

Name: \_\_\_\_\_

Roll No. \_\_\_\_\_

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

**1. The sufficient condition for the absolute stability analysis is based on the number of**

- (a) positive signs in the 1<sup>st</sup> column of Routh's tabulation
- (b) negative signs in the 1<sup>st</sup> column of Routh's tabulation
- (c) sign changes in the 1<sup>st</sup> column of Routh's tabulation
- (d) sign changes in the characteristic polynomial

**2. A zero row in Routh's tabulation indicates that**

- (a) all poles are on the imaginary axis
- (b) all poles complex conjugate
- (c) number of poles in LH and RH s-plane are equal
- (d) some of the poles are symmetrically placed about one or both of the axes

**3. As per Nyquist stability criterion, an unstable plant will be stable in the closed loop only if**

- (a) there are no encirclements of  $-1+j0$
- (b) there are as many clockwise encirclements as number of stable poles
- (c) there are as many anti-clockwise encirclements as number of unstable poles
- (d) there are as many clockwise encirclements as number of unstable poles

**4. Nyquist plot is able to examine the closed loop stability because it**

- (a) is unit impulse response in s-domain
- (b) is unit impulse response along  $\pm j\omega$  axis
- (c) represents the mapping of Nyquist curve with respect to  $-1+j0$
- (d) contains all the features of the plant

**5. As per Nyquist stability criterion, a stable plant will be stable in the closed loop only if**

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- (c) there are as many anti-clockwise encirclements as number of unstable poles
- (d) there are as many clockwise encirclements as number of unstable poles

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

**6. State the necessary condition for absolute stability as per Routh-Hurwitz stability criterion.**

The necessary condition is that the characteristic polynomial must be complete and all coefficients must have the same sign.

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**7. Define the Nyquist curve.**

The Nyquist curve is a semi-circle of infinite radius covering the complete RH s-plane, including the  $\pm j\omega$  axis, and excluding the singular points.

**8. State the conformal mapping hypothesis in respect of a point in s-plane and mapping  $F(s)$ .**

The conformal mapping theorem states that any point in s-plane, not passing through a singularity maps into a point in  $F(s)$  plane uniquely.

**9. Why is it sufficient to conclude about the absolute stability status of a system if we know only the number of poles with positive real part?**

It is sufficient to conclude about the stability from only the number of poles with positive real part because system will be stable only if this number is zero.

**10. What is the role of the necessary condition in the statement of Routh-Hurwitz stability criterion?**

The necessary condition establishes whether or not the sufficient condition must also be examined.