BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Bachelor of Technology in Computer Science & Engineering
Course Name – Control System
Course Code - OEC-801B
(Semester VIII)

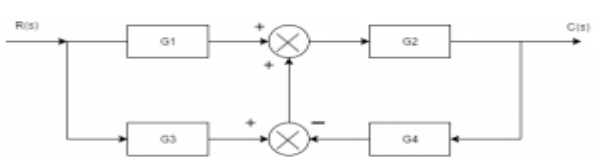
Time allotted : 1 Hrs.25 Min. **Full Marks : 70**

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question) 1 x 70=70

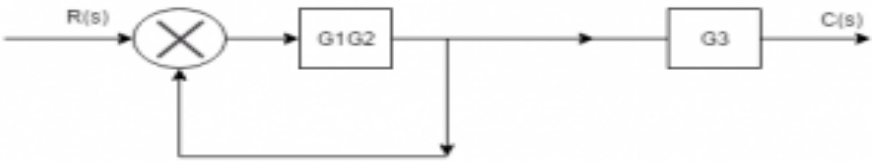
Choose the correct alternative from the following :

(1) 

If the transfer function of the system is given by T(s) = (G1G2+G2G3) / 1+X. Then X is

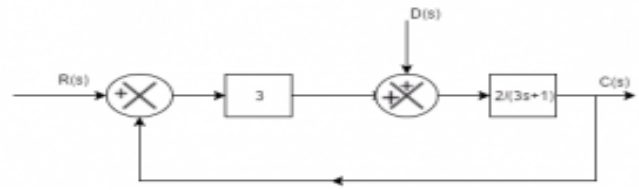
a) G2G3G4 b) G2G4
c) G1G2G4 d) G3G4

(2) For the block diagram given in the following figure, the expression of C/R is:



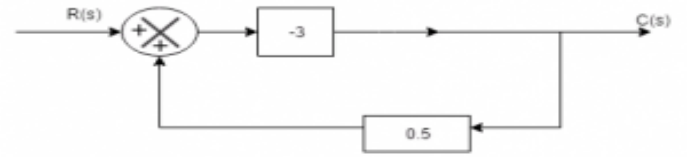
a) G1G2G3/1-G2G1 b) G1G2/1-G1G2G3
c) G1G2G3/1-G1G2G3 d) G1G2/G3(1-G1G2)

(3) The transfer function from D(s) to Y(s) is :



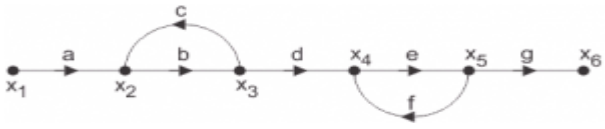
a) 2/3s 7 b) 2/3s 1
c) 6/3s 7 d) 2/3s 6

(4) The closed loop gain of the system shown in the given figure is :



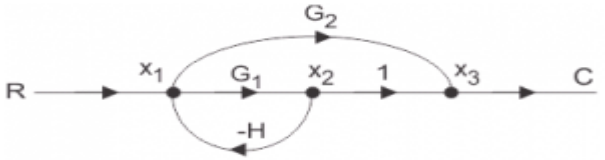
a) -9/5
b) -6/5
c) 6/5
d) 9/5

(5) Use mason's gain formula to find the transfer function of the given signal flow graph:



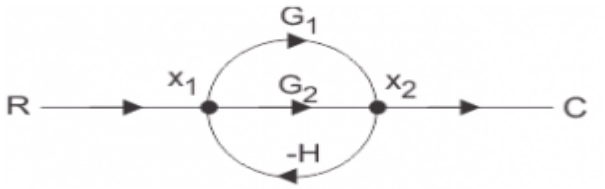
a) abd/1-(ac)
b) abdeg/1-(bc+ef)+bcef
c) abd/1-(bc+ef)+bcef
d) adcdef/1-(bc+ef)+bcef

(6) Use mason's gain formula to calculate the transfer function of given figure:



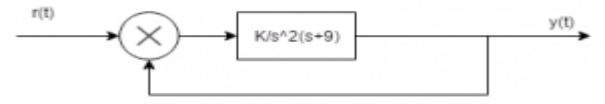
a) G1/1+G2H
b) G1+G2/1+G1H
c) G2/1+G1H
d) None of the mentioned

(7) Use mason's gain formula to find the transfer function of the given figure:



a) G1+G2
b) G1+G1/1-G1H+G2H
c) G1+G2/1+G1H+G2H
d) G1-G2

(8) Find the type and order of the system given below:



a) 2,3
b) 2,2
c) 3,3
d) None of the mentioned

(9) Consider a system with transfer function G(s) = s+6/Ks^2+s+6. Its damping ratio will be 0.5 wh en the values of k is:

a) 2/6
b) 3
c) 1/6
d) 6

(10) For the system, C(s)/R(s) = 16/(s^2+8s+16). The nature of the response will be

a) Overdamped
b) Underdamped
c) Critically damped
d) None of the mentioned

(11) Determine the centroid of the root locus for the system having G(s)H(s) = K/(s+1)(s^2+4s+5)

a) -2.1
b) -1.78
c) -1.66
d) -1.06

(12) The angles of asymptotes of the root loci of the equation s^3+$5s^2$+(K+2)s+K=0 are:

a) 0° and 270°
b) 0° and 180°

c) 90° and 270°
d) 90° and 180°

(13) If a feedback control system has its open loop transfer function $G(s)H(s) = K/(s-2)(s^2+3s+5)$ h as the root locus plot which intersects the imaginary axis at s =0, then the value of K at this po int will be

a) -5
b) 10
c) 5
d) -10

(14) The open loop transfer function of the feedback control system is given by $G(s) =K(s+3)/s(s+4)^2(s+5)(s+6)$. The number of asymptotes and the centroid of asymptotes of the root loci of clo sed loop system is

a) 4 and (-4,0)
b) 3 and (-12,0)
c) -4 and (-4,0)
d) -3 and (-12,0)

(15) The characteristic equation of a control system is given as $1+ K(s+4)/s(s+7)(s^2+2s+2)=0$. The real axis intercept for root locus asymptote is:

a) -2.25
b) -1
c) -1.67
d) 0

(16) The root locus diagram has loop transfer function $G(s)H(s) = K/ s(s+4)(s^2+4s+5)$ has

a) No breakaway points
b) Three real breakaway points
c) Only one breakaway points
d) Only one breakaway points

(17) The given characteristic equation $s^4+s^3+2s^2+2s+3=0$ has:

a) Zero root in the s-plane
b) One root in the RHS of s-plane
c) Two root in the RHS of s-plane
d) Three root in the RHS of s-plane

(18) The characteristic equation of the control system is $s^5+15s^4+85s^3+225s^2+274s+120=0$. What are the number of roots of the equation which lie to the left of the line s+1 = 0?

a) 2
b) 3
c) 4
d) 5

(19) The characteristic equation of a control system is given by $s^5+s^4+2s^3+2s^2+4s+6=0$. The numb er of the roots of the equation which lie on the right half of s-plane:

a) 0
b) 1
c) 2
d) 3

(20) For what values of K does the polynomial $s^4+8s^3+24s^2+32s+K=0$ have roots with zero real pa rts?

a) 10
b) 20
c) 40
d) 80

(21) Which of the following is an example of an open loop system?

a) Household Refrigerator
b) Respiratory system of an animal
c) Stabilization of air pressure entering into the mask
d) Execution of program by computer

(22) Backlash in a stable control system may cause:

a) Under damping
b) Over damping
c) High level oscillations
d) Low level oscillations

(23) Which of the following is not the feature of modern control system?

a) Quick response
b) Accuracy
c) Correct power level
d) No oscillation

(24) The output of the feedback control system must be a function of:

a) Reference input
b) Reference output
c) Output and feedback signal
d) Input and feedback signal

