



Roll No:

BTECH
(SEM. VI) THEORY EXAMINATION 2025-26
DIGITAL CONTROL SYSTEM

TIME: 3 HRS**M.MARKS: 70****Note:** Attempt all Sections. In case of any missing data; choose suitably.**SECTION A****1. Attempt all questions in brief. 02 x 7 = 14**

Q no.	Question
a.	Define a discrete time system.
b.	Define sampling period.
c.	Define unit circle in z-plane.
d.	Define sampling interval.
e.	Define Jury stability test.
f.	Define root locus.
g.	What is state transition matrix?

SECTION B**2. Attempt any three of the following: 07 x 3 = 21**

a.	Explain the process of data reconstruction in sampled systems.
b.	Discuss sampled signal flow graphs and explain their use in discrete-time system analysis.
c.	Explain the Jury stability test in detail with suitable example and procedure.
d.	Compare lead, lag, and lag-lead compensators in terms of performance and applications.
e.	Explain the derivation of characteristic equation and state transition matrix for discrete systems.

SECTION C**3. Attempt any one part of the following: 07 x 1 = 07**

a.	Explain lifted state-space models.
b.	Explain the role of sampling theorem in discrete systems.

4. Attempt any one part of the following: 07 x 1 = 07

a.	Explain the pulse transfer function of a closed-loop system with neat block diagram.
b.	Explain system identification techniques for discrete-time models.

5. Attempt any one part of the following: 07 x 1 = 07

a.	Describe frequency response analysis techniques for discrete-time systems.
b.	Explain rise time, peak time, settling time, overshoot, and damping ratio for second-order systems.

6. Attempt any one part of the following: 07 x 1 = 07

a.	Describe Nyquist stability criterion and explain its application in stability analysis of control systems.
b.	Explain the root locus method in detail and discuss the rules for sketching root locus diagrams.

7. Attempt any one part of the following: 07 x 1 = 07

a.	Discuss Lyapunov stability theorem and its application in discrete-time systems.
b.	Explain controllability and observability of discrete-time state-space models with mathematical conditions.