

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal, Hyderabad - 500 043

AERONAUTICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name		:	FLIGHT CONTROL THEORY
Course Code		:	AAE018
Program		••	B.Tech
Semester	1	:	VIII
Branch	1	••	Aeronautical Engineering
Section		:	A,B
Course Faculty		:	Mr. P Anudeep, Assistant professor

COURSE OBJECTIVES:

The	The course should enable the students to:							
Ι	To help students to consider in depth the terminology and nomenclature used in the syllabus.							
II	To focus on the meaning of new words / terminology/nomenclature							

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		MODULE	·I			
1	What is a system?	A system consists of a number of components connected together to perform a specific function.	Understand	CO1	CLO1	CAAE018.01
2	What is a control system?	When the output quantity is controlled by varying the input quantity then the system is called control system.	Understand	CO1	CLO1	CAAE018.01
3	What are the two major types of control system	open loop and closed loop system.	Understand	CO1	CLO1	CAAE018.01
4	Define open loop control system	The control system in which the output quantity has no effect upon the input quantity is called open loop control system.	Remember	CO1	CLO1	CAAE018.01
4	What are the components of feedback control system?	The components of feedback control system are plant, feedback path elements, error detector and controller.	Understand	CO1	CLO1	CAAE018.01

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
5	Define transfer	The T.F of a system is defined as	Remember	CO1	CLO2	CAAE018.02
	function.	the ratio of the Laplace transform				
		of				
		output to Laplace transform of				
		input with zero initial conditions.				
6	What are the	Mass, spring and dashpot.	Understand	CO1	CLO3	CAAE018.03
	basic elements					
	used for					
	modeling?mec					
	hanical					
	translational					
	system?			~~.	~~~~~	
7	Write the	F=Kx.	Remember	CO1	CLO3	CAAE018.03
	force					
	balance					
	equation					
	spring					
	element					
8	What are the	Mass M- Inductance L.	Understand	CO1	CLO3	CAAE018.03
	analogous					
	quantity for					
	Mass Element					
	in F-V analogy					
9	What are the	Force – current	Understand	CO1	CLO3	CAAE018.03
	analogous	Velocity-voltage.				
	quantities for					
	ForceandVelocity					
	in F-Ianalogy					
10	What are the	Force -Voltage	Understand	CO1	CLO3	CAAE018.03
	analogous	Velocity-Current				
	quantities					1000
	for Force					
	and				- C	
	Velocity					e
	in F-V					
	analogy			r -		
12	Write the force	$\mathbf{F} = \mathbf{M} \mathbf{d}^2 \mathbf{x} / \mathbf{dt}^2$	Understand	CO1	CLO3	CAAE018.03
	balance					
	equation of					
	an ideal	1-		Sec. 1		
	mass	· O.				
	element.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
13	What is	The servomechanism is a	Understand	CO1	CLO2	CAAE018.02
	servomechanism?	feedback control system in which				
		the output is mechanical				
		position.				
14	Write the	F = B dx / dt.	Understand	CO1	CLO3	CAAE018.03
	force					
	balance					
	equation of					
	ideal					
	dashpot					
1.7	element		TT. 1 . 1	CO 1	CL O1	
15	Why negative	The negative feedback results in	Understand	C01	CLOI	CAAE018.01
	reedback 1s	better stability in steady state and				
	invariably	rejects any disturbance signals.				
	preferred in					

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
	closed loop					
	system?					
16	What is	It is the actual signal input to the	Remember	CO1	CLO1	CAAE018.01
	Reference input?	control system.				
17	What is a system?	A system is a combination of	Remember	CO1	CLO1	CAAE018.01
	,	components that act together to				
		perform a specific goal				
18	What is	The quantity that must be	Remember	CO1	CL 01	CAAF018.01
10	Controllad	maintained at prescribed value	Remember	cor	CLOI	CITIL010.01
	variable					
	variable					
10			D 1	CO1	CL O1	GA A F010 01
19	What is	An unwanted input signal that	Remember	COI	CLUI	CAAE018.01
20	Disturbance?	affects the output signal.	D	CO1	CL O1	
20	What is	A system in which the output has	Remember	COI	CLOI	CAAE018.01
	Open-Loop	no effect on the input action. In				
	control system?	measured por fed back for				
	system?	comparison with the input One				
		practical example is a washing				
		machine.				
		Adv: 1) The open-loop control				
		system is easier to build because				
		system is casier to build because				
		problem 2) It is sensitive to				
		external disturbances				
21	Dafina Closed	A system in which the output has	Domomhon	CO1	CL 01	
21	Loon Control	an effect on the input quantity in	Kemeniber	COI	CLUI	CAAE018.01
	System?	a way that can maintain the				
	~) ~ · · · · ·	desired output value. An				
		example is a room temperature				
		control system.				