(25) The principle of homogeneity and superposition are applied to:

a) Linear time invariant systems
b) Nonlinear time invariant systems

c) Linear time variant systems
d) Nonlinear time invariant systems

(26) In regenerating the feedback, the transfer function is given by

a) C(s)/R(s)=G(s)/1+G(s)H(s)
b) C(s)/R(s)=G(s)H(s)/1-G(s)H(s)
c) C(s)/R(s)=G(s)/1+G(s)H(s)
d) C(s)/R(s)=G(s)/1-G(s)H(s)

(27) When deriving the transfer function of a linear element

a) Both initial conditions and loading are taken into account
b) Initial conditions are taken into account but the element is assumed to be not loaded
c) Initial conditions are assumed to be zero but loading is taken into account
d) Initial conditions are assumed to be zero and the element is assumed to be not loaded

(28) The overall transfer function from block diagram reduction for cascaded blocks is :

a) Sum of individual gain
b) Product of individual gain
c) Difference of individual gain
d) Division of individual gain

(29) Oscillations in output response is due to :

a) Positive feedback
b) Negative feedback
c) No feedback
d) None of the mentioned

(30) Signal flow graphs:

a) They apply to linear systems
b) The equation obtained may or may not be in the form of cause or effect
c) Arrows are not important in the graph
d) They cannot be converted back to block diagram

(31) Benefits of feedback:

a) Performance of system is greater.
b) Need for system much larger path gain and system instability.
c) Controlled variable accurately follows the desired value
d) Affected by parameter variations

(32) Feedback control systems are:

a) Insensitive to both forward and feedback path parameter changes
b) Less sensitive to feedback path parameter changes than to forward path parameter changes
c) Less sensitive to forward path parameter changes that to feedback path parameter changes
d) Equally sensitive to forward feedback path parameter changes

(33) Multiple signals as input can be used in which systems:

a) Feedback systems
b) Non feedback systems
c) Feedforward systems
d) None of the mentioned

(34) Standard test signals in control system are:

a) Impulse signal
b) Ramp signal
c) Unit step signal
d) All of the mentioned

(35) Laplace transform of unit impulse signal is :

a) A/s
b) A
c) 1
d) 1/s

(36) Regenerative feedback implies feedback with

a) Oscillations
b) Step input
c) Negative sign
d) Positive sign

(37) Zero initial condition for a system means

a) Input reference signal is zero
b) Zero stored energy
c) Initial movement of moving parts
d) System is at rest and no energy is stored in any of its components

(38) The transient response, with feedback system,

a) Rises slowly
b) Rises quickly

c) Decays slowly
d) Decays quickly

(39) In a control system the output of the controller is given to

a) Final control element
b) Amplifier
c) Comparator
d) Sensor

(40) A controller, essentially, is a

a) Sensor
b) Clipper
c) Comparator
d) Amplifier

(41) As unity feedback system has a forward path transfer function G(s) = K/s(s+8) where K is the gai n of the system. The value of K, for making this system critically damped should be

a) 4
b) 8
c) 16
d) 32

(42) For critically damped second order system, if the gain constant(K) is increased, the system behav ior

a) Becomes oscillatory
b) Becomes under damped
c) Becomes over damped
d) Shows no change

(43) On what difference does the pneumatic system works?

a) Speed
b) Pressure
c) Area
d) Length

(44) In a second order feedback control system natural frequency and damping

a) In a second order feedback control system natural frequency and damping
b) Cannot be designed by changing the gain of the in dividual system
c) Are independent on the type of input excitation
d) None of the mentioned

(45) Undamped natural frequency of a second order system has the following influence on the respon se due to various excitations:

a) Increase in speed of response and decrease sensiti vity
b) Decrease in speed of response and increase sensit ivity
c) Has no influence in the dynamic response
d) Increase oscillatory behavior

(46) Control system are normally designed to be:

a) Overdamped
b) Under damped
c) Un damped
d) Critically damped

(47) Stability of a system implies that :

a) Small changes in the system input does not result in large change in system output
b) Small changes in the system parameters does not result in large change in system output
c) Small changes in the initial conditions does not re sult in large change in system output
d) All of the above mentioned

