2072
M.E. Electrical Engineering (Power System)
Second Semester
EE-8208: Digital Control Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt any five questions.*

x-x-x

Q1 (a) Enumerate basic elements of a digital control system and show the block diagram representation of such a system. (5)

(b) What are digital control systems and how are these different from analog control systems? (5)

Q2 (a) Discuss principle of discretization. How is ideal sampler different from its actual sampler counterpart. (5)

(b) Give a comparison of various hold circuits based on impulse and frequency response. (5)

Q3 (a) Why is z-transform useful in analysis of digital control systems? Define Pulse transfer function. Also mention limitations of z-transform. (8)

(b) What are practical aspects of choice of sampling rate. (2)

Q4 (a) Define z-transform and discuss relationship between the Laplace transform and z-transform. (5)

(b) Define stability of digital control systems. Enumerate various methods used for stability investigation of such systems. (5)

Q5 Give block diagram representation of a digital position control system and discuss its functioning. (10)

Q6 (a) What are digital compensators and what are the methods for their realisation. (5)

(b) Discuss stepping motor operation with control action included and disk drive system incorporated. (5)

Q7 (a) What are the advantages of state variable method for analysis of digital control system? Show that the state variable model of a digital control system is given by

$$x(k+1) = \varphi (1) x (k) + \Theta(1) x(k)$$

$$c(k) = D x(k) + E u(k)$$

(7)

(b) Define controllability and observability. (3)

Q 8 Write short notes on

   (i)   Multivariable digital control system
   (ii)   On solution of state equation (10)

x-x-x