[187] SEAT No._____ No. of Printed Pages : 3

SARDAR PATEL UNIVERSITY
M.Sc.(Electronics) III[rd] Semester Examination
(Under CBCS)
Monday 22[nd] October,2018
TIME : 2:00 p.m.to 5:00 p.m.
PS03CELE 21 : PRINCIPLES OF CONTROL SYSTEMS

NOTE : Figures to the right indicate the maximum marks for the question. **Total Marks:70**

Q:1 **Give the correct / nearest answer (statement) for the following multiple choice questions (statements)** **8X1=[8]**

1. In a control system for a parabolic input, slope obtained is
(i) At (ii) A (iii) Zero (iv) None of these.

2. If the poles of the transfer functions are S=0,-3,+5,-5,+2 they are called _____.
(i)Repeated poles (ii) Simple poles
(iii) Complex conjugate poles (iv)Both (i) and (ii)

3. Reset controller is also known as _____ controller.
(i) ON-OFF (ii) PI (iii) PD (iv) PID

4. For a type 1 system, Error ess for step input is
(i) A/K (ii) 0 (iii) A/K+1 (iv) ∞

5. For a Direct Root Locus K value is _____.
(i) 0 to +∞ (ii) -∞ to 0 (iii) -∞ to +∞ (iv) Zero

6. For a polar plot if $\omega gc < \omega pc$, system is
(i) unstable (ii) critically stable (iii) stable (iv) All of these.

7. For Bode plot if slope is -20dB/decade, there is _____ pole at origin.
(i) One (ii) Two (iii) Three (iv) None of these

8. The lead compensator has zero at S = _____ and pole at S = _____.
(i) $-1/\tau$ (ii) $-1/\gamma\tau$ (iii) $-1/\alpha\tau$ (iv) $-\alpha/\tau$

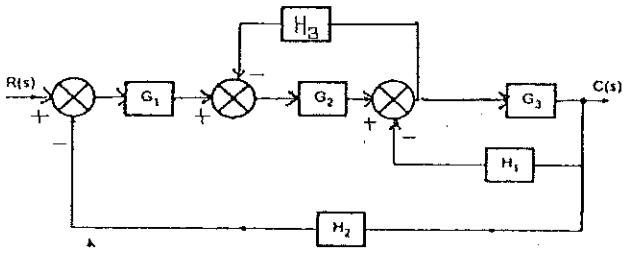
(P.T.O.)

Q.2 **Give short answers to the following. (Any Seven)** 7X2=[14]

1. Differentiate between Block diagram and signal flow graph representation.
2. Write classification of control system. Give examples of open loop and closed loop control system.
3. Define : (i) Transient Response (ii) Steady state Response
4. Determine positional error coefficient and corresponding steady state error.
5. Explain Angle and Magnitude condition in context with the direct root locus.
6. Discuss effect of addition of zeros on root locus.
7. Draw different compensation techniques.
8. Define : Gain cross over frequency and Phase cross over frequency.
9. Explain any two block diagram reduction rules.

Q.3 (a) What is proportional band? Draw the transfer curve with respect to 50% proportional band. Explain the working principle of proportional controller with proper circuit diagram. [6]

(b) Evaluate the closed loop transfer function for the following block diagram.Apply block diagram reduction rules. [6]



OR

(b) Explain various terminologies with respect to signal flow graph. [6]

Q.4 (a) Explain conceptual approach to frequency response for sinusoidal input and derive the equations for steady state response Css (t). [6]

(b) Enlist different standard test inputs. Draw its schematics. Write its equations. A unity feedback system has G(s) = 40 (S+2) / S (S+1)(S+4) Determine (i) Type of the system (ii) All error coefficients. [6]

OR

(b) With consideration of Ramp Input analyze Type 0,1 and 2 systems. Write its conclusions. [6]

Q.5 (a) Using Routh's method examine the stability of equation $S^3+6S^2+11S+6=0$. Write necessary and sufficient condition of Routh criterion. [6]

(b) Define Bode plot. Obtain Magnitude plot by considering effect of zeros at the origin. Sketch the graph and show corresponding slope. [6]

OR

(b) Consider system with G(S)H(S) = k / S (S+4). Test a point S = -2 + j.5 for its existence on root locus. Find corresponding value of k. [6]

Q.6 (a) Deduce the transfer function for phase lag compensator circuit. Find the values of pole and zero. Draw the pole-zero plot. Write its advantages and Disadvantages. [6]

(b) Consider a system with open loop transfer function as G(S)H(S) = 10/S. Obtain its polar plot. Write the steps for Nyquist plot Analysis. [6]

OR

(b) Explain the concept of Encirclement. Derive an equation of constant magnitude Loci(M circles) Hence, Draw the family of M circles. [6]

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