Printed Pages:02 **Sub Code: KEE-063**

Paper Id: 236902 **Roll No.** | | | | | | | | | | |

B.TECH
(SEM VI) THEORY EXAMINATION 2022-23
DIGITAL CONTROL SYSTEM

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. Discuss the methods of representation in discrete time system.

b. What is the condition for sampling of a signal in sampling theorem?

c. What do you mean by Sampled signal flow graph.

d. Explain mason's gain formula.

e. What do you mean by state of a dynamic system?

f. Define the term (a) State variable (b) State space

g. What do you mean by bounded input bounded output stability?

h. What do you mean by bode plot?

i. Explain the properties of state transition matrix.

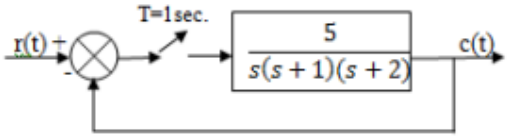
j. Discuss the mapping of real and imaginary axis in S-plane to Z-plane.

SECTION B

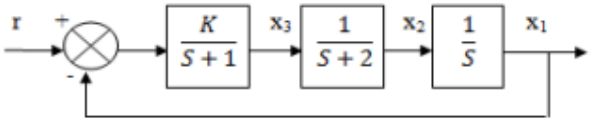
2. Attempt any *three* of the following: **10x3=30**

a. Describe the sample and hold operation.

b. Explain and determine the pulse transfer function of a given system.



c. Determine the stability and range for K of the system shown in fig. using Lyapunov equation.



d. Explain the strengths of frequency response approach, Establish correlation between frequency domain response and time domain response.

e. What do you mean by controllability and observability of a linear time invariant system? Explain controllability tests.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a. Explain and derive the relations for steady state accuracy of discrete time system.

b. Draw the basic digital control system and explain the function of each block. Also discuss the sampling effects.

4. Attempt any *one* part of the following: 10x1=10

a. Discuss the relationship between Laplace transform and Z transform.

b. Explain a closed loop position control system and transform it into state.

5. Attempt any *one* part of the following: 10x1=10

a. Write short note on;

(i)Stability analysis using bi-linear transformation

(ii)Transient and steady state responses

b. What is Jury stability criterion? Explain stability on the z-plane

6. Attempt any *one* part of the following: 10x1=10

a. Use the root locus method of plotting to sketch the loci of the roots of a unity feedback open loop transfer function given below. Find the range of K that yields a stables ystem.

$$G(s)H(S) = \frac{K}{s(s+1)(s+3)}$$

b. Distinguish between mapping the oremand Nyquistst ability criterion with suitable example. Write the steps of drawing the Nyquist plot for predicting there lativest ability of system.

7. Attempt any *one* part of the following: 10x1=10

a. Explain Lyapunov's stability theorem and stability of linear systems.

b. Obtain the companion first form, second form and Jordan canonical form realizations and draw block diagram for the transfer function.

$$\frac{Y(z)}{U(z)} = \frac{4z^3 - 12z^2 + 13z - 7}{(z-1)^2(z-2)}$$