		Adv: 1) The use of feedback				100 million (1990)
		makes the system response				
		insensitive to				
		external disturbances and			-	
		internal variations in system				
		parameters. 2) More complicated	1		· · · · ·	
		and more expensive comparing				
		with Open-Loop.			1	
22	Define Control	The unit that reacts to an	Remember	CO1	CLO1	CAAE018.01
	unit (dynamic	actuating signal to produce a		1		
	element)	desired output. This unit does the				
		work of controlling the output				
		and thus may be a power				
22	Define	The unit that are identified	Romambar	CO1	CL O1	CAAE019.01
25	Easthaal	for fooding hold the retriet	Kentenibei	001	CLUI	CAALUI0.UI
	reeuback	augustitu or a function of d				
	control	quantity, or a function of the				
	system.	output, in order to compare it				
		with the reference input.		CO1		
24	Define Actuating	The signal that is difference	Remember	COI	CLUI	CAAE018.01
	signal	between the reference input and				
		the feedback				
		signal if actuates the control unit				
		in order to maintain the output of				
		the desired value.				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
25	Define The sensor	It is a device that converts the	Remember	CO1	CLO1	CAAE018.01
	or measuring	output variable into another				
	element	suitable variable, such as a				
		displacement, pressure, voltage,				
26		etc.		CO1	CL O1	G 4 4 F010 01
26	Define the	the input to the plant according	Remember	COI	CLUI	CAAE018.01
	actuator	to the control signal so that the				
		output signal will approach the				
		reference input				
27	Define Automatic	signal.	Domombor	CO1	CL O1	CAAE019.01
21	Controllers	compares the actual value of the	Kellieliidei	COI	CLUI	CAAE010.01
	Controllers	plant output with the reference				
		input (desired value), determines				
		the deviation, and produces a				
		control signal that will reduce the				
		value.				
28	Define Transfer	The function of a linear time	Remember	CO1	CLO2	CAAE018.02
	function	invariant differential equation	1000			
		system is defined as the ratio of				
		response function) to the Laplace				
		transform of the input(drive				
		function) under the assumption				
- 20		that all initial conditions are zero.		CO1	CT O2	CAAF010.02
29	What is Synchro?	A Synchro is a device used to	Remember	COI	CLO3	CAAE018.03
		electrical signal or vice versa				
30	What is	The motors used in automatic	Remember	CO1	CLO3	CAAE018.03
	servomotor?	control systems or in				100
		servomechanism are called	·			-
		servomotors. They are used to		-	C)
		convert electrical signal into			-	
		angular motion.				
		MODULE-	п			
1	What are the	The basic elements of block	Understand	CO2	CLO4	CAAE018.04
	basic elements in Block Diagram?	diagram are blocks, branch		~		
2	What is a signal	A signal flow graph is a	Understand	CO2	CLO4	CAAE018.04
2	flow graph?	diagram that represents a set of	Childerstund		CLOT	CITILO10.01
		simultaneous algebraic				
		equations				
3	Define non-	The loops are said to be non-	Remember	CO2	CLO4	CAAE018.04
	touching loop	touching if they do not have				
4	Define celf loon	common nodes	Domomhor	CO2	CL O4	
4	Define self-loop	A feedback loop consisting of only one node is called self-	Remember	02	CLO4	CAAE018.04
		loop.				
5	What is transient	The transient response is the	Understand	CO2	CLO5	CAAE018.05
	response?	response of the system when				
		the system changes from one state to another				
6	What is an order	The order of a system is the	Understand	CO2	CLO5	CAAE018.05
-	of a system?	order of the differential				
		1				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		equation governing the				
		system				
7	Define Damping	Damping ratio is defined as the	Remember	CO2	CLO5	CAAE018.05
-	ratio.	ratio of actual damping to				
		critical damping				
8	Define Rise time.	The time taken for response to	Remember	CO2	CLO5	CAAE018.05
Ũ	2 01110 1 1000 011101	raise from 0% to 100% for the		002	0200	0111201000
		very first				
		time is rise time				
9	Define Settling	Settling time is defined as	Remember	CO2	CLO5	CAAE018.05
	time.	the time taken by the				
		response to reach and stay				
		within specified error.				
10	What is step	The step signal is a signal	Understand	CO2	CLO5	CAAE018.05
	signal?	whose value changes from				
		zero to A at $t=0$ and				
		remains constant at A for				
11		t>0.	D 1	002	CI O(CA 4 E010.06
11	Define Steady	Thesteadystateerrorisdefinedas	Remember	CO2	CLO6	CAAE018.06
	state error	thevalueorerrorastimetendstoin				
12	What are the		Understand	CO2	CL O6	CAAE019.06
12	three constants	1. Positional errorconstant	Understand	02	CLOO	CAAE010.00
	associated with a	11. Velocity errorconstant				
	steady state error?	iii. Acceleration				
	steady state error.	errorconstant				
13	What is the need	The controller is	Understand	CO2	CLO6	CAAE018.06
	for a controller?	provided to modify the				
		error signal for better				
		control action.				
14	What is	It is a device that produces a	Understand	CO2	CLO6	CAAE018.06
	Proportional	control signal which is				
	controller?	proportional to the				10 million (1997)
		input error signal.				
