

Code No: C7502

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech I - Semester Examinations, March/April 2011

DIGITAL CONTROL SYSTEMS

(CONTROL SYSTEMS)

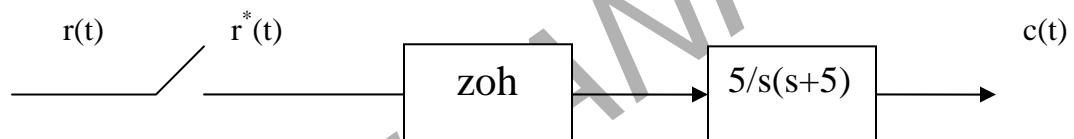
Time: 3hours

Max. Marks: 60

Answer any five questions  
All questions carry equal marks

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- 1.(a) State and prove the sampling theorem.  
(b) What is aliasing? [12]
- 2.(a) Determine the Z-transform of  $F(s) = 4/s^2(s+2)$   
(b) Explain the relationship between S-plane and Z-plane. [12]
3. For the system shown in figure 1. Find the output at the sampling instants  $c(kT)$ . The input is unit impulse and the sampling period is 0.1s. Find the final value of  $c(kT)$ ?. [12]



- 4.(a) Write properties of root loci in Z-plane.  
(b) Define stability in digital control systems. [12]
- 5.(a) Write the design steps for digital controller design by using Bilinear transformation.  
(b) Define digital PID controller. [12]
- 6.(a) Write state equations and output equations for the difference equation  $C(k+3)+5C(k+2)+3C(k+1)+2C(k)=u(k)$   
(b) What is the relationship between state equations and transfer function? [12]
- 7.(a) Define controllability.  
(b) Write the design procedure for pole placement design using state feedback. [12]
- 8.(a) Explain the formulation of optimal control problem.  
(b) Write kalman filter gain and variance equations. [12]

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