SS Computer Assignment 3

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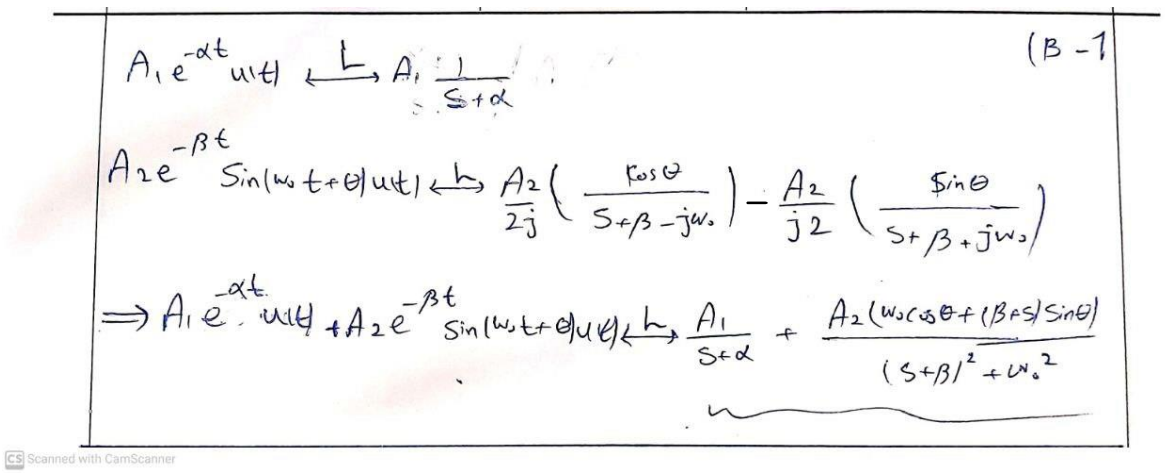
Question 1

Expression manipulation

B



D

This type of Laplace output display divides the function into two parts, each of which considers the main roots of the Laplace output, so we can see the poles of each term.

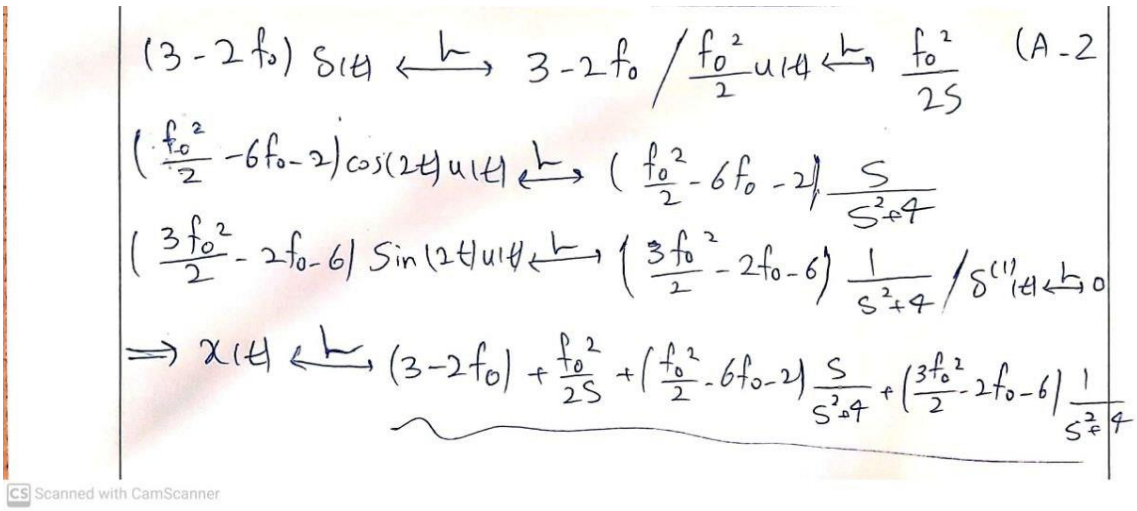
E

poles = $-\alpha$, $-(\beta - j\omega_0)$, $-(\beta + j\omega_0)$ valid area for S : Real(s) > max{$-\alpha$, $-\beta$}

