INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Department of Electrical and Electronics Engineering

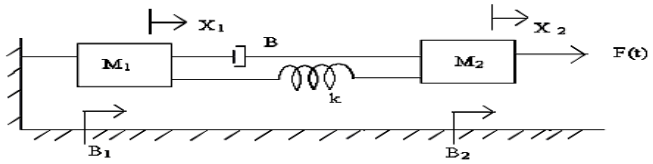
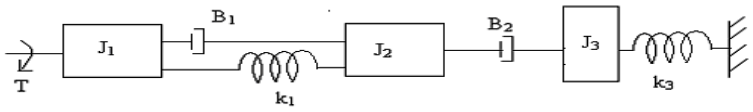
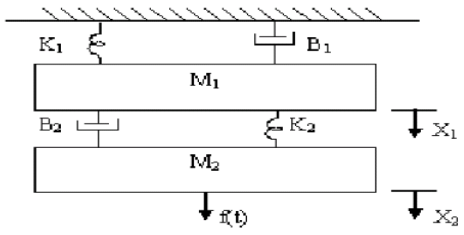
QUESTION BANK

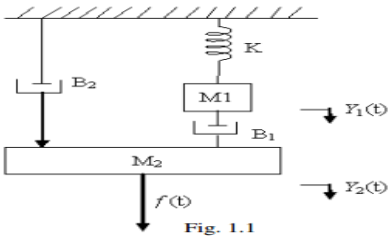
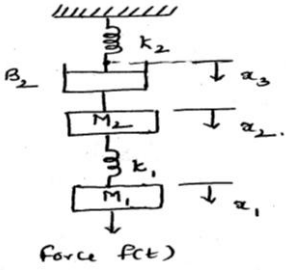
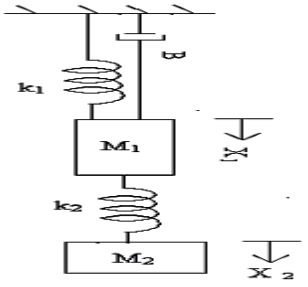
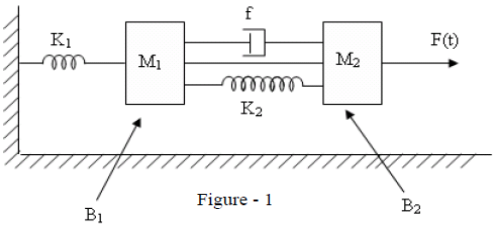
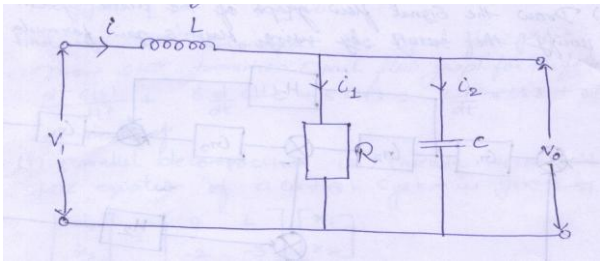
Course Name	**:**	**CONTROL SYSTEMS**
Course Code	**:**	**A50211**
Class	**:**	**III B. Tech I Semester**
Branch	**:**	**Electrical and Electronics Engineering**
Year	**:**	**2017– 2018**
Course Faculty	**:**	Dr.S.Vathsal

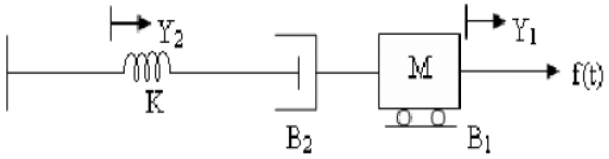
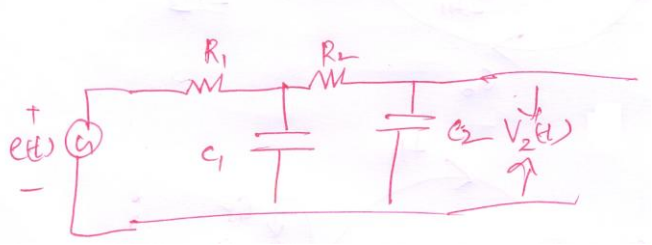
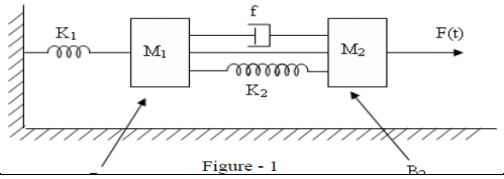
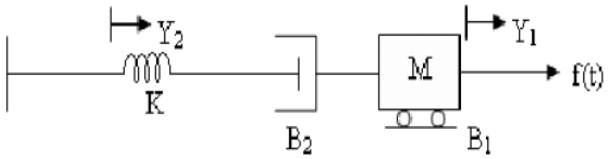
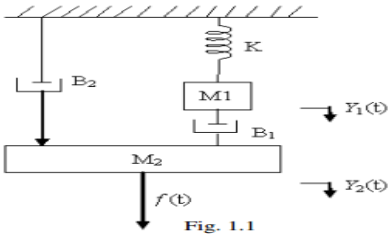
OBJECTIVES:

