**Vision Institute of Technology, Aligarh**

**Assignment**

**Subject: Control System(RIC 603)**

 **Unit -1**

1. Classify the control system & give the merits & demerits of open loop control system & closed loop control system.(2015-16)
2. How many types of feedbacks are there? Explain the advantages & disadvantages of each (2013-14)
3. Explain the concept of transfer function.
4. Compare open loop control system with closed loop control system.
5. (2012-2013)
6. Define the following : (2011-2012)
(1) Path (ii) Forward Path (iii) Path Gain (iv) Dummy node

(v) Non touching loop

1. Explain the block diagram reduction technique rules.(Numerical )
2. Explain Mason gain formula in brief. (2015-16)(Numerical)
3. Explain the working of AC servomotor .(2016-17)
4. What are the basic elements used for modelling of mechanical system. Explain Force voltage and Force current analogy.

 **Unit-2**

1. Under damped system is most preferred systems. Explain why? (2015)
2. A unity feedback system has a forward path transfer function G(S)=$ \frac{(S+2)}{S(S+1)}$ ,Determine rise time, Peak Time, & Settling Time. (2015)
3. Explain Various standard test signals, & also find relation between them (2015)
4. Define the following (2010-11,2016-17)
(a) Rise time (b)delay time (c)peak overshoot (d)steady state error (e) time constant (f)Peak time
5. Enlist the standard test signals.
6. Write the expression of second order control system for unity feedback signal.
7. Explain the error coefficients.
8. Give the comparison between PI&PID.
9. Define steady state error.(2016-17)
10. Mention the nature of transient response of second order control system for different types of Damping .

 **Unit-3**

1. Find the breakaway points of G(S)H(S)=$ \frac{K}{S\left(S+4\right)(S^{2}+4S+20)}$ .(2015-16)
2. State Necessary &Sufficient conditions of Routh Hurwitz criterion.(2015-16)
3. What do you understand by Relative stability.(2016-17)
4. What is Dominant pole?
5. What is the effect of addition of any pole or zero on root locus?
6. Sketch the root locus for the system having G(S)H(S)=$ \frac{K}{S(S^{2}+2S+2)}$ (2013)
7. Sketch the root locus for the open loop transfer function of a unity feedback control system given below & determine value of K, G(S)H(S)=$ \frac{K}{S\left(S+1\right)(S+3)}$ (2015)
8. Determine the stability of a closed loop system whose characteristic equation is $S^{5}$+$S^{4}$+$2S^{3}+2S^{2}$+11S+10=0 (2015)
9. Find the breakaway points of G(S)H(S)=$ \frac{K}{S\left(S+4\right)(S^{2}+4S+20)}$ . (2015)
10. Sketch the root locus for the open loop transfer function of a unity feedback control system given below & determine value of K, G(S)H(S)=$ \frac{K}{S\left(S+1\right)(S+3)}$ (2015)
11. Sketch the root locus for the system having G(S)H(S)=$ \frac{K}{S(S^{2}+2S+2)}$ (2013)
12. Consider the following equation, which may be the characteristic equation of linear control systems. Find the system is stable or unstable. $S^{5}$+$4S^{4}$+$8S^{3}+8S^{2}$+7S+4=0 (2015)
13. For the system G(S)H(S)=$ \frac{K(1+S)^{2}}{S^{3}}$, find the range of K for the system to be stable.(2015)
14. Determine the range of values of K such that the characteristic equation:S­­2+3(K+1)S2+(7K+5)S+(4K+7)=0 has roots more negative than S=-1

 **Unit-4**

1. Sketch the Nyquist plot for the system having G(S)H(S)=$ \frac{1+4S}{S\left(s+1\right)(s+2S)}$ usingtheNyquist Criterion determine wheather the closed loop system having the above open loop transfer function is stable or not. Also explain the condition for system to be statble by polar plot by means of Gain Margin & Phase Margin.2015
2. A unity feedback control system has G(S)=$ \frac{36(.2s+1)}{s^{2}\left(.05s+1\right)(.01s+1)}$ draw thebode plot. From the bode plot determine:2015
(i) Phase cross over frequency
(ii)Gain cross over frequency
(iii) Phase Margin
(iV) Gain Margin
3. Enlist the correlation between frequency domain & time domain response. Define resonant peak & Band Width (2012)
4. (i) What is nyquist stability criterion? Explain phase margin & gain margin in polar plot**.**(ii)Sketch the Nyqist plot for the system having G(S)H(S)=$ \frac{1.5(4+S)}{S\left(s-2\right)}$ usingtheNyqist $$Criterion determine whether the closed loop system having the above open loop transfer function is stable or not.
5. Find the gain margin of G(S)=$ \frac{80}{S\left(s+2\right)(s+20)}$
6. A unity feedback control system has G(S)=$ \frac{36(.2s+1)}{s^{2}\left(.05s+1\right)(.01s+1)}$ draw thebode plot. From the bode plot determine:2015
(i) Phase cross over frequency
(ii)Gain cross over frequency
(iii) Phase Margin
(iV) Gain Margin

 **Unit-5**

1. What is state, state variable & state vector of a system?
2. How transfer function can obtain from state equation.
3. Differentiate between lead & Lag network in view of their bode plot.(2016-17)
4. For the given transfer function obtain dynamic or state equations (2015-16)

$\frac{Y\left(s\right)}{u\left(s\right)}=k/(s3+a3s+a2s+a1$)

1. Obtain the time response of following system(2016-17)

$\left(\begin{matrix}X1\\X2\end{matrix}\right)$=$\left[\begin{matrix}1&0\\1&1\end{matrix}\right]\left(\begin{matrix}X1\\X2\end{matrix}\right)$+$\left(\begin{matrix}1\\1\end{matrix}\right)$U

 Where u(t) is unit step occurring at t=0 and X(0)=[1 0]

1. Define state transition matrix.
2. Define kalmans test for controllability and observability.
3. Expression for solution of state equation.

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