15	Define branch	A branch point is a	Remember	CO2	CLO4	CAAE018.04
	point	point from which				
		the signal from a				
		block goes	/		Sec. 1	
		concurrently to				
		other blocks or			1 A A	
		summing points		Sec. 7		
16	Define summing	A circle with a cross is the	Remember	CO^{2}	CL 04	CAAE018.04
10	point	symbol that indicates a	Kemeniber	002		CAALU10.04
	point	symbol mat mulcates a				
		summing operation. The				
		plus of linnus sign at each				
		arrownead indicates whether				
		ulat signal is to be added or				
17	Define bleet	subtracted	Damarahan	002	CL O4	CAAE019.04
1/	diagram	A block diagram of a	Kemember	002	CL04	CAAE018.04
	ulagrafii	system is a pictorial				
		representation of the				
		functions performed by				
		each component and of the				
		flow of signals.			ar	
18	Define open loop	The ratio of the feedback	Remember	CO2	CLO4	CAAE018.04
	transfer function	signal B(s) to the				
		actuating error signal E(s)				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		is called the open-loop				
		transfer function.				
19	What is a signal	A signal flow graph is a	Remember	CO2	CLO5	CAAE018.05
	flow graph?	diagram that represents a				
	0 1	set of simultaneous				
		algebraic equations .By				
		taking L.T the time domain				
		differential equations				
		governing a control system				
		can be transferred to a set				
		of algebraic				
20	XX 71	equations in s-domain.			GT 0 7	G 4 4 E 0 1 0 0 5
20	What is	The transmittance is the	Remember	CO2	CL05	CAAE018.05
	transmittance?	gain acquired by the	1.1			
		signal when it travels from				
		one node to another node				
		in signal flow graph				
21	What is sink a <mark>nd</mark>	Source is the input node in the	Remember	CO2	CLO5	CAAE018.05
	source?	signal flow graph and it has				
		only outgoing				
		branches. Sink is a				
		output node in the signal				
		flow graph and it has				
		only incoming branches.				
22	Define non	The loops are said to be non	Remember	CO2	CLO5	CAAE018.05
	touching loop.	touching if they do not have				
		common nodes.		~~~	67.0 7	<u></u>
23	Define Masons	Masons Gain formula states	Remember	CO ₂	CLO5	CAAE018.05
	Gain formula.	that the overall gain of the $T = 1/Al_{\rm c} Pl_{\rm c} l_{\rm c}$				
		System is $1 - 1/\Delta K \Gamma K K$ -				
		signal flow graph Pk-		_		-
		Forward path gain of kth				
		forward path $\Delta k = 1$ -[sum of		- 7	- C	2
		individual loop gains] +[sum			-	50 C
		of gain products of all			A	
		possible combinations of two		r		
		non touching loops]-[sum of			100	
		gain products of all possible				
		combinations of three non		2.3		
		touching loops]+	-	~		
		k - for that part of the graph		5 T		
		forward noth				
24	What is	The server achanism is a	Domomhor	CO2	CL O2	CAAE018 02
24	what is	faadback control system in	Keinenidei	02	CLU5	CAAE018.05
	ser vomeenamism?	which the output is				
		machanical				
		derivatives of				
		negition velocity				
		position velocity				
25	Define transient	The transient mean and	Pomomhor	CO2	CI 06	CAAE019 04
23	response?	in the management response	Kemeniber	002		CAAEU10.00
	response:	is the response of the				
		system when the				
		system changes from				
		one state to another.				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
26	Define steady	The steady state response is	Remember	CO2	CLO6	CAAE018.06
	state response?	the response of the system				
		when it approaches infinity.				
27	What is an order	The order of a system is the	Remember	CO2	CLO6	CAAE018.06
	of a system?	order of the differential				
		equation governing the				
		system. The order of the				
		the transfer function				
		of the given system				
28	Define Damning	Damping ratio is defined as the	Remember	CO2	CLO6	CAAE018.06
20	ratio	ratio of actual damping to	Remember	001	0200	C/111L010.00
	Tutio.	critical damping				
29	Define Delay	The time taken for	Remember	CO2	CLO6	CAAE018.06
	time.	response to reach 50% of				
		final value for the very				
		first time is delay time.				
30	Define peak	Peak overshoot is defined as	Remember	CO2	CLO6	CAAE018.06
00	overshoot.	the ratio of maximum peak	1.0.110.110.01			01112010100
		value measured				
		from the maximum value to				
		final value				
31	Define Settling	Settling time is defined as	Remember	CO2	CLO6	CAAE018.06
	time.	the time taken by the				
		response to reach and stay				
		within specified error.				
32	Define Steady	The steady state error is	Remember	CO2	CLO6	CAAE018.06
	state error.	defined as the value of error as				
		time tends to				
		infinity		~~~		2 • • P0 • 0 • 0
33	What is step	The step signal is a signal	Remember	CO2	CLO6	CAAE018.06
	signal?	whose value changes from		_	-	
	~	zero to A at $t=0$ and				1.