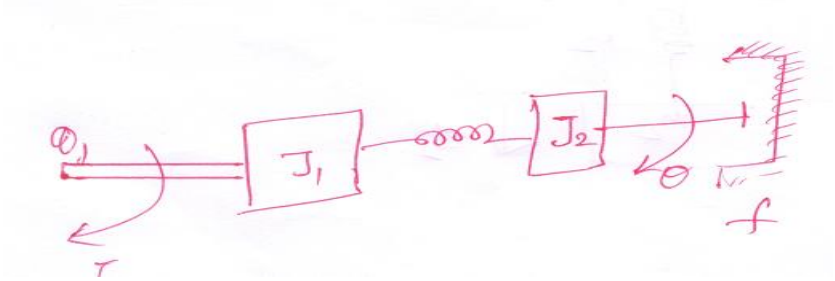
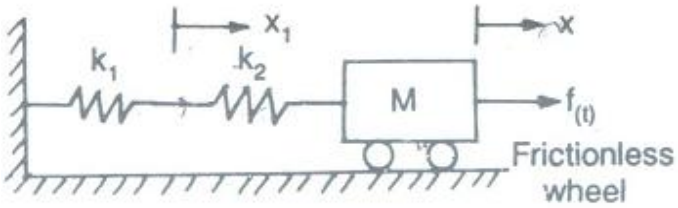
This course it is aimed to introduce the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain

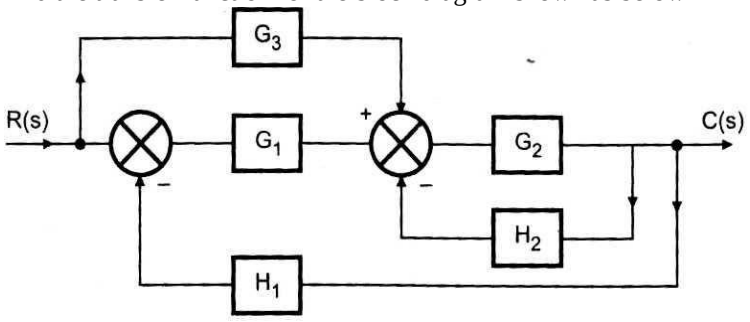
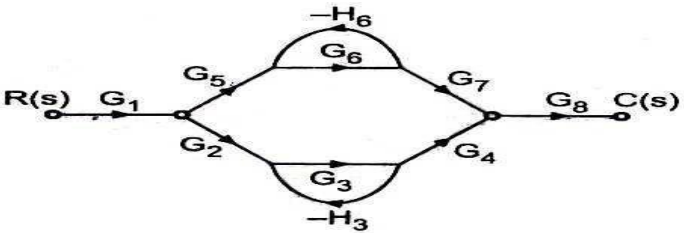
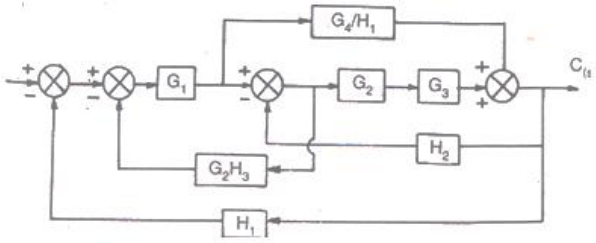
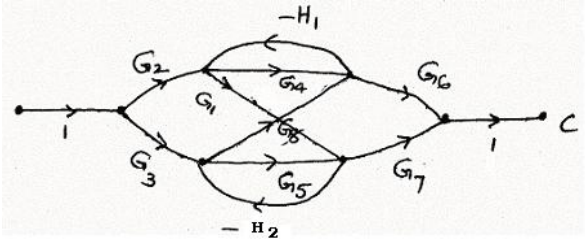
S. No	QUESTION	Blooms Taxonomy Level	Program Outcome
	UNIT - I **INTRODUCTION TO CONTROL SYSTEMS**		
	Part – A (Short Answer Questions)		
1	What is control system?	Understanding	1
2	Define open loop control system?	Analyze	1
3	Define closed loop control system?	Analyze	1
4	Define transfer function?	Analyze	1
5	What are the basic elements used for modeling mechanical rotational system?	Remember	1
6	Write the force balance equation of ideal mass element?	Evaluate	1
7	Write the force balance equation of ideal dashpot element?	Evaluate	1
8	Write the force balance equation of ideal spring element?	Evaluate	1
9	Write the analogous electrical elements in force voltage analogy for the elements of mechanical translational system?	Evaluate	1
10	Write the analogous electrical elements in force current analogy for the elements of mechanical translational system?	Evaluate	1
11	What are the basic elements used for modeling mechanical translational system?	Remember	1
12	Write the analogous electrical elements in torque voltage analogy for the elements of mechanical rotational system?	Evaluate	1
13	Write the analogous electrical elements in torque current analogy for the elements of mechanical rotational system?	Evaluate	1
14	Write the torque balance equation of ideal rotational mass element?	Evaluate	1
15	Write the torque balance equation of ideal dash-pot element?	Evaluate	1
	Part – B (Long Answer Questions)		
1	Explain open loop & closed loop control systems by giving suitable Examples & also highlights their merits & demerits?	Creating & Analyze	1
2	Explain the difference between open loop and closed loop systems?	Evaluate	1
3	Illustrate at least three applications of feedback control systems?	Evaluate	1
4	Explain the classification of control systems?	Analyze	1

