

**R16**

Code No: 137BV

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2021

**DIGITAL CONTROL SYSTEMS**

(Electrical and Electronics Engineering)

Time: 3 Hours

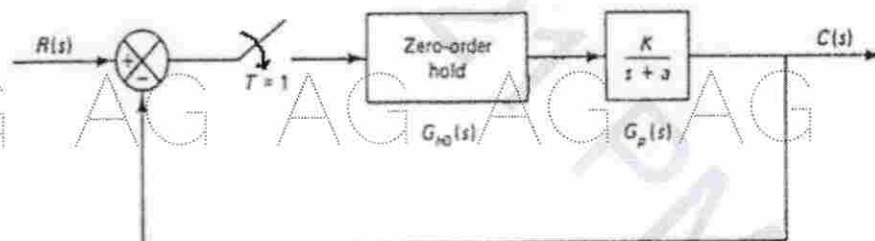
Max. Marks: 75

Answer any Five Questions

All Questions Carry Equal Marks

---

1. What is meant by sampling? Explain mathematical modeling of sampling process with necessary conditions. [15]
- 2.a) Obtain the inverse z-transform of the following:  
i)  $X(z) = \frac{z}{(z+2)(z+3)}$       ii)  $X(z) = \frac{z}{(z+1)^2}$   
b) Discuss the merits and demerits of Digital control systems. [7+8]
- 3.a) What is Jury's stability test? Explain its necessary and sufficient conditions.  
b) Describe the importance of frequency domain specifications in the evaluation of stability using bode plot in digital control systems. [7+8]
4. What is a pulse transfer function? Obtain the closed loop pulse transfer function of the following discrete time system. Also find its unit step response. [15]



- 5.a) Discuss the design of PID controller using root locus technique.  
b) Distinguish between cascade and feedback compensation in control systems. [8+7]
- 6.a) Discuss the significance of 'bilinear transformation' in the design of digital controllers.  
b) What is state transition matrix? Write its properties. [8+7]
- 7.a) Explain the design of state feedback controller using pole-placement approach.  
b) Discuss the advantages of discrete state space analysis. [8+7]
- 8.a) Enumerate the design of reduced order observer with a block diagram.  
b) Write the properties of deadbeat controller. [7+8]

---ooOoo---