	C	remains constant at A for	Contraction of the local distance			
24	XX /1 / ·	t>0.	D 1	CO2	CLOG	CA 4 E010.06
34	what is ramp	The ramp signal is a signal	Remember	02	CLOO	CAAE018.06
	signal?	whose value increases intearly				
		an initial value of zero at		22		
		t=0 the ramp signal resembles		10		
		a constant velocity.		5.7		
35	What is	It is a device that produces	Remember	CO2	CLO9	CAAE018.09
	Proportional	a control signal which is	· · · ·			
	controller?	proportional to the input				
		error signal.				
36	What is PI	It is a device that produces a	Remember	CO2	CLO9	CAAE018.09
	controller?	control signal consisting of two				
		terms - one				
		proportional to error				
		signal and the other				
		proportional to the				
		integral of error signal.				
37	What is PD	PD controller is a	Remember	CO2	CLO9	CAAE018.09
	controller?	proportional plus derivative				
		controller which produces an				
		output signal consisting of				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		two time - one proportional to				
		error signal and				
		other proportional to the				
		derivative of the signal.				
		MODULE-1	ш			
1	Define stability.	A system is said to be stabile if	Understand	CO3	CLO7	CAAE018.07
		every bounded input results in a				
		bounded output.				
2	What is Routh	Routh criterion states that the	Remember	CO3	CLO7	CAAE018.07
	stability	necessary and sufficient				
	criterion?	condition for		-		
		stability is that all of the	1.1			
		elements in the first column of)		
		the routh array is positive		~~~		<u></u>
3	What is	The denominator polynomial of	Remember	CO3	CL07	CAAE018.07
	characteristic	C(S)/R(S) is the characteristic				
4	equation?	equation of the system	Damamhar	CO3		CAAE018.07
4	what is auxiliary	The auxiliary polynomial is the	Remember	COS		CAAE010.07
	porynollial?	row just above the row of all	10 million (1997)			
		zeros.				
5	What is the time	Time constant of the system	Remember	CO3	CLO7	CAAE018.07
	constant of the	indicate, how fast the system				
	system indicate	reaches the final value				
6	Define Relative	Relative stability is the degree of	Remember	CO3	CLO7	CAAE018.07
	stability	closeness of the system, it is an				
		indication of strength or degree				
7	What are reat	of stability	Damamhan	CO2	CLOS	
/	loci?	The path taken by the roots of	Remember	005	CLU8	CAAEU18.08
	10011	when the loop gain is varied			C	
		from 0 to 1 are called root loci		- C	-	
8	What is a	The dominant pole is a complex	Remember	CO3	CLO8	CAAE018.08
	dominant pole?	conjugate pair which decides the	1		-	
		transient response of the system.			1	
9	What are break	At break away point the root	Understand	CO3	CLO8	CAAE018.08
	away and break	locus breaks from the real axis to	-	8		
	in points?	enter into		5 T .		
		the complex plane. At break in		· · · ·		
		point the root locus enters the	· · · · ·			
10	What are	A superstates and the staright lines.	Understand	CO3	CLOS	CAAE018.08
10	asymptotes?	Asymptotes are the straight lines	Onderstand	005	CLU8	CAAL010.00
	J I	going to infinity and meet the				
		root locus at infinity.				
12	What is centroid?	The meeting point of the	Understand	CO3	CLO8	CAAE018.08
		asymptotes with the real axis is			-	
		called centroid				
13	What are the	Adding a zero to a system	Understand	CO3	CLO9	CAAE018.09
	effects of adding	increases peak overshoot				
	a zero to a	арргеставту				
	system?					
		<u> </u>				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
14	How to find the	By Routh Hurwitz criterion	Understand	CO3	CLO9	CAAE018.09
	crossing point of					
	root locus in					
	imaginary axis?					
15	What is impulse	The impulse response of a	Understand	CO3	CLO8	CAAE018.08
	response?	system is the inverse Laplace				
		transforms of the system transfer				
		function				
16	Dofino stability	A linear releved system is said to	Domomhor	CO3	CL O7	CAAE018.07
10	Define stability.	have DIDIO stability if avery	Kemember	005	CL07	CAAL010.07
		have biblo stability if every				
		bounded				
17	William in Discut	input results in a bounded output.	D	CO 2	CL O7	
1/	what is Routh	Routh criterion states that the	Remember	003	CL0/	CAAE018.07
	stability	necessary and sufficient				
	criterion?	condition for stability is that all	Second Second)		
		of the elements in the first				
		column of the routh array is				
		positive. If this condition is not				
		the number of sign changes in				
		the elements of the first column				
		of routh array corresponds to the				
		number of roots of characteristic				
		equation in the right				
		half of the S-plane				
18	What is	The magnitude criterion states	Remember	CO3	CL07	CAAE018.07
10	magnitude	that s=sa will be a point on root	Remember	005	CLOT	CILLUI0.07
	criterion?	locus if for that value of S.				
		magnitude of $G(S)H(S)$ is equal				
		to 1. $ G(S)H(S) = K(product of$				
		length of vectors from open loop				
		zeros to the point s=sa)/				-
		(product of length of vectors				10 million (1997)
		from open loop poles to the point				
		s=sa) = 1.			· · · ·	1.