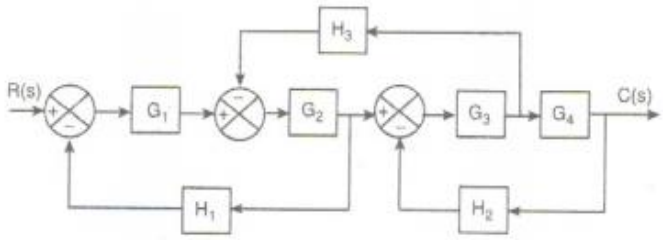
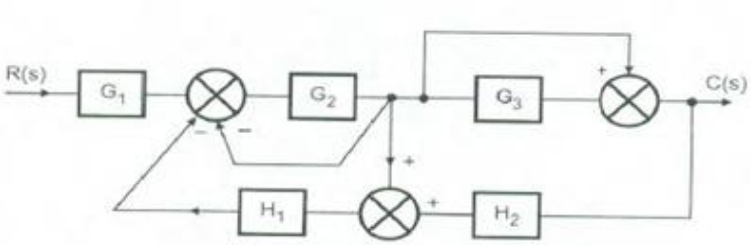
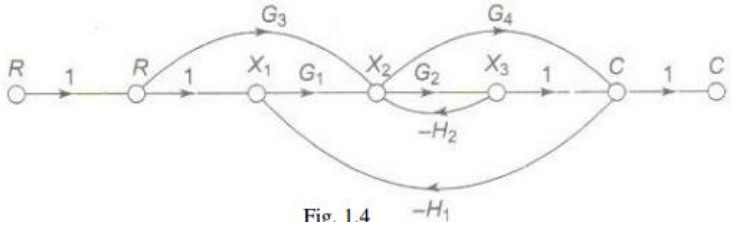
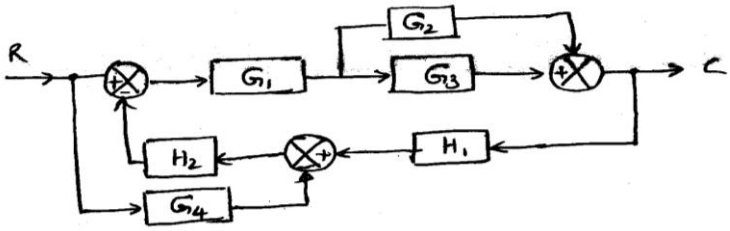
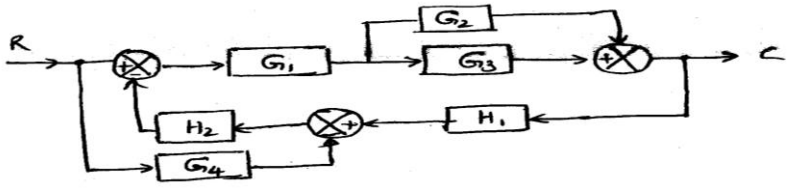
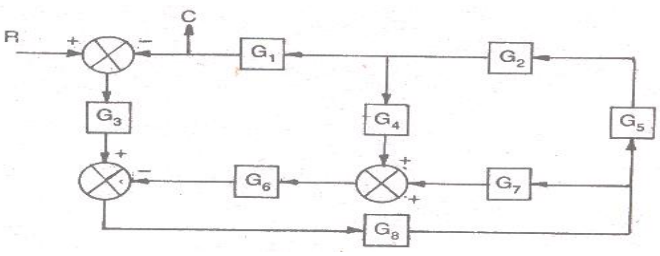
5	Explain the advantages of systems with feedback? What are the effects of feedbackOn the performance of a system? Briefly explain?	Evaluate	1
6	Explain the traffic control systems using open loop and closed loop system	Evaluate	1
7	(a) Explain the effects of disturbance signals by use of feedback? (b)Why negative feedback invariably preferred in closed loop systems?	Evaluate	1
8	What is mathematical model of a physical system? Explain briefly?	Remember & Evaluate	1
9	(a) Write short notes on impulse response of a system? (b) Explain and derive the relation between impulse response and transfer function?	Understand	1
10	What is transfer function and what are the advantages and limitations?	Analyze & Understand	1
11	Explain the temperature control system using open loop and closed loop systems?	Evaluate	1
12	Human being is an example of closed loop system. Justify your answer?	Evaluate	1
13	What is sensitivity function and explain it with respect to open loop and closed loop systems?	Analyze & Understand	1
14	Explain translator and rotary elements of mechanical systems?	Remember & Evaluate	1
15	Human being is an example of closed loop system. Justify your answer?	Evaluate	1
	Part – C (Analytical Questions)		
1	Write the differential equations governing the Mechanical system shown in fig. and determine the transfer function? 	Evaluate	1
2	Write the differential equations governing the Mechanical rotational system shown in fig. find the transfer function? 	Evaluate	1
3	Obtain the transfer function X1(s)/F(s) for the mechanical system as shown in figure. 	Evaluate	1

