Enrollment No:	Exam Seat No:

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name: Linear Control Theory

Subject Code: 4TE05LCT1 Branch: B.Tech (Electrical,IC)

Semester: 5 Date: 25/04/2016 Time: 02:30 To5:30 Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

Q-1 Attempt the following questions:

(14)

- a) Define: Control System.
- **b)** In an open loop control system
 - (a) Output is independent of control input (b) Output is dependent on control input
 - (c) Only system parameters have effect on the control output(d) None of the above
- c) By which of the following the control action is determined when a man walks along a Path?
 - (a) Brain (b) Hands (c) Legs (d) Eyes
- d) The transistent response, with feedback system,(a)rises slowly (b) rises quickly (c) decay slowly (d) decay quickly
- e) The Capacitance, in force- current analogy, is analogous to (a)momentum (b) velocity (c) displacement (d)mass
- f) In Liquid level and electrical system analogy, voltage is considered analogus to (a)head (b) liquid flow (c) liquid flow rate (d) none of above
- g) From which of the following transfer function can be obtained?

 (a)Signal flow graph (b)Analogus table (c)output-input ratio(d)none of above
- h) The type 1 system has _____at the origin.

 (a)no pole (b)net pole(c)Simple pole (d) two pole
- i) Technique gives quick transient and stability response.
 - (a) Root locus(b) bode plot (c) Nyquist (d) Nichols
- j) The impulse function is a derivative of __ function:
 - (a) Parabolic (b) Step (c) Ramp (d) Linear
- **k)** Proportional band of the controller is expressed as:
 - (a) Gain (b) Ratio (c) Percentage (d) Range of control variables
- 1) In a signal flow graph method, how is an overall transfer function of a system obtained?
 - (a) Poisson's equation (b) Block diagram reduction rules (c) Mason's equation
 - (d) Lagrange's equation



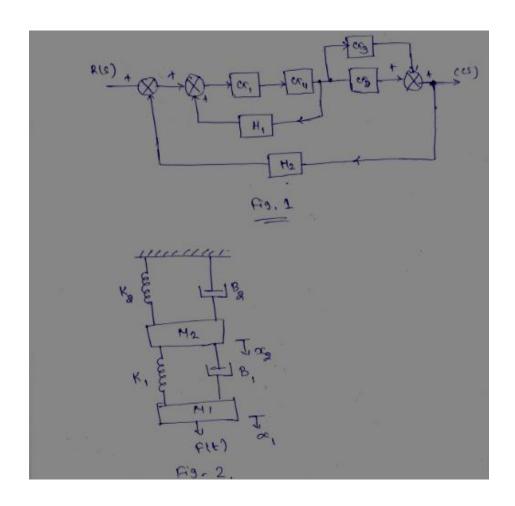
	m)	State space analysis is applicable even if the initial conditions are (a) Zero (b) Non-zero (c) Equal (d) Not equal	
		(a) Zero (b) Non-zero (c) Equal (d) Not equal	
	n)	Phase margin of a system is used to specify which of the following?	
		(a) Frequency response (b) Absolute stability (c) Relative stability (d) Time response	
	pt any	four questions from Q-2 to Q-8	
Q-2		Attempt all questions	(14)
	(a)	Define the Term	(07)
		i)Time Response ii)Transient Response iii)Steady state response iv)steady state error	
		v) Delay time vi) Rise time vii) Peak Time.	
	(b)	Explain the difference between Open loop and Close loop control system with examples.	(07)
0.2		Compare their merits and demerits.	(4.4)
Q-3	(-)	Attempt all questions	(14)
	(a)	Using the block diagram reduction techniques, find the closed loop transfer	(07)
	(b)	Function of the system whose block diagram is given in Fig.1. Draw free body diagram and write the differential equation for the given mechanical	(07)
	(0)	system for Fig 2.	(07)
Q-4		Attempt all questions	(14)
ν.	(a)	Define the term (1) Transfer function (2) state (3) Self loop (4) Source node (5) Sink	(05)
	()	node.	(**)
	(b)	Write a short note on Standard Test Signal.	(05)
	(c)	What is analogus system? Establish force voltage and force current analogy.	(04)
Q-5		Attempt all questions	(14)
	(a)	Obtain overall transfer function C/R of the system whose signal flow graph shown in	(07)
		Fig.3.	
	(b)	Derive the expression for static error coefficient.	(07)
Q-6		Attempt all questions	(14)
	(a)	Discuss the stability for the given characteristics equations using Routh-Hurwitz criteria:	(08)
		i) $2s^4+s^3+3s^2+5s+10=0$	
	a >	ii) $s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$	(0.0)
0.7	(b)	Derive the transfer function of simple liquid level system.	(06)
Q-7	(a)	Attempt all questions	(14) (10)
	(a)	For a Unity feedback system $G(s) = \frac{K}{s(s+2)(s+10)}$. Find Marginal Value of 'K' for which	(10)
		system will be marginally stable, using Bode Plot.	
	(b)	What are advantages of Bode Plots?	(04)
Q-8		Attempt all questions	(14)
	(a)	Sketch the Root Locus for the system having $G(S)H(S) = \frac{K}{s(s^2+2s+2)}$	(10)
		$S(S^2+2S+2)$	



(04)

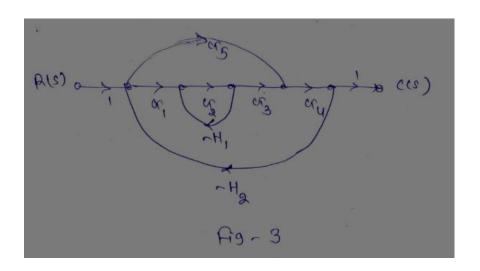
What are advantages of Root Locus Method?

(b)



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