

Code: R7411008

B.Tech IV Year I Semester (R07) Supplementary Examinations December 2015

DIGITAL CONTROL SYSTEMS

(Common to EIE & E.Con.E)

(For 2008 Regular admitted batch only)

Time: 3 hours

Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain the advantages and disadvantages of digital control systems.
(b) Derive the transfer function of zero order hold device.
- 2 (a) Find the Z-transform of the following:
(i) $x(t) = \cos 3t$.
(ii) $y(t) = e^{-at}$ where sampling period $T = 1$ sec.
(b) Define Z-transform. Explain the modified Z-transform.
- 3 (a) Explain with the block diagram, analysis of sampled-data systems.
(b) Define difference equation. Find the transfer function using Z-transform for the system described by the following difference equation:
$$y(n) = x(n) - 5x(n-1) + 0.3y(n-2).$$
- 4 (a) Define state transition matrix and also list the properties of state transition matrix.
(b) With an example, explain the state space representation of discrete time systems.
- 5 (a) Describe the concept of duality between controllability and observability.
(b) Derive the necessary condition for digital control system.
$$x(k+1) = Ax(k) + Bu(k), \quad y(k) = Cx(k)$$
 is to be controllable.
- 6 (a) Define and explain the constant damping ratio loci.
(b) Explain the stability analysis by use of bilinear transformation.
- 7 Explain the following:
(a) Lead lag compensator.
(b) Digital PID controller.
- 8 (a) Define and explain the Ackerman's formula.
(b) Describe about the state observers.