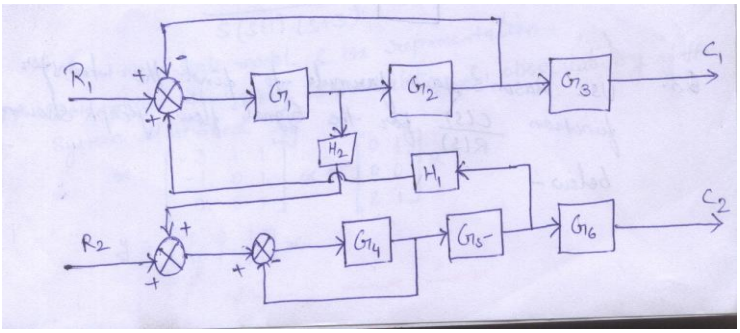
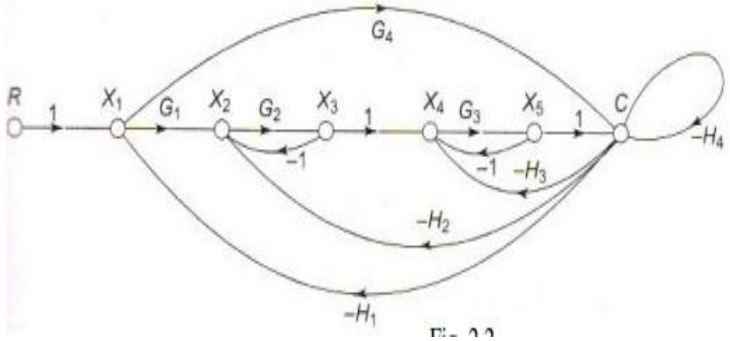
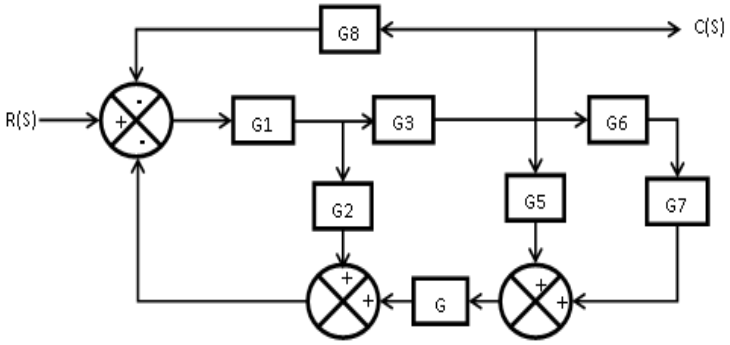
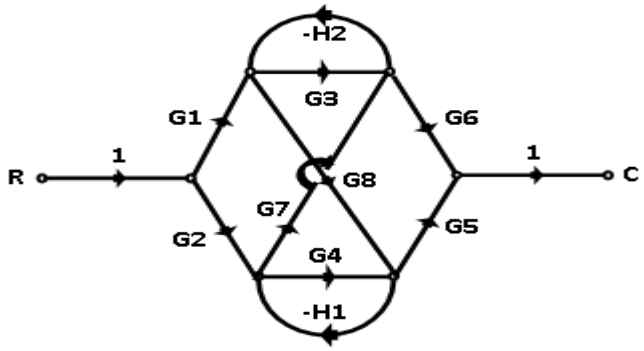
4	Write the differential equations governing the mechanical system shown below and determine the transfer function Y1(s)/F(s).  Fig. 1.1	Evaluate	1
5	Draw the electrical analogous circuit of the mechanical system shown below.  	Evaluate	1
6	Determine the transfer function Y2(S)/F(S) of the system shown in fig.  	Evaluate	1
7	Obtain the transfer function Y1(s)/F(s) of the mechanical system shown in figure 1  Figure - 1	Evaluate	1
8	Find the transfer function of the electrical network shown in figure.  	Remember & Evaluate	1

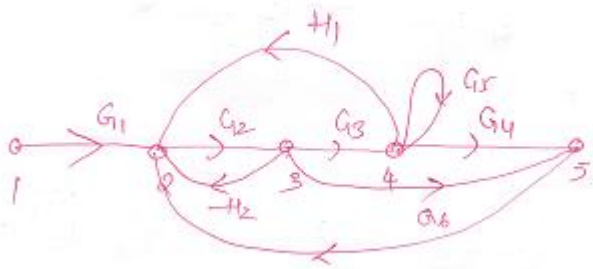
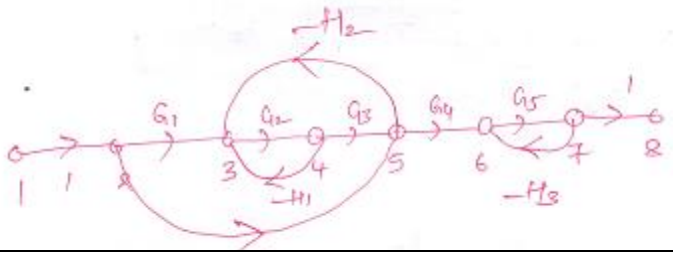
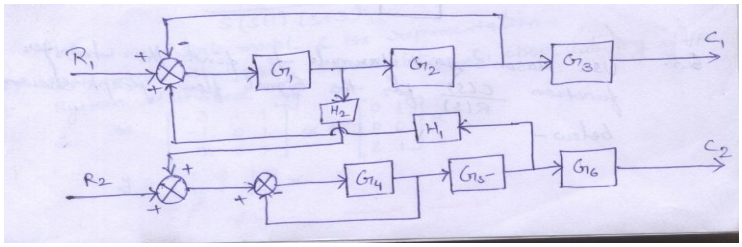
9	For the mechanical system shown in Figure 3, determine the transfer function  Y1(s)/F(s)	Evaluate	1
10	For the given electrical circuit find transfer function v2(s)/e(s)  	Evaluate	1
11	Obtain the transfer function Y2(s)/F(s) of the mechanical system shown in figure 1  Figure - 1	Evaluate	1
12	For the mechanical system shown in Figure 3, determine the transfer function Y2(s)/F(s)  	Evaluate	1
13	Write the differential equations governing the mechanical system shown below and determine the transfer function Y2(s)/F(s).  Fig. 1.1	Evaluate	1

