QPC: RJ19BTECH143 AR 19 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester – Regular) Examinations, June – 2021

BPCEL4020 / BPCEE4020 – CONTROL SYSTEMS

(Common to EE and EEE)

Time: 2 hrs Maximum: 50 Marks

Answer ALL Questions

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) **(1 x 10 = 10 Marks)**

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. A closed loop system is distinguished from open loop system by which of the following 1 1

(i) Servo mechanism (ii) feedback

(iii) output pattern (iv) input pattern

b. Transfer function of a control system depends on 1 1

(i)System parameters alone (ii) initial conditions of input and output

(iii)nature of input 9iv) nature of output

c. Regenerative feedback 1 1

(i) Decreases the gain of amplifier (ii) Increases the gain of amplifier

(iii)no effect on gain of amplifier (iv)None of the above

d. Velocity error constant of a system is measured when the input to the system is unit ____ function 2 1

(i)step (ii)impulse

(iii) Ramp (iv) Parabolic

e. The centroid in the root locus is a point where 2 1

(i) The branches of the root locus intersect with the imaginary axis. (ii) The branches of the root locus tend to infinity.

(iii) The asymptotes cross the real axis. (iv) The branches of the root locus terminate on the real axis.

f The steady state acceleration error for a type1 system is 3 1

(i)Zero (ii) infinity

(iii) between zero and infinite (iv) unity

g. The corner frequency in the Bode plot is: 3 1

1 (i)The frequency at which bode plot slope is 0 dB /decade. (ii) The frequency at which bode plot slope is -10 dB /decade.

(iii)The frequency at which the two asymptotes intersect. (iv)The frequency at which the two asymptotes meet.

h According to Nyquist stability criterion, where should be the position of all zeros of q(s) corresponding to s-plane? 3 1

(i)On left half (ii)On right half

(iii)At centre (iv)At random

i. AC servo motor resembles 4 1

(i) two phase induction motor (ii) Three phase induction motor

(iii) direct current series motor (iv) universal motor

j. Which of the following device is commonly used as error detector 4 1

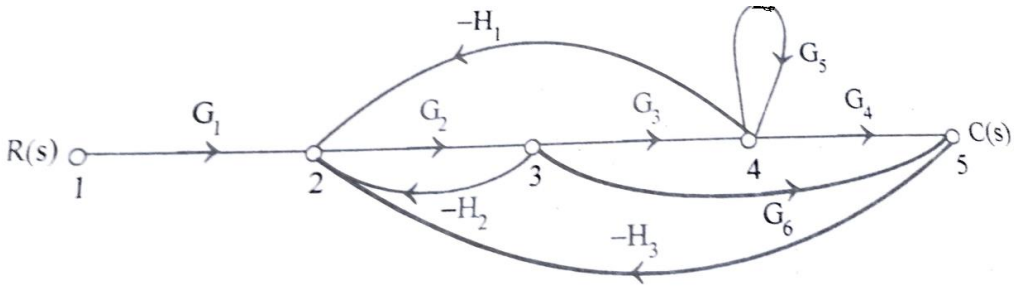
(i) Vernistats (ii) Microsysns

(iii) Resolvers (iv) Any of the above

PART – B: (Short Answer Questions) **(2 x 5 = 10 Marks)**

Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. List the major advantages and disadvantage of open loop control system	1	1
b. What is steady state error?	2	1
c. State the Nyquist stability criterion	3	1
d. Define Phase margin	3	1
e. What is servo motor	4	1

PART – C: (Long Answer Questions) **(6 x 5 30 Marks)**

Answer ***ANY FIVE*** questions	Marks	[CO#]	[PO#]
3. Find the overall gain for the signal flow graph shown 	(6)	1	2
4. Explain briefly about feedback characteristics of control systems	(6)	1	1
5. Derive the time response of a typical under damped second order system for a unit step input	(6)	2	1
6. Sketch the root locus of the system whose open loop transfer function is $G(s) = \frac{K}{s(s^2+4s+13)}$	(6)	2	2
7. Sketch the Bode plot for the transfer function of the system represented by $G(s) = \frac{20}{s(1+3s)(1+4s)}$ and determine gain cross over frequency	(6)	3	2
8. Sketch the Nyquist plot for the OTF given by $\frac{k(1+s)^2}{s^3}$ ..	(6)	3	2
9. Explain the operation principle of AC servo motor and derive its transfer function	(6)	4	1
10. Explain the effect of adding PI, PD and PID controllers in feedback control systems	(6)	4	1

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