University of Mumbai

Examination Second Half 2021 under cluster 06

(Lead College: Vidyavardhini's College of Engg Tech)

Examinations Commencing from 22nd November2021 to 5thJanuary 2022

Program: **Electronics Engineering**

Curriculum Scheme: Rev2019

Examination: TE SemesterV

Course Code: ELC_ 501and Course Name: PCS

Time: 2 hour 30 minutes Max. Marks: 80

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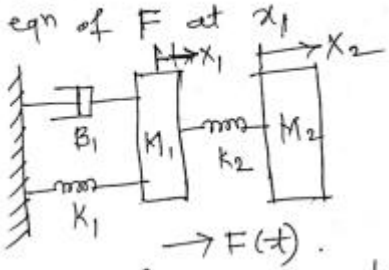
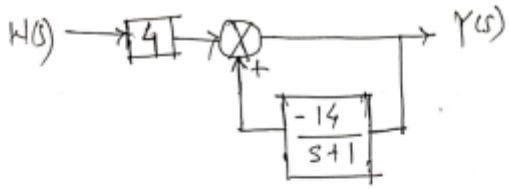
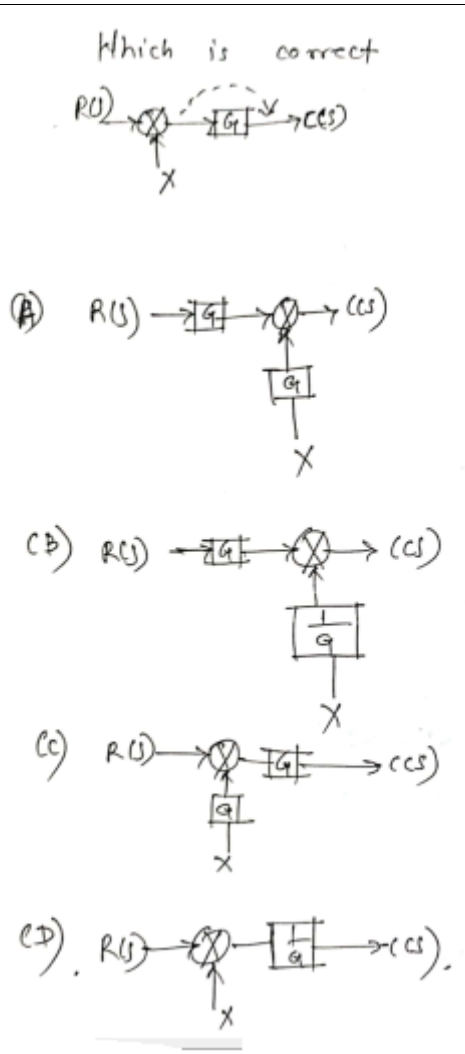
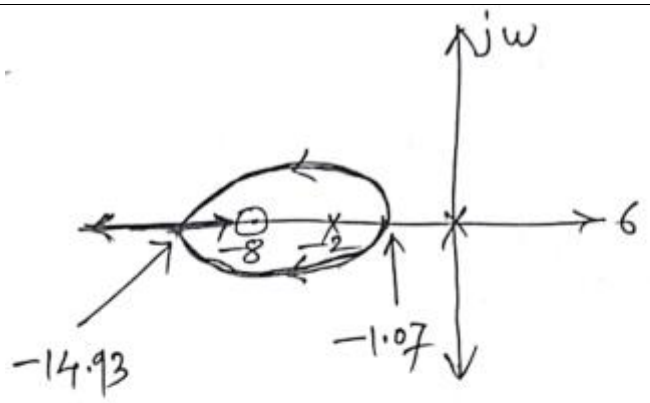
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	What is the Laplace Transform of impulse function
Option A:	S
Option B:	1
Option C:	1/S
Option D:	A
2.	For the mechanical system write the eqn of F at x_1  (A) $F = M_1\frac{d^2x_1}{dt^2} + k_1x_1 + \beta_1\frac{dx_1}{dt} + k_2(x_1 - x_2)$ (B) $F = M_1\frac{dx_1}{dt} + k_1x_1 + \beta_1\frac{d^2x_1}{dt^2} + k_2(x_1 - x_2)$ (C) $F = M_1\frac{d^2x_1}{dt^2} + k_1x_1 + \beta_1\frac{dx_1}{dt} + k_2(x_2 - x_1)$ (D) $F = M_1\frac{d^2x_1}{dt^2} + K_2x_2 + \beta_1\frac{dx_1}{dt} + k_2(x_1 - x_2)$
Option A:	
Option B:	
Option C:	
Option	

n D:	
3.	Which is the formula for acceleration error coefficient (A) $K_a = \lim_{s\to 0} G(s)H(s)$ (B) $K_a = \lim_{s\to 0} sG(s)H(s)$ (C) $K_a = \lim_{s\to 0} s^2G(s)H(s)$ (D) $K_a = \lim_{s\to 0} s^3G(s)H(s)$
Optio n A:	
Optio n B:	
Optio n C:	
Optio n D:	
4.	 What should be $\frac{Y(s)}{R(s)}$ = ? (A) $\frac{4(s+1)}{s+4+14}$ (B) $\frac{4(s+1)}{s+14}$ (C) $\frac{4(s+1)}{s+1+15}$ (D) $\frac{4(s+1)}{s+15}$
Optio n A:	
Optio n B:	
Optio n C:	
Optio n D:	