(48) Roots with higher multiplicity on the imaginary axis makes the system :

a) Absolutely stable
b) Unstable
c) Linear
d) Stable

(49) Roots on the imaginary axis makes the system :

a) Stable
b) Unstable
c) Marginally stable
d) Linear

(50) If root of the characteristic equation has positive real part the system is :

a) Stable
b) Unstable
c) Marginally stable
d) Linear

(51) The Positiveness of the coefficients of characteristic equation is necessary as well as sufficient co ndition for:

a) First order system
b) Second order system

c) Third order system
d) None of the mentioned

(52) Routh Hurwitz criterion gives:

a) Number of roots in the right half of the s-plane
b) Value of the roots
c) Number of roots in the left half of the s-plane
d) Number of roots in the top half of the s-plane

(53) Routh Hurwitz criterion cannot be applied when the characteristic equation of the system contain ing coefficient's which is/are

a) Exponential function of s
b) Sinusoidal function of s
c) Complex
d) Exponential and sinusoidal function of s and com plex

(54) The characteristic equation of a system is given as 3s4+10s3+5s2+2=0. This system is :

a) Stable
b) Marginally stable
c) Unstable
d) Linear

(55) The characteristic equation of a system is given as s3+25s2+10s+50=0. What is the number of th e roots in the right half s-plane and the imaginary axis respectively?

a) 1,1
b) 0,0
c) 2,1
d) 1,2

(56) For making an unstable system stable:

a) Gain of the system should be increased
b) Gain of the system should be decreased
c) The number of zeroes to the loop transfer function should be increased
d) The number of poles to the loop transfer function should be increased

(57) Determine the stability of closed loop control system whose characteristic equation is s5+s4+2s3 +2s2+11s+10=0.

a) Stable
b) Marginally stable
c) Unstable
d) None of the mentioned

(58) Consider a characteristic equation, s4+3s3+5s2+6s+k+10=0. The condition for stability is

a) K>5
b) -10
c) K>-4
d) -10

(59) The polynomial s4+Ks3+s2+s+1=0 the range of K for stability is _____

a) K>5
b) -10
c) K>-4
d) K-1>0

(60) The characteristic equation of a system is given by 3s4+10s3+5s2+2=0. This system is:

a) Stable
b) Unstable
c) Marginally stable
d) Linear

(61) Number of roots of characteristic equation is equal to the number of _____

a) Branches
b) Root
c) Stem
d) Poles

(62) When the number of poles is equal to the number of zeroes, how many branches of root locus ten ds towards infinity?

a) 0
b) 1
c) 2
d) Equal to the number of zeroes

(63) For a stable closed loop system, the gain at phase crossover frequency should always be:

a) < 20 dB
b) < 6 dB
c) > 6 dB
d) > 0 dB

(64) If the gain of the open loop system is doubled, the gain of the system is :

a) Not affected
b) Doubled
c) Halved
d) One fourth of the original value

(65) The critical value of gain for the system is 40. The system is operating at a gain of 20. The gain

margin of the system is :

a) 2 dB
b) 3 dB
c) 6 dB
d) 4 dB

(66) The gain margin in dBs of a unity feedback control system whose open loop transfer function, G (s) H(s) =1/s(s+1) is

a) 0
b) 1
c) -1
d) Infinite

(67) OLTF contains one zero in right half of s-plane then

a) Open loop system is unstable
b) Close loop system is unstable
c) Close loop system is unstable for higher gain
d) Close loop system is stable

(68) The critical value of gain for a system is 40 and gain margin is 6dB. The system is operating at a gain of:

a) 20
b) 40
c) 60
d) 120

(69) First column elements of the Routh's tabulation are 3, 5, -3/4, ½, 2. It means that there :

a) Is one root in the left half of s-plane
b) Are two roots in the left half of s-plane
c) Are two roots in the right half of the s-plane
d) Is one root in the right half of s-plane

(70) Determine the zeros of given transfer function

$$G(s) = \frac{s(s+2)(s+4)}{s(s+3)(s+4)}$$

a) s=0, -2, -4
b) s=0, -1, -4
c) s=0, -2, -3
d) s= -2, -4