University of Mumbai

Examinations Summer 2022
Program: **Electronics Engineering**
Examination: TE Semester-VI (Rev 2019)
Course Code: ELDO601   Course Name: Digital Control System
Time: 2 hour 30 minutes   Max. Marks: 80
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Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The relation between output response and input signal in closed loop system is :
Option A:	Exponential
Option B:	Parabolic
Option C:	Linear
Option D:	Nonlinear
2.	What is the z-transform of the signal $x[n] = a^n u(n)$?
Option A:	$X(z) = 1/z\text{-}1$
Option B:	$X(z) = 1/1\text{-}z$
Option C:	$X(z) = z/z\text{-}a$
Option D:	$X(z) = 1/z\text{-}a$
3.	Pulse transfer function relates z-transform of the _____ at the sampling instants to the Z-transform of the _____ input.
Option A:	Output, sampled
Option B:	Output, continuous
Option C:	Input, Continuous
Option D:	It is not related to z
4.	For an nth order system, he number of rows in the Jury's table is
Option A:	2n-1
Option B:	3n+1
Option C:	2n-3
Option D:	3n-1
5.	Which of the following techniques is utilized to determine at the actual point at which the root locus crosses the imaginary axis?
Option A:	Nyquist technique
Option B:	Routh-Hurwitz technique
Option C:	Nichol's technique
Option D:	Bode technique
6.	Zero initial condition for a system means
Option A:	Input reference signal is zero
Option B:	Zero stored energy
Option C:	Initial movement of moving parts
Option D:	System is at rest and no energy is stored in any of its components
7.	Region of convergence of a causal LTI system

Option A:	Is the entire s-plane
Option B:	Is the right-half of s-plane
Option C:	Is the left-half of s-plane
Option D:	Does not exist
8.	In dead beat control, all the poles of Closed Loop system are placed in z plane at
Option A:	Unit Circle
Option B:	Zero
Option C:	Diagonally Opposite
Option D:	Infinite
9.	Effect of feedback on sensitivity is minimum in
Option A:	Open loop control system
Option B:	Closed loop control system
Option C:	SISO Systems
Option D:	MIMO Systems
10.	What is the number of roots of the polynomial $F(z) = 4z^3-8z^2-z+2$, lying outside the unit circle?
Option A:	0
Option B:	1
Option C:	2
Option D:	3

Q2	Solve any Two Questions out of Three 10 marks each
A	Define Controllability and Observability of a system. Discuss any one method to determine Controllability and Observability of a system.
B	Write a short note on Nyquist sampling theorem
C	Determine the stability of the system having characteristics equation P(z)= z4 – 1.2 z3 + 0.07 z2 + 0.3 z – 0.08 = 0 using Jury's Stability Criterion

Q3	Solve any Two Questions out of Three 10 marks each
A	Explain Digital Control System with neat block diagram. Explain folding and aliasing in brief.
B	Explain pole placement method using Ackerman's formula.
C	Describe bilinear transformation approach for discretization of continuoustime systems in detail. Also, comment on the mapping between s-plane and z-plane under such discretization.

Q4	Solve any Two Questions out of Three 10 marks each
A	Design a deadbeat controller for a discrete-time system which is described by following open-loop pulse transfer function. Assume loop to be closed by negative unity feedback. $G(z) = \dfrac{2(z+0.5)}{(z-1)(z-0.61)}$
B	Explain Mason's gain formula for Signal Flow Graph.
C	What are the state space representation forms and explain them.