19	What are the	Adding a zero to a system results	Remember	CO3	CLO8	CAAE018.08
	effects of adding	in pronounced early peak to			· · · ·	
	a zero to a	system response thereby the peak	1			
	system?	overshoot increases appreciably.				
20	What is a	The dominant pole is a pair of	Remember	CO3	CLO8	CAAE018.08
	dominant pole?	complex conjugate pair which		Sec. 1		
		decides the		~		
		transient response of the system.		1		
21	What are root	The path taken by the roots of	Remember	CO3	CLO8	CAAE018.08
	loci?	the open loop transfer function				
		when the loop gain is varied				
		from 0 to 1 are called root loci.				
22	What is limitedly	For a bounded input signal if the	Remember	CO3	CLO7	CAAE018.07
	stable system?	output has constant amplitude				
		oscillations, then the system may				
		be stable or unstable under some				
		limited constraints such a system				
		is called limitedly stable system.				
23	What is a	The principles of arguments	Remember	CO3	CLO8	CAAE018.08
	principle of	states that let $F(S)$ are analytic				
	argument?	function and if an arbitrary				
		closed contour in a clockwise				
		direction is chosen in the S-plane				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		so that F(S) is analytic at every				
		point of the contour. Then the				
		corresponding F(S) plane				
		contour mapped in the F(S) plane				
		will encircle the origin N times				
		in the anti clockwise direction,				
		where N is the difference				
		between number of poles and				
		zeros of $F(S)$ that are encircled				
		by thechosen				
		closed contour in the S-plane.				
24	What are break	At break away point the root	Remember	CO3	CLO8	CAAE018.08
	away and break	locus breaks from the real axis to				
	in points?	enter into the complex plane. At				
		break in point the root locus				
		enters the real axis from the				
		complex plane. To find the break				
		away or break in points, form a				
		equation for K from the				
		differentiate the equation of K				
		with respect to s. Then find the				
		roots of the equation $dK/dS=$				
		0. The roots of $dK/dS = 0$ are	1			
		break away or break in points		-		
		provided for this value of root				
		provided for this value of foot				
		the gain K should be positive and				
25	M/1	real.	D 1	001	CI OR	GA 4 E010.00
25	What is centroid?	The meeting point of the	Remember	03	CL08	CAAE018.08
		asymptotes with the real axis is				
		given by Centroid – (sum of				
		poles – sum of zeros) / $(n-m)$		- 10		100
		n-number of poles m-number of				
		zeros.			- C	
26	What is angle	The angle criterion states that	Remember	CO3	CLO8	CAAE018.08
	criterion?	s=sa will be the point on the root				
		locus if for that value of S the				
		argument or phase of G(S)H(S)			100	
		is equal to an odd multiple of				
		180°. (Sum of the angles of		28		
		vectors from zeros to the point		Sec. 1		
		s=sa)- (Sum of the angles of		1 m		
		vectors from poles to the point		e		
		s=sa) =				
		$\pm 180^{\circ}(2q+1)$		~		
27	How will you	To find the root loci on real axis,	Remember	CO3	CLO8	CAAE018.08
	find the root	choose the test point on real axis.				
	locus on real	If the total number of poles and				
	ax1s?	zeros on the real axis to the right				
		then the test point is oud number				
		locus. If it is even then the				
		test point does not lie on the root				
		locus				
28	Whatic	The denominator networmist of	Remember	CO3		CAAF018.08
20	vy liat 18	The denominator polynomial of $C(S)/P(S)$ is the characteristic	Kennenhoel	005		CAAL010.00
	characteristic	C(3)/K(3) is the characteristic				
	equation?	equation of the system.				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
29	What is auxiliary	In the construction of routh array	Remember	CO3	CLO8	CAAE018.08
	polynomial?	a row of all zero indicates the				
		existence				
		of an even polynomial as a factor				
		of given characteristic equation.				
		In an even polynomial the				
		exponents of S are even integers				
		or zero only. This even				
		polynomial factor is called				
		auxiliary polynomial. The				
		auxiliary polynomial are given				
		by the elements of the row just	<u> </u>			
		above the row of all zeros.				
		MODULE-	IV			
				~ ^ /	GX 0 10	
1	What is	A frequency response is the	Understand	CO4	CLOI0	CAAE018.10
	response?	steady state response of a system				
	response?	when the input to the system is a				
		sinusoidal signal.		a c t		
2	List out the	The frequency domain	Understand	CO4	CLO10	CAAE018.10
	frequency	specifications are				
	domain	i. Resonant peak. Resonant				
	specifications	frequency.				
