Reg. No. : | | | | | | | | | | | | |

Question Paper Code: 1015337

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Fifth Semester
Aeronautical Engineering
U20AE505 – FUNDAMENTALS OF CONTROL ENGINEERING
(Regulation 2020)

Time: Three Hours | Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. List the elements of an angular displacement system.

2. Draw the block diagram for a flight control system.

3. State the fundamental principle used in the block reduction technique.

4. What type of feedback system facilitates automation?

5. Illustrate the time response and indicate the relevant specifications.

6. What is meant by the order of a system?

7. Compare the resonant peak and resonant frequency.

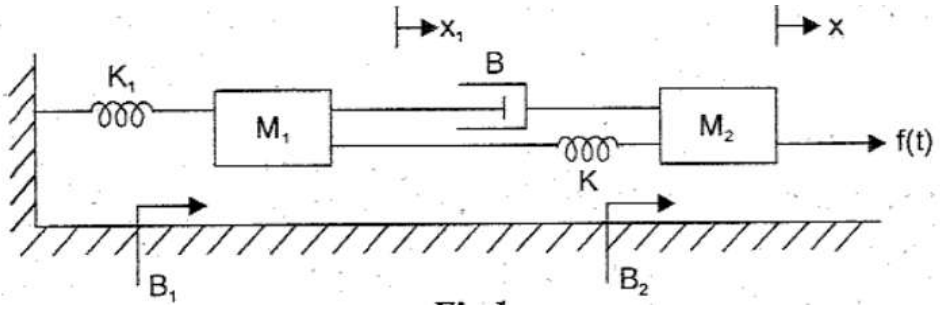
8. How can you determine the angles of the asymptotes?

9. Why a derivative controller is typically not employed in control systems?

10. Define digital PID controller.

PART – B (5 x 16 = 80 Marks)

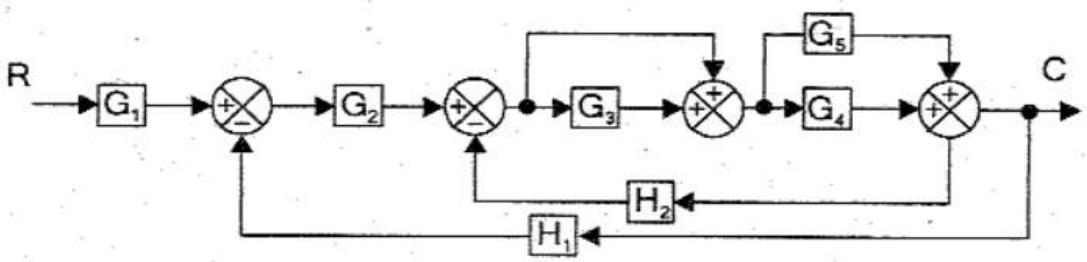
11.(a) Derive the differential equations governing the mechanical system shown below and determine the transfer function. (16)



(OR)

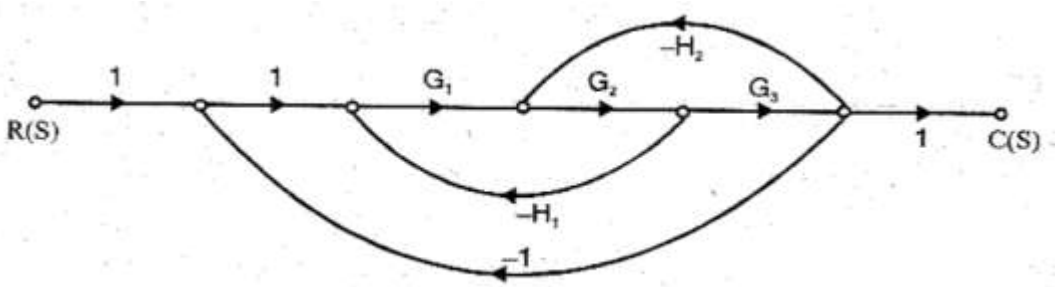
(b) With a block diagram explain the concept of flight control systems. (16)

12. (a) Using block diagram reduction determine the transfer function of the below sketch. (16)



(OR)

(b) Evaluate the transfer function of below sketch using Mason gain formula. (16)



13. (a) Examine the response of first order system when subjected to the unit step input and sketch the neat time domain specifications for various time delays. (16)

(OR)

(b) Consider the unity feedback closed loop system where the forward transfer function is $G(s) = \frac{25}{s(s+5)}$ analyze the rise time, peak time, maximum overshoot and the settling time when the system is subjected to a unit step signal. Draw the time domain specifications. (16)

14. (a) Construct ruth array and determine the stability of the system represented by the characteristic equation, $s^5+s^4+2s^3+2s^2+3s+5=0$. Comment on the location of the roots of characteristic equation. (16)

(OR)

(b) The open loop transfer function of a unity feedback system is given below, identify the root locus of the system. (16)

$$G(s) = \frac{k(s+9)}{s(s^2 + 4s = 11)}$$

15. (a) What is meant by sample and hold circuits and derive the transfer function zero order hold. (16)

(OR)

(b) Explain the significance of controller and mention its types and also the design procedure for PID controller in feedback control system. (16)

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