5.	
Option A:	
Option B:	
Option C:	
Option D:	

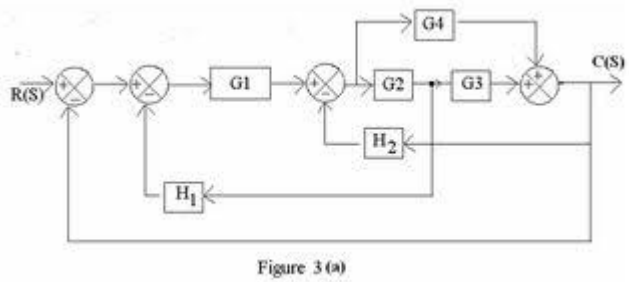
6.	 For the shown Root locus Comment on stability (A) Absolutely stable (B) Marginally stable (C) Relatively stable (D) Unstable.
Option A:	
Option B:	
Option C:	
Option D:	

7.	What is the formula to calculate angle of asymptotes. (A) $\phi_A = \frac{(2q)\,180}{n-m}$ (B) $\phi_A = \frac{(2q)\,180}{m-n}$ (C) $\phi_A = \frac{(2q+1)\,180}{n-m}$ (D) $\phi_A = \frac{(2q+1)\,180}{m-n}$ where n is number of poles m is number of zeros.
Option A:	
Option B:	
Option C:	
Option D:	

8.	To exists resonant peak ζ should b (A) $\zeta > 1$ (B) $\zeta < 1$ (C) $\zeta < 0.707$ (D) $\zeta > 0.707$
Option A:	
Option B:	
Option C:	
Option D:	

9.	For the function $G(s)H(s) = \frac{K(s+8)}{s(s+2)}$ what are (i) Number of Loci (ii) Number of loci ending at ∞. (A) 2, 2 (B) 1, 2 (C) 1, 1 (D) 2, 1
Option A:	
Option B:	
Option C:	
Option D:	

10.	If two poles at origin i.e. $\frac{1}{s^2} = \frac{1}{(j\omega)^2}$. It contribute the slope for the magnitude plot. (A) 20dB/dec (B) -20dB/dec (C) 40dB/dec (D) -40dB/dec.
Option A:	
Option B:	
Option C:	
Option D:	

Q2	
A	**Solve any Two** **5 marks each**
i.	Compare and Contrast Open loop and Closed loop Control Systems.
ii.	For the Characterstic equation Find the stabiolity $F(S) = S^4+6S^3+26S^2+56S+80+0$
iii.	Explain the Routh Hurwitz Criteria for determining the stability of a system.
B	**Solve any One** **10 marks each**
i.	Find the Transfer Function C(S)/R(S)  Figure 3 (a)
ii.	The state equation of a linear time-invariant system is given below:

	$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$ Where u>0. Determine the following: (i) The state transition matrix. (ii) Controllability of the system.

Q3	
A	**Solve any Two** **5 marks each**
i.	Compare and Contrast Open loop and Closed loop Control Systems.
ii.	Explain Adaptive control system.
iii.	Explain lead and lag compensator
B	**Solve any One** **10 marks each**
i.	Sketch the bode plot for the open loop transfer function given by: G(s) = [288(s+4)] / [s(s+1) (s2+4.8s+144)] and H(s) = 1.
ii.	For G(s)H(s) = 1+4s / [s2+(1+s)(1+2s)], draw the Nyquist plot examine the stability of the system.(10 mar.

Q4	
A	**Solve any Two** **5 marks each**
i.	Derive the expression of Peak Overshoot when step input applied to the system.
ii.	Sketch the polar plot of G(s) = 12 / [s(s+1)].
iii.	Construct the signal flow graphs for the following set of equations: Y2 = G1Y1 - G2Y4 Y3 = G3Y2 + G4Y3 Y4 = G5Y1 + G6Y3 Where Y4 is the output.
B	**Solve any One** **10 marks each**
i.	Explain P, PI and PID controller.
ii.	Sketch the complete root locus for the system G(s)H(s) = [K (s+1)(s+2)] / [(s+0.1)(s-1)], where K>0.