3	Define Resonant	The frequency at which resonant	Remember	CO4	CL 010	CAAE018 10
5	frequency	peak occurs is called resonant	Remember	COT	CLOID	CAAL010.10
	(fr)	frequency				
4	What is	The Bandwidth is the range of	Remember	CO4	CLO10	CAAE018.10
-	Bandwidth?	frequencies for which the system				
	50	gain is more than $3 dB$				
5	Define Cut off	The slope of the log-magnitude	Remember	CO4	CL010	CAAE018 10
5	rate	curve near the cut-off is called	Remember	001	CLOIO	ern Horo.ro
	Tute.	cut-off rate				
		The cut off rate indicates the			A	
	0	ability to distinguish the signal			-	
		from noise.			1	
6	Define Gain	The Gain Margin,kgis defined as	Remember	CO4	CLO10	CAAE018.10
	Margin	the reciprocal of the magnitude		67		
		of the open loop transfer		~		
		function at phase cross over		2		
		frequency				
7	Define Phase	The frequency at which, the	Remember	CO4	CLO10	CAAE018.10
	cross over.	phase of open loop transfer				
		functions is called phase cross				
		over frequency Δpc .				
8	What is Phase	The Phase margin is the amount	Remember	CO4	CLO10	CAAE018.10
	margin?	of phase lag at the gain cross				
		over				
		frequency required to bring				
		system to the verge of instability				
9	What is Bode	The Bode plot is the frequency	Understand	CO4	CLO10	CAAE018.10
	plot?	response plot of the transfer				
		function of a system				
10	Define Corner	The frequency at which the two	Remember	CO4	CLO10	CAAE018.10
1						

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	frequency.	asymptotic meets in a magnitude				
		plot is called Corner frequency				
11	What is Nyquist	The contour that encloses entire	Remember	CO4	CLO11	CAAE018.11
	contour?	right half of S plane is called				
		Nyquist contour.				
12	What are the	A simple method for sketching	Understand	CO4	CLO12	CAAE018.12
	main	an approximate log curve is				
	advantages of	available.				
	Bode plot?					
13	Define Gain cross	The Gain cross over frequency	Understand	CO4	CLO12	CAAE018.12
	over frequency	Δgc is the frequency at which				
		transfer function is unity				
14	If the gain of the	Not effected as the gain of the	Understand	CO4	CL012	CAAE018 12
17	open loop	system is not dependent on the	Onderstand	04	CLOIZ	C/M L010.12
	system is	overall gainof the system.				
	doubled, the					
	gainof the					
	system is:					
15	What is the	For Nyquist contour, the size of	Understand	CO4	CLO12	CAAE018.12
	size of radius	radius is ∞.				
	inNyquist		1 A			
	contour?					
16	What is	Afrequencyresponseisthesteadys	Remember	CO4	CLO10	CAAE018.10
	frequency	tateresponseofasystemwhenthein				
	response?	put to the system is a				
		sinusoidalsignal				
17	Define Resonant	The maximum value of the	Remember	CO4	CLO10	CAAE018.10
	Peak (Δr)	magnitude of closed loop				
		transfer function is called	_			-
	C .	Resonant Peak.		_		
18	Define	The frequency at which resonant	Remember	CO4	CLO10	CAAE018.10
	Resonant	peak occurs is called resonant		· · · ·		e
	frequency	frequency.			-	
	(Δf)				-	
19	What is	The Bandwidth is the range of	Remember	CO4	CLO10	CAAE018.10
	Bandwidth?	frequencies for which the system				
		gain is more than 3 dB. The		28		
		ability of a feedback system to		1		
		reproduce the input signal noise		5 T		
		rejection characteristics and rise	1			
		time.				
20	Define Cut off	The slope of the log-magnitude	Remember	CO4	CLO10	CAAE018.10
	rate.	curve near the cut-off is called				
		cut-off rate. The cut off rate				
		indicates the ability to				
		distinguish the signal from				
		noise.				
21	Define Gain	The Gain Margin, kg is defined	Remember	CO4	CLO12	CAAE018.12
	Margin.	as the reciprocal of the				
		magnitude of the open loop				
		transfer function at phase cross				
		over frequency.		ac i		
22	Define Phase	The frequency at which, the	Remember	CO4	CLO12	CAAE018.01
	cross over	phase of open loop transfer				2

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	frequency.	functions is called				
		phase cross over frequency Δpc .				
23	What is Phase	The Phase margin is the amount	Remember	CO4	CLO12	CAAE018.12
	margin?	of phase lag at the gain cross				
		over frequency required to bring				
		system to the verge of instability				
24	Define Gain cross	The Gain cross over frequency	Remember	CO4	CLO12	CAAE018.12
	over	Δgc is the frequency at which				
	frequency.	the				
		magnitude of the open loop				
		transfer function is unity.				