Question 2

Laplace Transform

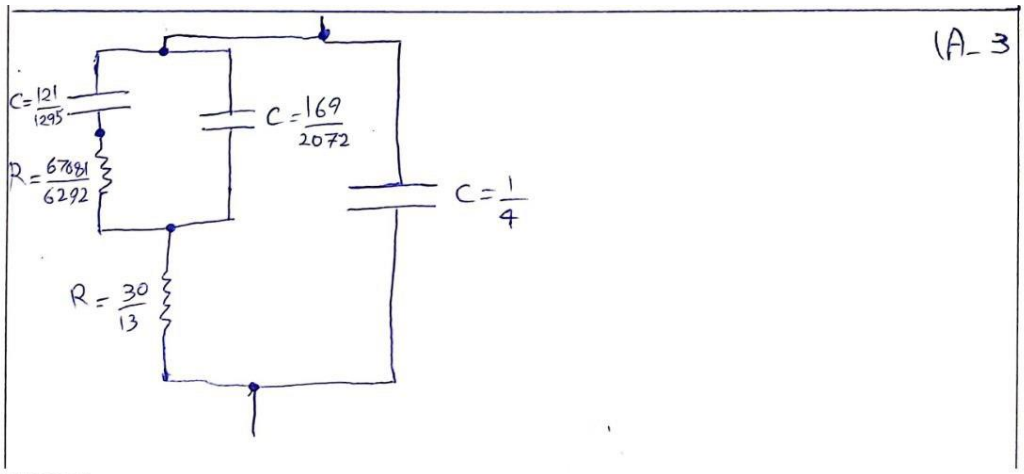
A



Question 3

Networks

A



Question 4

Discrete analysis

A
T = 24

B
Maximum size : n = { 0 + T }

Maximum phase : n = { 3 + T , 21 + T }

Sequences

A
Circular convolution, also known as cyclic convolution, is a special case of periodic convolution, which is the convolution of two periodic functions that have the same period. Periodic convolution arises, for example, in the context of the discrete-time Fourier transform (DTFT). In particular, the DTFT of the product of two discrete sequences is the periodic convolution of the DTFTs of the individual sequences.

B

$$x_4[m] = x_3[5-m : 10-m] * x_2 = \sum_{i=0}^{5} x_3[5-m+i] * x_2[i] \qquad (B-4$$

Discrete Transforms

A

In all three cases the values of the poles and zeros are real.

In the first case {a = 1}, one of the poles is outside the circle and the other pole and two values of zero are inside the circle.

In the second case {a = 1.5}, one of the poles is outside the circle and the other pole is on the circle and two values of zero are inside the circle.

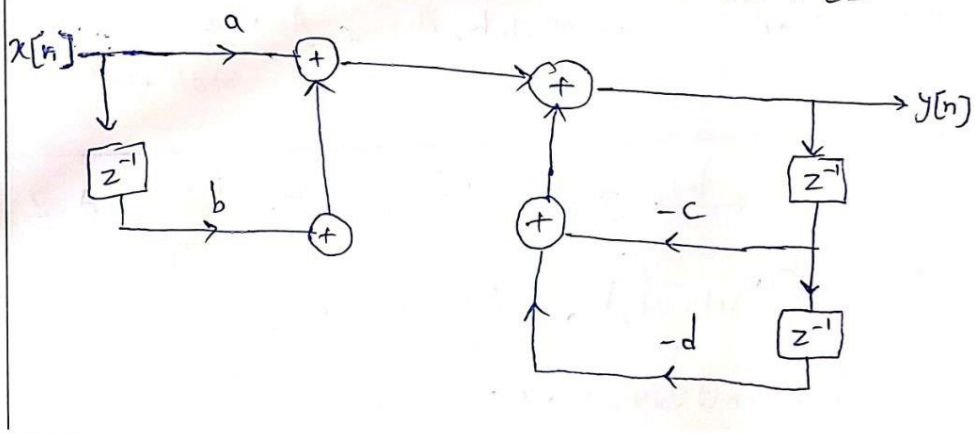
In the third case {a = 3}, one of the zeros is inside the circle and the other zero and two poles are outside the circle.

Question 5

E

$$H(z) = \frac{z(az+b)}{cz+d+z^2} = \frac{az^2+b}{z^2+cz+d} = H_1(z) \cdot H_2(z) \qquad (E-5$$

$$H_1(z) = a(z)^{-0} + b(z)^{-1} \qquad H_2(z) = \frac{1}{1 + cz^{-1} + dz^{-2}}$$



F

$a=1, b=1, c=-3, d=2 \Rightarrow 3\times 2^n - 2$ for $n \geq 0$ F-5