UNIT - III

1. Frequency response analysis studies system behavior in the:

A) Time domain
B) Frequency domain
C) State domain
D) Spatial domain
Answer: B

2. Frequency response is obtained by applying a:

A) Step input
B) Ramp input
C) Sinusoidal input
D) Impulse input
Answer: C

3. The relationship between time response and frequency response is established through:

A) Laplace Transform
B) Fourier Analysis
C) Differential Equations
D) State Variables
Answer: B

4. A Polar Plot represents:

A) Magnitude only
B) Phase only
C) Magnitude and phase on the complex plane
D) Gain margin only
Answer: C

5. In a polar plot, frequency is generally varied from:

A) $-\infty$ to $+\infty$
B) 0 to ∞
C) 1 to 100

D) 0 to 1
Answer: B

6. Bode plots consist of:

A) Magnitude plot only
B) Phase plot only
C) Magnitude and Phase plots
D) Nyquist plot only
Answer: C

7. The magnitude in a Bode plot is expressed in:

A) Watts
B) Decibels (dB)
C) Hertz
D) Degrees
Answer: B

8. The phase angle in a Bode plot is measured in:

A) Radians only
B) Hertz
C) Degrees
D) Seconds
Answer: C

9. The slope of a first-order pole in the magnitude plot is:

A) +20 dB/decade
B) -10 dB/decade
C) -20 dB/decade
D) -40 dB/decade
Answer: C

10. The slope contributed by a first-order zero is:

A) +20 dB/decade
B) -20 dB/decade
C) +40 dB/decade
D) 0 dB/decade
Answer: A

11. The Nyquist criterion is used to determine:

A) Time constant
B) System stability
C) Rise time
D) Settling time
Answer: B

12. Nyquist criterion is based on:

A) Routh Array
B) Argument Principle
C) Fourier Series
D) Differential Equations
Answer: B

13. Gain Margin indicates:

A) Additional gain before instability occurs
B) Additional phase before instability occurs
C) Error reduction
D) Overshoot value
Answer: A

14. Phase Margin is measured at:

A) Phase crossover frequency
B) Gain crossover frequency
C) Resonant frequency
D) Natural frequency
Answer: B

15. Gain crossover frequency is the frequency at which:

A) Phase = 0°
B) Magnitude = 0 dB
C) Magnitude = -20 dB
D) Phase = -90°
Answer: B

16. Phase crossover frequency is the frequency at which:

A) Magnitude = 0 dB
B) Phase = -180°
C) Phase = 90°
D) Magnitude = 20 dB
Answer: B

17. Positive gain and phase margins indicate:

A) Unstable system
B) Marginally stable system
C) Relatively stable system
D) Oscillatory system only
Answer: C

18. A larger phase margin generally results in:

A) Better relative stability
B) Less stability
C) Infinite gain
D) Zero damping
Answer: A

19. Closed-loop frequency response describes:

A) Open-loop behavior only
B) Response including feedback effects
C) Pole locations only
D) Transfer function only
Answer: B

20. Which plot directly shows gain margin and phase margin?

A) Root Locus
B) Polar Plot
C) Bode Plot
D) Time Response Plot
Answer: C

Fill in the Blanks

1. Frequency response analysis studies the system behavior in the **frequency domain**.
2. Frequency response is obtained by applying a **sinusoidal** input signal.
3. The magnitude and phase characteristics can be represented using **Bode plots**.
4. A polar plot is drawn on the **complex plane**.
5. The magnitude in a Bode plot is expressed in **decibels (dB)**.
6. The phase angle in a Bode plot is measured in **degrees**.

7. A first-order pole contributes a slope of **−20 dB/decade**.
8. A first-order zero contributes a slope of **+20 dB/decade**.
9. The Nyquist stability criterion is based on the **Argument Principle**.
10. The Nyquist plot is used to determine system **stability**.
11. Gain Margin indicates how much **gain** can be increased before instability.
12. Phase Margin indicates how much additional **phase lag** can be tolerated before instability.
13. The gain crossover frequency occurs when the magnitude is **0 dB**.
14. The phase crossover frequency occurs when the phase angle is **−180°**.
15. Positive gain and phase margins imply **relative stability**.
16. A larger phase margin generally improves system **stability**.
17. Closed-loop frequency response includes the effect of **feedback**.
18. Bode plots use a **logarithmic** frequency scale.
19. Nyquist plots are drawn by varying frequency from **0 to ∞**.
20. Gain Margin and Phase Margin are measures of **relative stability**.