25	What is Bode	The Bode plot is the frequency	Remember	CO4	CLO11	CAAE018.11
	plot?	response plot of the transfer				
		function of a system. A Bode				
		plot consists of two graphs. One	Second Contraction			
		is the plot of magnitude of				
		versus log A The other is a plot				
		of the phase				
		angle of a sinusoidal function				
		versus $\log \Lambda$				
26	Define Corner	The frequency at which the two	Remember	CO4	CLO11	CAAE018.11
	frequency.	asymptotic meet in a magnitude				
		plot is called Corner frequency				
27	State Nyouist	If the Nyquist plot of the open	Remember	CO4	CL011	CAAE018 11
27	stability	loop transfer function G(s)	Remember	001	02011	CI II ILOIO.III
	criterion.	corresponding to				
		the Nyquist control in the S-				
		plane encircles the critical point				
		-1+j0 in the counter clockwise				
		direction as many times as the				
	C	number of right half S- plane				C
	0	poles of G(s), the closed loop				
	~	system is stable			· · ·	2
28	What is Nyquist	The contour that encloses entire	Remember	CO4	CL011	CAAE018.11
	contour?	right half of S plane is called				
	C	Nyquist				
		contour.		a a i	AX 0.44	<u></u>
29	Define Relative	Relative stability is the degree of	Remember	CO4	CL011	CAAE018.11
	stability.	closeness of the system, it is an				
		indication of strength or degree		\sim		
		of stability.		1		
30	Define polar plot?	The Polar plot is a plot, which	Remember	CO4	CLO11	CAAE018.11
		can be drawn between the				
		magnitude and				
		the phase angle of $G(j\omega)H(j\omega)$				
	<u> </u>	by varying ω from zero to ∞ .				
		MODINE	T 7			
		MODULE-	V			
1	What are the	It can be applied to non linear as	Understand	CO5	CL 013	CAAE018 13
1	advantages of	It can be applied to non-intear as	Onderstand	005	CLOIS	CAAL010.13
	state space	well as time varying systems. It				
	analysis?	can be applied for MIMO				
		systems also. The state variables				
		selected need not necessarily be				
		the physical quantities of the				
	1	I system.				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
2	What are phase	system variables and its	Understand	CO5	CLO13	CAAE018.13
	variables?	derivatives are called phase				
		variables				
3	Define state	The minimal set of variables	Remember	CO5	CLO13	CAAE018.13
	variable	which can describe the system				
		status are known as state				
		variables				
4	Is the state model	State model is not unique	Understand	CO5	CI 012	CAAE019 12
4		State model is not unique	Understand	005	CLUIS	CAAE010.15
	unique for					
	a given transfer					
5	Tunction /		I I advantand	COF	CI 014	
5	What is	A system is said to be completely	Understand	COS	CL014	CAAE018.14
	controllability?	state controllable if it is possible				
		transfer the system state from $\mathbf{X}(t_0)$ at any other	Sec. 1			
		any initial state $X(t)$ at any other				
		desired state $X(t)$, in specified				
		finite time by a control vector				
6	What is	O(l).	Understand	CO5	CL 014	CAAE019 14
0	observability?	A system is said to be completely	Understand	COJ	CL014	CAAL010.14
	observability.	observable if every state X(t) can				
		be completely identified by	1			
		measurements of the output Y(t)	-			
	D	over a finite time interval.		~~~	CT 010	G + + F010 10
7	Define state	Status of the system is called	Remember	CO5	CL013	CAAE018.13
0	What is the state	State.	I In denote a d	COS	CL 012	CAAE019.12
8	what is the state	State equation and output	Understand	COS	CLOIS	CAAE018.15
0	Model	The number of transforming of	I In denote a d	COF	CI 014	
9	what is similarity	The process of transforming a	Understand	COS	CL014	CAAE018.14
	transformation?	similar matrix R				
		by a transformation $\mathbf{D}^{-1}\mathbf{A}\mathbf{D} = \mathbf{P}$ is		_		100
		by a transformation F AF = B is				
		The summarity transformation.		-)
		The matrix P is called		_	-	
10	XX71	transformation matrix.	TT 1 1	005	CL O 14	GA A E010 14
10	What is meant by	The process of converting the	Understand	CO5	CL014	CAAE018.14
	diagonalization?	system matrix A into a diagonal			Sec	
		similarity transformation using		27		
		the modal matrix M is called	-	1		
11	XX71 / 1 1	diagonalization.	TT 1 / 1	005	CI 014	
11	what is modal	The modal matrix is a matrix	Understand	005	CL014	CAAE018.14
	matrix !	used to diagonalize the system	· · · ·			
12	What are the		Understand	CO5	CL 015	CAAE019 15
12	three types of	Lag compensator, lead	Understalld	005	CLUIJ	CAALUIO.IJ
	Compensators?	compensator and Lag-Lead				
	with a state of the state of th	compensator		007		a - - :
13	What is the use	Improve the steady state behavior	Understand	CO5	CLO15	CAAE018.15
	of lag	or a system, while nearly				
14	What is a	preserving its transient response.	Understand	COS	CL 015	CAAE019 15
14	what is a	A device inserted into the system	Understand	COS	CLUIS	CAAEUI8.13
	compensator :	for the purpose of satisfying the				
		specifications is called as a				
	****	compensator.				
15	When lag lead	The lag lead compensator is	Understand	CO5	CLO15	CAAE018.15
	compensator is	required when both the transient				
	required?	and steady state response of a				

S.No	QUESTION	ANSWER	Blooms Level	СО	CLO	CLO Code
		system has to be improved.				
