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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech. (ANE) (Sem.-6)
AUTOMATIC FLIGHT CONTROL
Subject Code : ANE-321
M.Code : 60530

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- a) Compare the merits and demerits of feedback control systems in comparison to open loop control systems.
- b) Write down the equation of operation for a PID controller.
- c) What is meant by frequency response of a system?
- d) Define the transfer function of a control system.
- e) State the significance of root loci.
- f) State the basic function of I.L.S.
- g) List the basic components of a pitch attitude control system.
- h) Plot the time response of a second order system.
- i) State the transient response parameters of a second order system.
- j) What is the purpose of a displacement type auto pilot?

SECTION-B

2. For the control system shown in fig. 1, determine k_1 , k_2 and a such that the system will have a steady state gain of 1.0, a damping ratio $\zeta = 0.6$ and a natural frequency, $\omega_n = 5.0$.

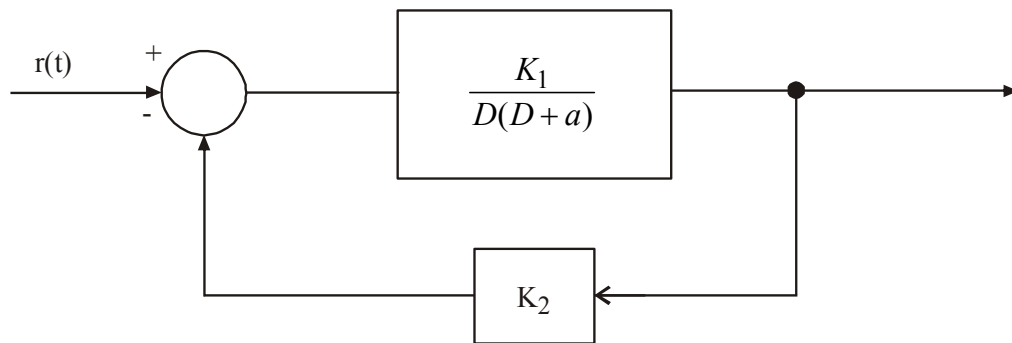


Fig.1

3. The characteristic equation for a control system to control the output torque of an engine is :

$$S(S^2 + 8S + a) + 4(S + 8) = 0$$

Use Routh's criterion to obtain the range of values of a for which the system is stable.

4. For the system shown in fig. 2, write the characteristic equation and then determine the value of K such that $\omega_n = 3$. What is the corresponding value of the damping ratio ζ ? Sketch the asymptotes of the log-magnitude plot for both the open-loop and closed-loop frequency response. Determine ω_p and M_p .

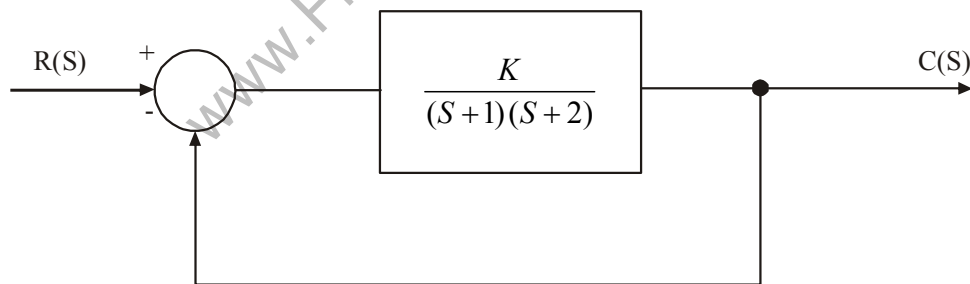


Fig.2

5. Explain with the help of a block diagram how the damping of the Dutch Roll is accomplished?

6. Sketch the root locus plot for the system shown in fig. 3. Determine the value of K to yield a damping ratio of 0.5.

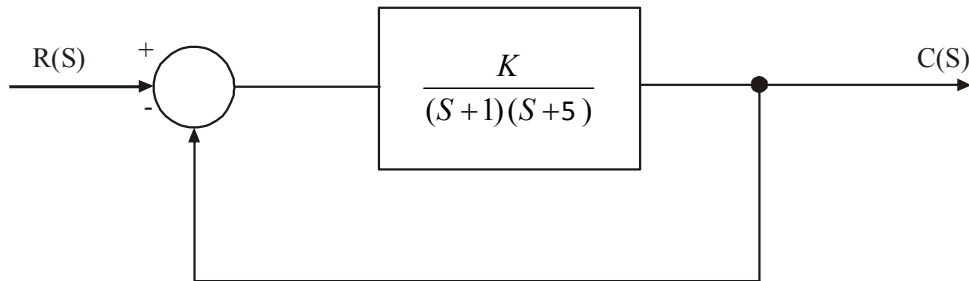


Fig.3

SECTION-C

7. How will you carry out the design of an autopilot of longitudinal flight control of a conventional aircraft? State the procedure.
8. What does fly-by-wire mean? How does it prevent unsafe operation of the aircraft outside of its performance envelope?
9. Write notes on :
- Acceleration control system
 - Yaw Orientational Control System.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.