14	Find the transfer function ɵ(s)/t(s). 	Evaluate	1
15	Obtain transfer function of the system shown in fig. 	Evaluate	1
	UNIT - II **TRANSFER FUNCTION REPRESENTATION**		
	Part – A (Short Answer Questions)		
1	What is block diagram?	Understanding	2
2	What is a signal flow graph?	Analyze	2
3	What is transmittance?	Analyze	2
4	What is sink and source?	Analyze	2
5	Write Masons Gain formula?	Evaluate	2
6	Define non- touching loop?	Analyze	2
7	What is servomechanism?	Remember	2
8	What is Synchro transmitter?	Remember	2
9	What is Synchro receiver?	Understanding	2
10	Define forward path?	Analyze	2
11	What is the basis for framing the rules of block diagram reduction technique?	Understanding	2
12	What are the components of block diagram?	Understanding	2
13	Write the mason's gain formula?	Understanding	2
14	Write the rule for moving summing point a head of a block?	Understanding	2
15	Define loop?	Analyze	2
	Part – B (Long Answer Questions)		
1	Derive the transfer function of a field controlled DC servomotor and develop its block diagram. State the assumptions made if any.	Creating & Analyze	2
2	Derive the transfer function of an armature controlled DC servomotor and develop its block diagram	Evaluate	2
3	Derive the transfer function of DC servomotor and explain about its torque speed characteristics.	Evaluate	2
4	With the help of neat sketches, explain the construction and working principle of synchro transmitter and receiver.	Analyze	2
5	(a) Explain the differences between AC servomotor and DC servomotor? (b) Explain the practical applications of servomotors?	Analyze	2

6	Find the transfer function for the block diagram shown as below 	Evaluate	2
7	Describe Synchro as an error detector	Understanding	2
8	What is the basis for framing the rules of block diagram reduction technique?	Evaluate	2
9	Explain properties of signal flow graphs? Explain the need of signal flow graph representation for any system	Understanding	2
10	How do you construct a signal flow graph from the equations?	Evaluate	2
11	Obtain the overall transfer function C/R from the signal flow graph shown. 	Evaluate	2
12	Explain briefly about mason's gain formula?	Understanding	2
13	What are advantages of signal flow graph over block diagram?	Understanding	2
14	Define transfer function and determine the transfer function of RLC series circuit if the voltage across the capacitor is a output variable and input is voltage source v(s).	Understanding	2
15	Derive the transfer function for synchro?	Understanding	2
	Part – C (Analytical Questions)		
1	Determine the overall transfer function C(S)/R(S) for the system shown in fig 	Evaluate	2
2	Discuss Mason's gain formula. Obtain the overall transfer function C/R from the signal flow graph shown. 	Evaluate	2

3	Determine the transfer function C(S)/R(S) of the system shown below fig. 2.3 by block diagram reduction method 	Evaluate	2
4	Reduce the given block diagram and hence obtain the transfer function C(s)/R(s) 	Evaluate	2
5	For the signal flow graph shown below fig.1.4, find the overall gain  Fig. 1.4	Evaluate	2
6	Draw a signal flow graph and evaluate the closed-loop transfer function of a system whose block diagram is given as follows: 	Create & Evaluate	2
7	Draw a signal flow graph and evaluate the closed-loop transfer function of a system whose block diagram is given as follows 	Apply	2
8	Find the closed loop transfer function of the system 	Evaluate	2

9	Reduce the given block diagram and hence obtain the transfer function $C_1(s)/R_1(s)$.  	Evaluate	2
10	For the signal flow graph shown below fig.2.2 using Mason's gain formula obtain C(s)/R(s).  	Evaluate	2
11	Find the closed loop transfer function using block diagram reduction technique for the block  	Evaluate	2
12	find the transfer function through the Mason's gain formula for the figure given below  	Evaluate	2

13	Apply masons gain formula to find its transfer function. 	Evaluate	2
14	For the signal flow graph find transfer function. 	Evaluate	2
15	Reduce the given block diagram and hence obtain the transfer function $C_2(s)/R_2(s)$. 	Evaluate	2
	UNIT - III **TIME RESPONSE ANALYSIS**		
	Part – A (Short Answer Questions)		
1	What is Proportional controller and what are its advantages?	Analyze	3
2	What is the drawback in P-controller?	Remember	3
3	What is integral control action? What is the advantage and disadvantage in integral controller?	Evaluate& Remember	3
4	What is PI, PD, PID controller?	Analyze	3
5	Define Damping ratio.?	Analyze	3
6	Distinguish between type and order of a system?	Remember	3
7	Define rise, Delay time	Analyze	3
8	Define Peak time? Write formula?	Analyze	3
9	Give the relation between generalized and static error coefficients?	Evaluate	3
10	What are generalized error coefficients?	Analyze	3
11	Define settling time and write formula?	Analyze	3
12	Define Peak overshoot and write formula?	Analyze	3
13	How the system is classified depending on the value of damping?	Analyze	3
14	Find the type and order of the system G(S)=40/S(s+4)(s+5)(s+2)	Evaluate	3
15	Find the type and order of the system G(S)=40/S(s+4)(s+5)(s+2)	Evaluate	3
	Part – B (Long Answer Questions)		
1	Explain about various test signals used in control systems? (b)Define time constant and explain its importance?	Creating & Analyze	3