16	State sampling	A continuous time signal can be	Remember	CO5	CLO13	CAAE018.13
	theorem.	completely represented in its				
		samples and recovered back if				
		the sampling frequency				
		Fs≥2Fmax where Fs is the				
		sampling frequency and Fmax is				
		in the				
		signal				
17	What is periodic	Sampling of a signal at uniform	Remember	CO5	CL 013	CAAF018 13
17	sampling?	equal intervals is called periodic	Remember	005	CLOID	C/111L010.15
	sumpring.	sampling.				
18	What are phase	The phase variables are defined	Remember	CO5	CLO13	CAAE018.13
_	variables?	as the state variables which are				
		obtained from one of the system				
		variables and its derivatives				
19	Define state	The state of a dynamical system	Remember	CO5	CI 014	CAAF018 14
17	variable	is a minimal set of variables	Remember	000	CLOIT	C/M L010.14
	variable.	(known as state variables) such				
		that the knowledge of these				
		variables at t-t0 together with the				
		knowledge of the inputs for $t > t0$				
		, completely determines the				
		behavior of the system for $t > t0$.		2 .2.7		
20	What is	A system is said to be completely	Remember	CO5	CLO15	CAAE018.15
	controllability?	state controllable if it is possible				
		to				
		transfer the system state from				
		any initial state X(t0) at any other				
	1.1	desired state X(t), in specified				
	50	finite time by a control vector				
	-	U(t).				
21	What is	A system is said to be	Remember	CO5	CLO15	CAAE018.15
	observability?	completely observable if every			~	
		state X(t) can be completely			1	
	0	the output $V(t)$ over a finite time				
		interval			100	
22	What is Nyouist	The Sampling frequency equal to	Remember	CO5	CL013	CAAE018.13
	rate?	twice the highest frequency of				
		the signal is called as Nyquist		~		
		rate fs-2fm		2		
23	What is similarity	The process of transforming a	Pomombor	C05	CL 014	CAAE018 14
23	transformation?	square matrix Δ to another	Kemember	005	CL014	CAAL010.14
		similar matrix B				
		by a transformation $P_1 \Delta P - B$				
		is called similarity				
		transformation The matrix D is				
		called transformation matrix				
24	What is meant by	The process of converting the	Remember	C05	CL 014	CAAE018 14
27	diagonalization?	system matrix A into a diagonal	Remember	005	CLOIT	CAAL010.14
	Bonanization.	matrix by a similarity				
		transformation using the modal				
		matrix M is called				
		diagonalization.				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
25	What is modal	The modal matrix is a matrix	Remember	CO5	CLO14	CAAE018.14
	matrix?	used to diagonalize the system				
		matrix. It is also called				
		diagonalization matrix. If A =				
		system matrix. $M = Modal$				
		matrix And M ⁺ = inverse of				
		modal matrix. Then				
		M ² AM will be a diagonalized				
26	What is a	system matrix.	Domomhor	COS	CL 015	CAAE019.15
20	what is a	A device inserted into the system	Remember	COS	CLUIS	CAAE018.15
	compensator :	for the purpose of satisfying the				
		specifications is called as a				
		compensator.		a a	CT OI	G + + F010.15
27	Define Phase lag	A negative phase angle is called	Remember	CO5	CL015	CAAE018.15
	and phase lead.	phase lag. A positive phase angle				
		is called phase lead.				
28	Define phase lead	A system which has one pole and	Remember	CO5	CLO15	CAAE018.15
	compensator?	one dominating zero (the zero				
		which is closer to the origin than				
		all over zeros is known as				
		lead network. If we want to add a				
		dominating zero for				
		compensation in control system				
		then we have to select lead				
		compensation				
		network.				
29	Define phase lag	A system which has one zero and	Remember	CO5	CLO15	CAAE018.15
	compensator?	one dominating pole (the pole				
		which iscloser to origin that all				
		other poles is known as			· .	
		dominating pole) is known				100
		as lag network. If we want to add				
		a dominating pole for			C	2
		compensation incontrol system			-	10 A
		then, we have to select a lag			A	
20	D (1 1 1	compensation network.			GT 0.1.5	G + + F010.15
30	Define phase lag-	With single lag or lead	Remember	CO5	CL015	CAAE018.15
	lead	compensation may not satisfy				
	compensator?	design specifications.For an				
		lead compensation provides		1		
		fastresponse but does not provide				
		enough phase margins whereas				
		lagcompensation stabilizes the	1000			
		system but does not provide				
		enough bandwidth.				
		So we need multiple				
		compensators in cascade.				

Signature of the Faculty

HOD, AE