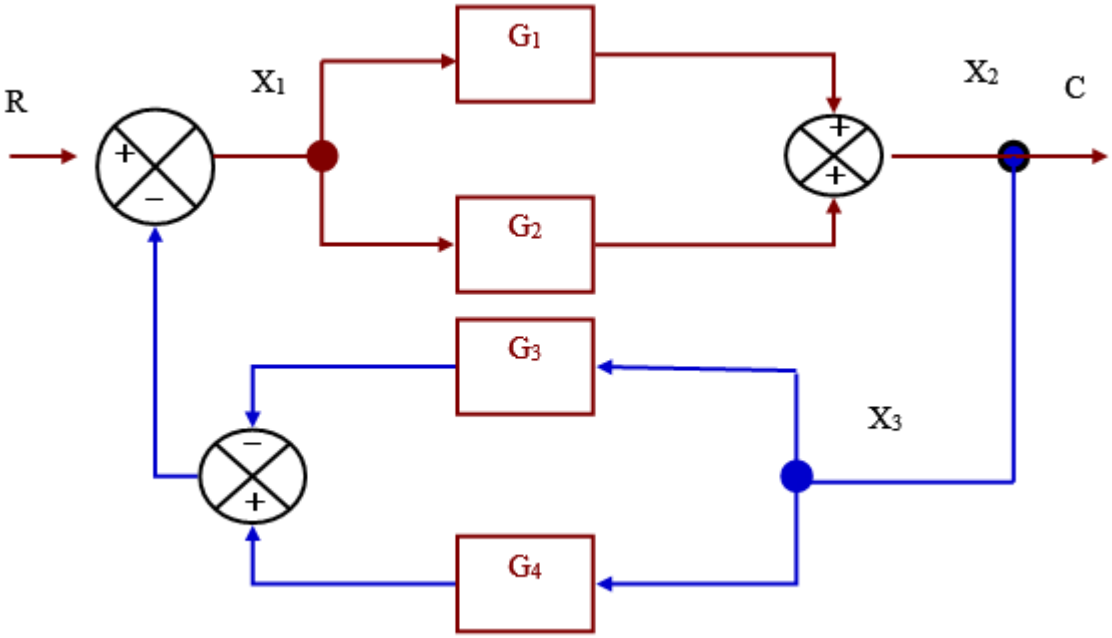
A)

B) Reduce the block diagram shown in figure and obtain its transfer function.



(3)

C) Draw the signal flow graph of the block diagram shown in figure. (3)



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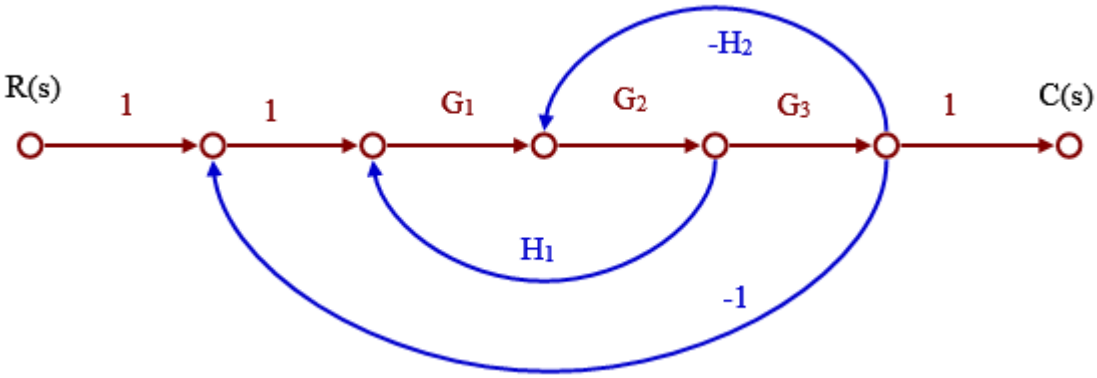
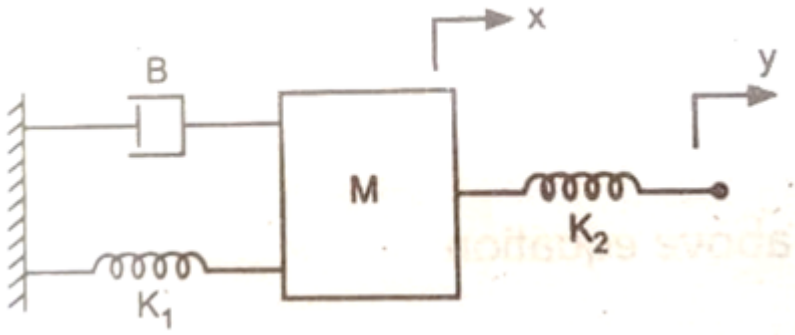
3) Obtain the transfer function of C/R of the system whose signal flow graph is shown in Figure

A)



(4)

B) Obtain the transfer function of the mechanical system as shown in figure



(3)

C) Discuss the differences between Time Domain and Frequency Domain Analysis (3)

4) With a sketch explain standard test signals of a control system. (4)

A)

B) Describe the following time response specifications a) Delay time b) rise time c) settling time (3)

C) With a neat sketch explain the time response of first order system for a step input (3)

5)

A) Draw the polar plot the given control system $G(S)H(S) = \frac{10}{(S+2)(S+4)}$. (4)

B) For the given control system $G(S)H(S) = \frac{K}{S\,(S+2)(S+10)}$ Obtain the Nyquist plot. (3)

C) For the given control system $G(S)H(S) = \frac{K}{S\,(S+2)(S+10)}$ Calculate the range of K for the stability. (3)

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