2	Derive the expression for time domain specification of a under damped second order system to a step input?	Evaluate	3
3	Derive the transient response of under damped second order system when excited by unit step input?	Evaluate	3
4	Derive the transient response of over damped second order system when excited by unit step input?	Analyze	3
5	How steady state error of a control system is determined? How it can be reduced?	Evaluate	3
6	For a system $G(s)H(s) = \frac{K}{S^2(S+2)(S+3)}$ Find the value of K to limit steady state error to 10 when input to system is $1 + 10t + \frac{40}{2}t^2$	Evaluate	3
7	Explain error constants K_p, K_v and K_a for type I system?	Evaluate	3
8	Explain the effect of PI control on the performance of control system?	Remember & Evaluate	3
9	What are P, D, and I controllers? Why D controller is not used in control systems?	Understand	3
10	Discuss the advantages and disadvantages of proportional, proportional derivative, proportional integral control system?	Understand	3
11	Derive the transient response of un damped second order system when excited by unit step input?	Understand	3
12	Derive the transient response of critically damped second order system when excited by unit step input?	Analyze	3
13	Explain the effect of PD control on the performance of control system	Remember & Evaluate	3
14	Explain error constants K_p, K_v and K_a for type II system.	Evaluate	3
15	What are generalized error constants? State the advantages and significance of generalized error constants?	Understand	3
	Part – C (Analytical Questions)		
1	A unity feedback system has $G(s) = \frac{40(S+2)}{S(S+1)(S+4)}$ Determine (i) Type of the system (ii) All error coefficients and (iii) Error for the ramp input with magnitude 4	Creating & Analyze	3
2	For a unity feedback system whose open loop transfer function is G(s) = 50/(1+0.1s)(1+2s) , find the position, velocity & acceleration error Constants.	Evaluate	3
3	A unity feedback system is characterized by an open loop transfer function $G(s) = \frac{K}{S(S+10)}$ Determine gain 'K' so that system will have a damping ratio of 0.5. For this value of 'K' determine settling time, peak overshoot and time to peak overshoot for a unit step input. Also obtain closed loop response in time domain	Evaluate	3
4	The open loop transfer function of a unity feedback system is given by $G(s) = \frac{K}{S(TS+1)}$ where K and T are positive constants. By what factor should the amplifier gain be reduced so that the peck overshoot of unit step response of the system is reduced from 75% to 25%?	Analyze	3
5	A unity feed-back system is characterized by the open-loop transfer function: $G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$. Determine the steady-state errors for unity-step, unit-ramp and unit-acceleration input. Also find the damping ration and natural frequency of the dominant roots.	Analyze	3
6	The forward transfer function of a unity feedback type1, second order system has a pole at -2. The nature of gain k is so adjusted that damping ratio is 0.4. The above equation is subjected to input r(t)=1+4t. Find steady state error?	Evaluate	3

7	A feedback control system is described as G(s) = 50/s(s+2)(s+5) , H(s) = 1/s For a unit step input, determine the steady state error constants & errors.	Evaluate	3
8	The closed loop transfer function of a unity feedback control system is given by- C(s)/R(s) = 10/(s^2+4s+5) Determine (i) Damping ratio (ii) Natural undammed resonance frequency (iii) Percentage peak overshoot (iv) Expression for error response	Evaluate	3
9	For a unity feedback system whose open loop transfer function is G(s) = 50/(1+0.1s)(1+2s) , find the position, velocity & acceleration error Constants.	Evaluate	3
10	The open loop transfer function of a control system with unity feedback is given by $G(s) = \frac{100}{s(s+0.1s)}$. Determine the steady state error of the system when the input is 10+10t+4t^2	Evaluate	3
11	A feedback control system is described as G(s) = 50/s(s+3)(s+5) , H(s) = 1/s For a unit step input, determine the steady state error constants & errors.	Evaluate	3
12	For a system $G(s)H(s) = \frac{K}{S^2(S+2)(S+6)}$ Find the value of K to limit steady state error to 10 when input to system is $1 + 10t + \frac{40}{2}t^2$	Evaluate	3
13	A unity feedback system has $G(s) = \frac{40(S+2)}{S(S+3)(S+4)}$ Determine (i) Type of the system (ii) All error coefficients and (iii) Error for the ramp input with magnitude 4	Creating &analyze	3
14	For a unity feedback system whose open loop transfer function is G(s) = 50/(1+s)(1+2s) , find the position, velocity & acceleration error Constants.	Evaluate	3
15	The closed loop transfer function of a unity feedback control system is given by- C(s)/R(s) = 20/(s^2+16s+25) Determine (i) Damping ratio (ii) Natural undammed resonance frequency (iii) Percentage peak overshoot (iv) Expression for error response	Evaluate	3
UNIT - 1V STABILITY ANALYSIS IN S-DOMAIN			
Part – A (Short Answer Questions)			
1	Define BIBO stability. What is the necessary condition for stability?	Analyze	4
2	What is characteristic equation? How the roots of characteristic equation are related to stability?	Understand	4
3	What is the relation between stability and coefficient of characteristic polynomial?	Analyze	4
4	What will be the nature of impulse response when the roots of characteristic equation are lying on imaginary axis?	Evaluate	4
5	What will be the nature of impulse response if the roots of characteristic equation are lying on right half s-plane?	Evaluate	4
6	What is root locus? How will you find root locus on real axis?	Analyze	4
7	What are asymptotes?	Remember	4
8	What is centroid, how it is calculated?	Analyze	4
9	What is breakaway point ?	Evaluate	4

