

Name: _____

Roll No. _____

Choose only one option which is the most appropriate for questions 1 - 5.

1. 1st order Pade' approximation of a time delay term contributes to the transfer function

- (a) only an additional zero in RH s-plane
- (b) a pole in LH s-plane and a zero in RH s-plane
- (c) both a pole and a zero in RH s-plane
- (d) a zero in LH s-plane and pole in RH s-plane

2. Nyquist plot is the trace of the tip of the phasor (i.e. vector in complex plane) whose length is given by

- (a) $|\operatorname{Re}\{G(j\omega)\}|$
- (b) $|\operatorname{Im}\{G(j\omega)\}|$
- (c) $|G(j\omega)|$
- (d) $|\operatorname{Re}\{G(j\omega)\}| + |\operatorname{Im}\{G(j\omega)\}|$

3. Nyquist plot of $1/(1 + j\omega T)$ is

- (a) semi-circle in 1st quadrant
- (b) positive imaginary axis
- (c) negative real axis
- (d) semi-circle in 4th quadrant

4. Forced response based stability requires that

- (a) input is bounded and output is bounded
- (b) input is unbounded and output is bounded
- (c) input is bounded and output is unbounded
- (d) input is unbounded and output is unbounded

5. Nyquist plot of a type 3 system, for $\omega \rightarrow 0$, would become tangent to

- (a) positive real axis
- (b) positive imaginary axis
- (c) negative imaginary axis
- (d) negative real axis

Give short (1 - 2 lines) answer to the questions 6-10

6. How can we get the undamped natural frequency of a 2nd order system from the Nyquist plot?

Undamped natural frequency in Nyquist plot is the point at which it crosses the imaginary axis.

..... 2 (PTO)

7. Define a minimum phase system.

Minimum phase system is that whose all poles and zeros are in LH s-plane.

8. Define the asymptotic stability.

A system is asymptotically stable when every natural response decays to zero as $t \rightarrow \infty$.

9. List the main performance attributes that we normally look for in the response of a system?

Stability, Tracking and Disturbance Rejection

10. What are the main impacts of the time delay term on the time response of a system?

The main impacts of the time delay term on the time response of a system are; (1) delay in settling and (2) large initial out-of-phase response.