Chettinad College of Engineering & Technology
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Department of Electrical and Electronics Engineering

Subject & Subject Code: Control Systems & IC8451

UNIT III

FREQUENCY RESPONSE

1. Which one of the following methods can determine the closed loop system resonance frequency operation?
   a) Root locus method
   b) Nyquist method
   c) Bode plot
   d) M and N circle
   Answer: d
2. Constant M- loci:
   a) Constant gain and constant phase shift loci of the closed-loop system.
   b) Plot of loop gain with the variation in frequency
   c) Circles of constant gain for the closed loop transfer function
   d) Circles of constant phase shift for the closed loop transfer function
   Answer: d
3. Constant N-loci:
   a) Constant gain and constant phase shift loci of the closed-loop system.
   b) Plot of loop gain with the variation in frequency
   c) Circles of constant gain for the closed loop transfer function
   d) Circles of constant phase shift for the closed loop transfer function
   Answer: c
4. The forward path transfer function of a unity feedback system is given by $G(s) = 100/(s^2+10s+100)$. The frequency response of this system will exhibit the resonance peak at:
   a) 10 rad/sec
   b) 8.66 rad/sec

c) 7.07 rad/sec

d) 5rad/sec

Answer: c

Explanation: $G(s) = 100/(s^2+10s+100)$

wn = 10rad/sec

G = 10/2wn =0.5

wr = 0.707 rad/s.

5. The constant M circle for M=1 is the

a) straight line x=-1/2

b) critical point (-1j0)

c) circle with r= 0.33

d) circle with r=0.67

Answer: a

6. The polar plot of a transfer function passes through the critical point (-1,0). Gain margin is

a) Zero

b) -1dB

c) 1dB

d) Infinity

Answer: a

7. The open loop transfer function of a system is G(s) H(s)= K / (1+s)(1+2s)(1+3s)

The phase cross over frequency ωc is

a) V2

b) 1

c) Zero

d) V3

Answer: b

8. For the transfer function

G(s) H(s) = 1 / s(s+1) (s+0.5), the phase cross-over frequency is

a) 0.5 rad/sec

b) 0.707 rad/sec

c) 1.732 rad/sec

d) 2 rad/sec

Answer: b

9. The gain margin (in dB) of a system having the loop transfer function

G(s) H(s) = 2 / s(s+1) is

a) 0

b) 3

c) 6

d) 8

Answer: d

10. The gain margin for the system with open loop transfer function

G(s) H(s) = G(s) =2(1+s) / s2 is

a) 8

b) 0

c) 1

d) -8

Answer: 0

11. Which controller has the potential to eliminate/overcome the drawback of offset in proportional controllers?

a. P-I

b. P-D

c. Both a and b

d. None of the above

ANSWER: (a) P-I

12. In P-I controller, what does an integral of a function compute?

a. Density of curve

b. Area under the curve

c. Volume over the curve

d. Circumference of curve

ANSWER: (b) Area under the curve

13. The bode plot is used to analyse which of the following?

A. Minimum phase network

B. Lag lead network

C. Maximum phase network

D. All phase network

ANSWER: (a)

14. The bode plot is a plot relating log w with magnitude in decible and.....

A. Phase angle

B. 90^0

C. 180^0

D. None of the above

ANSWER: (a)

15. The system is said to be marginally stable, if gain margin is _____

a. 0

b. 1

c. $+\infty$

d. None of the above

ANSWER: $+\infty$

16. If the phase angle at gain crossover frequency is estimated to be -105°, what will be the value of phase margin of the system?

a. 23°

b. 45°

c. 60°

d. 75°

ANSWER: 75°

17. The constant M circle for M=1 is the

a) straight line x=-1/2

b) critical point (-1j0)

c) circle with r= 0.33

d) circle with r=0.67

Answer: a

Explanation: For M =1 the constant M circle is a straight line at x=-1/2.

18. The polar plot of a transfer function passes through the critical point (-1,0). Gain margin **is**

a) Zero

b) -1dB

c) 1dB

d) Infinity

Answer: a

Explanation: Gain margin of a polar plot passing through the critical point is zero.

19. The open loop transfer function of a system is G(s) H(s)= K / (1+s)(1+2s)(1+3s)

The phase cross over frequency ωc is

a) V2

b) 1

c) Zero

d) V3

Answer: b

Explanation: Phase crossover frequency is calculated as by calculating the magnitude of the transfer function and equating it to 1 and the frequency calculated at this magnitude is phase cross over frequency.

20. Cut off frequency is the frequency at which magnitude of closed loop frequency response is

a) 1 db below its zero frequency

b) 2 db below its zero frequency

c) 3 db below its zero frequency

d) 4 db below its zero frequency

Ans: (c)

21. Transfer founction, when the bode diagram is plotted should be of the form

a) (1+T)

b) (1+S)

c) (Ts)

d) (1+Ts)

Ans: (d)

22. Slope in Bode plot is expressed as

a) – 6 db/decade

b) – 6 db/octave

c) – 7 db/octave

d) – 8 db/octave

Ans: (b)

23. Polar plots for+ve and –ve frequencies

a) Are always symmetrical

b) Can never be symmetrical

c) May be symmetrical

d) None of these

Ans: (a)

24. A complex-conjugate pair of poles near the jw axis will produce a

a) High oscillatory mode of transient response

b) Steady state mode of response

c) Sinusoidal mode of response

d) None of these

Ans: (a)

25. Polar plots for+ve and –ve frequencies

a) Are always symmetrical

b) Can never be symmetrical

c) May be symmetrical

d) None of these

Ans: (a)