10	What is dominant pole?	Analyze	4
11	What is break in point?	Evaluate	4
12	Determine poles for G(S)=40/S(s+4)(s+5)	Evaluate	4
13	Determine poles for G(S)=40/S(s+6)(s+2)	Evaluate	4
14	Determine the zeros for G(S)=40(s+2)(s+6)/(s+4)(s+5)	Evaluate	4
15	Determine the zeros for G(S)=10(s+6)(s+8)/(s+3)(s+2)	Evaluate	4
	Part – B (Long Answer Questions)		
1	Define the terms (i) absolute stability (ii) marginal stability (iii)conditional stability (iv) stable system(v) Critically stable system (vi) conditionally stable system?	Creating & Analyze	4
2	State Routh's stability criterion. State their advantages	Evaluate	4
3	what are the necessary conditions to have all the roots of characteristics equation in the left half of s-plane?	Evaluate	4
4	By means of Routh criterion ,determine the stability represented by characteristic equation ,$s^4+2s^3+8s^2+4s+3=0$	Analyse	4
5	The open loop transfer function of a unity feedback system is given by $G(s) = \frac{K}{S(1+0.25S)(1+0.4S)}$.find the restriction on k so that the closed loop system is absolutely stable.	Evaluate	4
6	Explain the steps for the construction of root locus?	Evaluate	4
7	The open loop t.f of a control system is given by G(s) H(s) $=\frac{K}{S(S+6)(S^2+4S+13)}$ sketch complete root locus.	Evaluate	4
8	Check whether the points lie (-1+j) and (-3+j) lie on the root locus of a system given by G(s) H(s)$=\frac{1}{(S+1)(S+2)}$.use the angle condition.	Remember	4
9	Sketch the root locus G(S)=K/s(s^2+6s+10), H(S)=1	Understand	4
10	What is PID controller? Explain effect of PID controller on the control system?	Understand	4
11	Check the stability of the given characteristic equation using Routh's method $S^6 + 2S^5 + 8S^4 + 12S^3 + 20S^2 + 16S + 16 = 0$	Evaluate	4
12	Locate the poles and zeros on the S-plane of a system G(s)=13(s+7)(s+9)/(s^2+5s+8)	Analyze	4
13	Using the routh's criterion determine the stability of the system represented by characteristic equation $s^4+8s^3+18s^2+16s+5=0$	Remember	4
14	Using the routh's criterion determine the stability of the system represented by characteristic equation $s^7+9s^6+24s^5+24s^3+24s^2+23s+15$	Evaluate	4
15	Construct the routh array for the unity feedback system g(s)=10/s(s+2)(s+4)(s+6)	Evaluate	4
	Part – C (Analytical Questions)		
1	With the help of Routh Hurwitz criterion comments upon the stability of the system having the following characteristic equation $S^6+s^5-2s^4-3s^3-7s^2-4s-4=0$	Creating & Analyse	4
2	How many roots does each of the following polynomials have in the right half of the s-plane. $s^4+2s^3+4s^2+8s+15$	Evaluate	4
	The system having characteristic equation2 $s^4+4s^2+1=0$ (i) the number of roots in the left half of s-plane (ii) the number of roots in the right half of s-plane (iii)The number of roots on imaginary axis use RH stability criterion.	Evaluate	4
3	A unity feedback system has an open loop transfer function $G(s)=\frac{K}{(s+2)(s^2+4s+5)}$. Use RH test to determine the range of positive values of K for which the system is	Evaluate	4
4	Find the range of K for stability of the system with characteristic equation $s^4+3s^3+3s^2+2s+k=0$	Evaluate	4

5	For the unity feedback system the open loop T.F. is $G(s) = \frac{K}{S(1+0.6S)(1+0.4S)}$ Determine(a) Range of values of K,marginal K (c) Frequency of sustained	Evaluate	4
6	Using RH stability criterion determine the stability of the following systems(a)its loop t.f has poles at s=0,s=-1,s=-3 and zero at s=-5 gain k of forward path is 10.(b) it is a type-1 system with an error constant of 10sec-1 and poles at s=-3 and s=-6.	Evaluate	4
7	Sketch the Root Locus for the unity feedback system with $G(s)H(s) = \frac{K}{S(S+1)(S+3)(S+6)}$ Find the breakaway point on real axis and find K of damping ratio=0.5	Evaluate	4
8	Sketch the complete Root Locus of the system $G(s) = \frac{K}{S(S+2)(S^2+4S+13)}$	Evaluate	4
9	Sketch root locus plot for unity feedback system whose open loop T.F is given by G(S)=$\frac{k(s+0.5)}{s^2(s+4.5)}$	Evaluate	4
10	Sketch the root locus plot of a unity feedback system whose open loop T.F is G(s)=$\frac{s}{(s^2+4)(s+2)}$	Evaluate	4
11	Using the routh's criterion determine the stability of the system represented by characteristic equation $s^5+s^4+2s^3+2s^2+3s+5=0$ also determine the roots lying on the right half of the s-plane	Evaluate	4
12	Construct the routh array for the unity feedback system g(s)=10/s(s+2)(s+6)(s+7)	Evaluate	4
13	Sketch the root locus of open loop transfer function given below? $G(s) = \frac{K}{S(S+3)(S^2+2S+2)}$	Evaluate	4
14	Sketch the root locus of open loop transfer function given below? $G(s) = \frac{K}{S(S^2+8S+20)}$	Evaluate	4
15	Sketch the root locus of open loop transfer function given below? $G(s) = \frac{K}{S(S+2)(S^2+2S+2)}$	Evaluate	4
	UNIT - V **FREQUENCY RESPONSE ANALYSIS**		
	Part – A (Short Answer Questions)		
1	What is frequency response?	Analyze & Understand	5
2	What are frequency domain specifications?	Analyze	5
3	Define Resonant Peak?	Analyze	5
4	What is Bode plot? What are the advantages of Bode Plot?	Analyze	5
5	Define gain margin?	Analyze	5
6	Define phase margin?	Analyze	5
7	Define corner frequency?	Analyze	5
8	What is Gain cross-over frequency?	Evaluate	5
9	What is phase cross-over frequency?	Remember	5
10	Define Bandwidth?	Remember	5
11	What are advantages of frequency response analysis?	Analyze	5
12	Write the expression for resonant peak?	Analyze	5
13	What is cut-off rate?	Analyze	5
14	Write the expression for resonant frequency?	Analyze	5
15	Define corner frequency?	Analyze	5

