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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(Automation & Robotics) (2012 & Onward) (Sem.–4)

LINEAR CONTROL SYSTEMS

Subject Code : BTEE-402

M.Code : 57108

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

Q1. Answer briefly :

a) Define ramp signal.

b) What are the standard test signals employed for time domain studies ?

c) What is transient response ?

d) What is a lag lead compensator ?

e) Give the limitations of frequency response analysis.

f) Define a decade in bode plot.

g) What are frequency domain specifications ?

h) What is function of error detector in control system ?

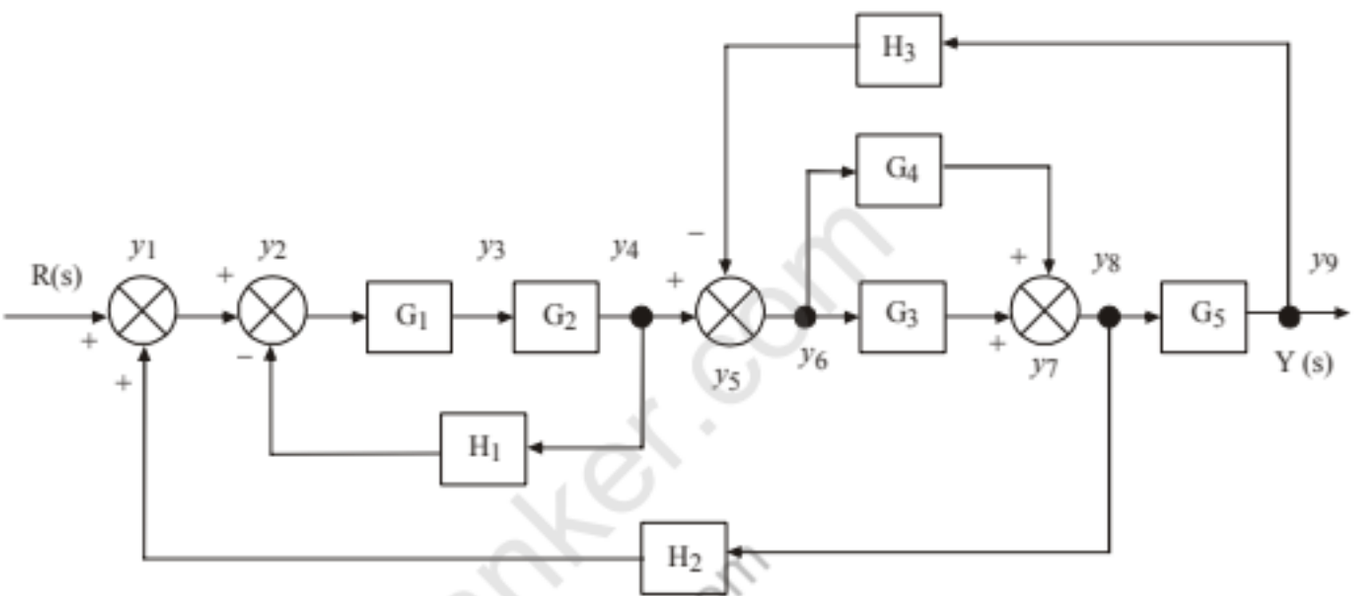
i) Define phase-cross over frequency.

j) Why the zeros on the real axis near the origin are generally avoided in design ?

SECTION-B

2. Discuss sampled data control system with the help of a block diagram. Write its advantages and disadvantages.

3. Convert the following block diagram into its equivalent signal flow graph.



4. State how steady state error of a control system is determined ? How it can be reduced ?

5. Discuss the working of a servo motor with the help of suitable diagram.

6. What is a multivariable system ? Discuss with a suitable example. Also discuss issues in the analysis and design of multivariable control systems.

SECTION-C

7. Sketch the Nyquist plot for the system with the open loop transfer function

$$G(s) = \frac{K}{(s+1)(s+1.5)(s+2)}$$

and determine the range of K for which the system is stable.

8. What information can you obtain from the root locus? Explain the method for calculating the breakaway points, draw the root locus plot for a system with

$$G(s)H(s) = \frac{k}{s(s^2 + 4s + 10)}$$

Determine angles of departure and the approximate positions of the closed loop poles for k = 10.

9. Design a suitable lead compensator for a system with unity feedback and having open loop transfer function $G(s) = \frac{4}{s(s+1)(s+4)}$ to meet the specifications

a) Damping ratio = 0.5.

b) Undamped natural frequency = 2 rad/sec.

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.