Question **1**

Complete

Marked out of 3.00

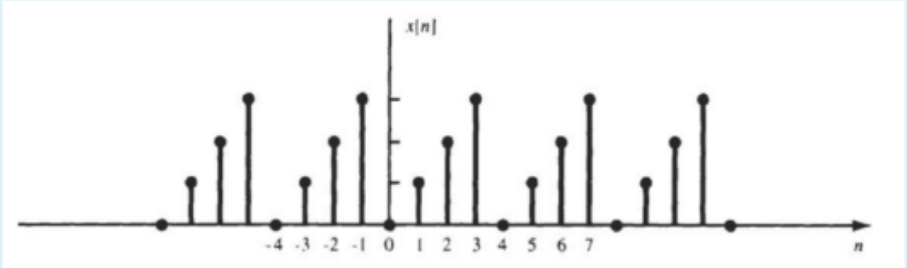
Flag question

Find the Fourier coefficients of the signal x(n) as shown in the Figure:

Arrange the Unique Id number "a" (sent via mail) in ascending order to get "b".

The magnitude of x[n] are as follows:

x[0] = 0; x[1]= b[1], x[2]=b[2]; x[3]=b[3].



Question **2**

Complete

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Flag

- Determine the z-transform of the sequence $x[n] = \delta[n] - \frac{a[0]}{10}\delta[n - a[1]]$.
- Sketch pole-zero pattern for the sequence in part 1.

Question **3**

Not answered

Marked out of 3.00

Flag question

Obtain the time domain impulse response of the time invariant system described by,

$y(n) = a[0]x(n) + a[1]x(n-1) + a[2]x(n-2) + a[3]x(n-3) + a[4]x(n-4)$

Here "a" is the Unique Id number sent via mail.

Question **4**

Complete

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Flag question

Consider x(n) = u(n + a[1]) − u(n − a[1]). Find its Bilateral and Unilateral Z-Transform.

"a" is the Unique Id number sent via mail.

Question **5**

Complete

Marked out of 5.00

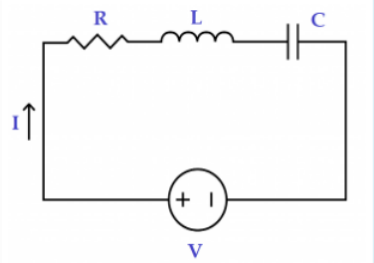
Flag question

In the circuit shown in the figure, x(t) is the input voltage and y(t) is the voltage across the capacitor.

The circuit elements are given as:

$R = 2a[0]; L = 1; C = \frac{1}{a[0]^2 + a[1]^2}$

"a" is the Unique Id number sent via mail.



RLC Series circuit

- Determine the differential equation relating x(t) and y(t).
- Find the homogeneous solution of the differential equation from part (i).
- Show that, since the voltage and current are restricted to be real, the natural response of the system is a decaying sinusoid.

Question **6**

Complete

Marked out of 7.00

Flag question

Consider a causal LTI system given by the differential equation:

$\frac{d^2y(t)}{dt^2} - a[0]\frac{dy(t)}{dt} + a[1]y(t) = x(t)$

"a" is the Unique Id number sent via mail.

Let h(t) be the impulse response and H(s) be the Laplace transform of h(t).

- Determine H(s) and sketch the pole zero location.
- Determine the impulse response h(t) for the system and specify the region of convergence (ROC).
- Is the computed h(t) stable?
- If yes why? If No what will be the ROC and h(t) to make the system stable.

Question **7**

Complete

Marked out of 3.00

Flag question

A signal $x(t) = sin(2\pi a[0]t)$ is sampled at 10Hz. Describe the signal recoverd $y(t)$ if the sampled signal is passed through

- A ideal low pass filter with cut-off 18Hz .
- An ideal bandpass filter with passband between 2 and 8 Hz.

"a" is the Unique Id number sent via mail.

Question **8**

Not answered

Marked out of 5.00

Flag question

A real-valued discrete-time signal x[n] has a Fourier transform (FT) $X(e^{j\omega})$ that is zero for $\frac{a[0]}{10a[1]}\pi \leq |\omega| \leq \pi$. The nonzero portion of the FT of one period of $X(e^{j\omega})$ can occupy the region $|\omega| < \pi$ by performing upsampling (upscaling or interpolation) and downsampling (downscaling or decimation) by a factor of L and M respectively.

- Find the values of L and M.
- Which should be done first - upsampling or downsampling ?
- Sketch the spectrum of x[n] for each of the steps used above.

"a" is the Unique Id number sent via mail.