Part – B (Long Answer Questions)			
1	What is frequency response? What are advantages of frequency response analysis?	Creating & Analyse	5
2	write short notes on various frequency domain specifications	Evaluate	5
3	Explain the steps for the construction of Bode plot? What are the advantages of Bode Plot?	Evaluate	5
4	Explain with the examples (i)minimum phase function (ii) non-minimum phase function (iii) all pass function	Analyse	5
5	Sketch the Bode plot for the open loop transfer function $G(s) = \frac{10(S+3)}{S(S+2)(S^2+4S+100)}$	Evaluate	5
6	The open loop transfer function of a system is $G(s) = \frac{K}{S(1+S)(1+0.1S)}$ Determine the value of K such that (i) Gain Margin = 10dB and (ii) Phase Margin = 50 degree	Evaluate	5
7	For H(s)=1, G(s)=$Ke^{-0.2s}$/s(s+2)(s+8). Determine K so that(i) phase margin is 45^0 (ii.) value of k for the gain margin to be 10db	Evaluate	5
8	Given the open loop transfer function$\frac{20}{s(1+3s)(1+4S)}$Draw the Bode plot and hence the phase and gain margins.	Remember & Evaluate	5
9	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = \frac{75}{S(s^2+16s+100)}$	Evaluate	5
10	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = \frac{10}{S(1+0.4s)(1+0.1s)}$	Evaluate	5
11	Derive expression for resonant peak and resonant frequency and hence establish correlation between time and frequency response.	Evaluate	5
12	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = \frac{50(1+0.1S)}{S(1+0.01S)(1+S)}$	Evaluate	5
13	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = \frac{30(1+0.1S)}{S(1+0.01s)(1+s)}$	Evaluate	5
14	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = \frac{100(1+0.1S)}{S(1+0.2s)(1+0.5s)}$	Evaluate	5
15	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = G(s) = \frac{40(1+s)}{(1+5s)(s^2+2s+4)}$	Evaluate	5
Part – C (Analytical Questions)			
1	Given damping ratioξ=0.7 and ω_n=10 rad/sec find the resonant peak, resonant frequency and band width.	Evaluate	5

2.	For a second order system with unity feedback G(s)=$\frac{200}{s(s+8)}$.find various frequency domain specifications.	Evaluate	5
3	Sketch bode phase angle plot of a systemG(s)=$\frac{1}{(1+s)(1+2s)}$	Evaluate	5
4	Draw the exact bode plots and find the gain margin and phase margin of a system represented by G(s)H(s)=$\frac{10(s+1)}{s\,(s+0.05)(s+3)(s+5)}$	Evaluate	5
5	Draw the exact bode plots and find the gain margin and phase margin of a system represented by G(s)=$\frac{10(s+1)}{s\,(s+0.05)(s+3)(s+5)}$,H(S)=1	Evaluate	5
6	The open loop transfer function of a unity feedback system is G(s)=$\frac{50K}{s\,(s+10)(s+5)(s+1)}$ find the gain margin and phase margin using bode plot?	Evaluate	5
7	Sketch the bode plot for transfer function G(s)= $\frac{Ks^2}{(1+0.2s)(1+0.02s)}$and find value of K such that gain cross over frequency is 5 rad/sec	Evaluate	5
8	Sketch the bode plot or a system G(s) = $\frac{15(s+5)}{s\,(s^2+16s+100)}$ .hence determine thestability of the system.	Evaluate	5
9	Sketch the bode plots of G(s)=$\frac{e^{-0.1s}28.5}{s(1+s)(1+0.1s)}$.hence find the gain cross over frequency	Evaluate	5
10	A unity feedback control system has G(s)=$\frac{K}{s(s+1)(1+\frac{s}{10})}$.find the value of K so that GM=12db and PM=30deg.	Evaluate	5
11	Given damping ratioξ=0.8 and ω_n=10 rad/sec find the resonant peak, resonant frequency and band width	Evaluate	5
12	For a second order system with unity feedback G(s)=$\frac{200}{s(s+6)}$.find various frequency domain specifications.	Evaluate	5
13	Calculate the damping ratio and natural frequency of second order system is 0.5 and 8 rad/sec respectively. Calculate the resonant peak and resonant frequency?	Evaluate	5
14	Sketch the bode plots of G(s) =$\frac{Ke^{-0.2s}}{s(S+2)(S+8)}$..Find k so that the system is stable with,(a) gain margin equal to 2db. (b)phase margin equal to 45deg	Evaluate	5
15	Sketch the bode plot for a system with unity feedback having the transfer function, and assess its closed-loop stability. $G(s) = \frac{30}{S(1+3s)(1+4s)}$	Evaluate	5

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