Total No. of Questions : 8]

SEAT No. :

P3781

[Total No. of Pages : 2

[5561]-182
B.E.(Electrical)
Control System - II
(2012 Course) (Semester - I) (403145)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer any one question from each pair of questions : Q.1 & Q.2, Q.3 & Q.4, Q.5 & Q.6, Q.7 & Q.8.***
2) ***Figures to the right indicate full marks.***

Q1) a) Draw electrical circuit & derive transfer function of Lead compensation network. **[6]**

b) A unity feedback system has an open loop transfer function, $G(s) = \frac{4}{s(s+2)}$. Design a suitable Lead compensator so that phase margin is 50º and Kv = 20/sec. **[10]**

c) Explain the effect of pole zero cancellation on the controllability of system. **[4]**

OR

Q2) a) Explain the steps to design lag network by Bode plot approach. **[6]**

b) Determine the STM for the system is given by : **[10]**

$$\dot{X}(t) = \begin{bmatrix} -2 & 3 \\ 0 & -3 \end{bmatrix} X(t)$$

by Inverse transform method.

c) Evaluate the controllability and observability of the following system. **[4]**

$$A = \begin{bmatrix} -2 & 1 \\ 1 & -2 \end{bmatrix}; B = \begin{bmatrix} 1 \\ 0 \end{bmatrix}; C = \begin{bmatrix} 1 & -1 \end{bmatrix}$$

Q3) a) Derive the describing function for Ideal Relay. **[8]**

b) Explain asynchronous quenching and frequency entrainment of linear system. **[8]**

OR

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Q4) a) A system with $G(s) = \frac{50}{s(s+1)(s+2)}$ includes ideal relay with output equal to ∓ 1 unit. Determine the amplitude and frequency of limit cycle by describing function method. **[6]**

b) Determine the kind of Singularity, find the characteristic equation and draw phase portrait for the following differential equation $\ddot{x} + 3\dot{x} + 3x = 0$. **[10]**

Q5) a) Compare Digital Control System with Continuous Control System. **[8]**

b) Determine Inverse Z-transform of the following : **[8]**

i) $X(z) = \frac{z-4}{(z-1)(z-2)^2}$ by partial fraction expansion

ii) $X(z) = \frac{4z}{(z+0.5)^2}$ for $|z| > 0.5$

OR

Q6) a) Explain the effect of sampling period on the transient response and on the stability of digital control system. **[8]**

b) What is Zero Order Hold (ZOH)? Derive its transfer function. **[8]**

Q7) a) Obtain direct & cascade realization from given transfer function. **[10]**

b) Describe general procedure to obtain pulse transfer function. **[8]**

OR

Q8) a) Explain various methods of digital programming. **[10]**

b) Obtain the pulse transfer function of two systems in cascade with sampler in between. **[8]**

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