1. Fundamental period of the signal $x[n] = \sum_{k=-\infty}^{\infty} \{\delta[n-3k] + \delta[n-3k^2]\}$ is, [1 mark]

A. 1
B. 3
C. Undefined
D. Non-periodic

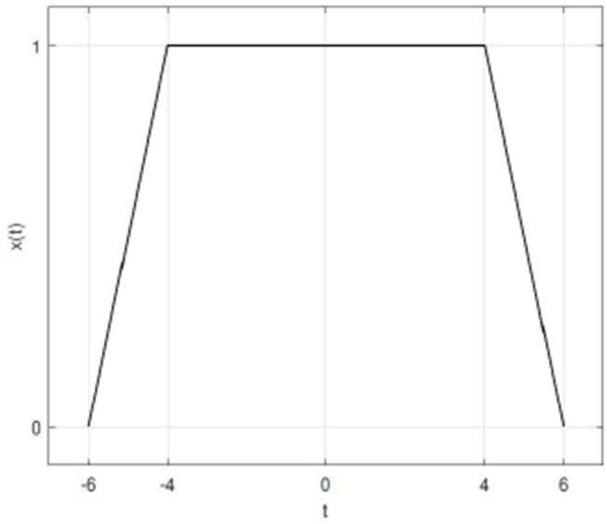
Ans: Option D

2. A system's output is a complex conjugate of the input signal. The system is, [1 mark]

A. Homogeneous
B. Additive
C. Linear
D. None of these

Ans: Option B

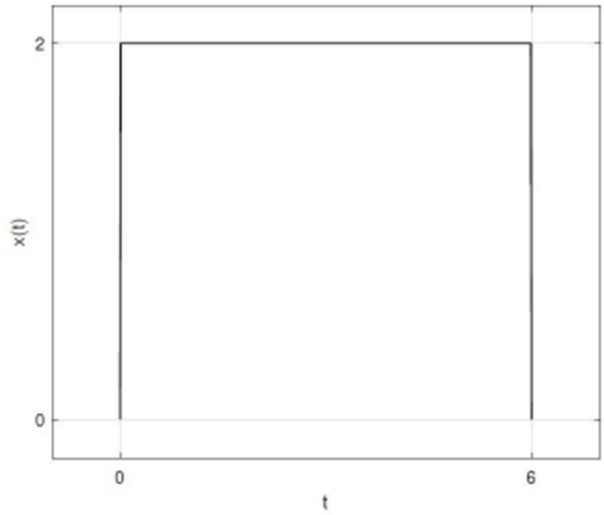
3. Consider the signal below. In case this signal is applied as an input signal to a differentiator, energy of the output signal will be, [1 marks]



A. 0
B. $\frac{1}{4}$
C. $\frac{1}{2}$
D. 1

Ans: Option B

4. Consider the pulse below. This signal is applied as an input to an integrator, $\int_0^t x(\tau)\,d\tau$, energy of the output signal will be, [1 marks]



A. 280
B. 288
C. 296
D. 312

Ans: Option B

5. The value of $t\,\frac{d\delta(t)}{dt}$ is, [1 mark]

A. $\delta(t)$
B. $-\delta(t)$
C. $\frac{1}{\delta(t)}$
D. None of these

Ans: Option B

6. Even and odd component of signal $x[n] = \delta[n]$ are, [1 mark]

A. $0, 0$
B. $0, -\delta(t)$
C. $\delta(t), 0$
D. $\delta(t), -\delta(t)$

Ans: Option C

7. The value of $\delta[2n]$ is, [1 mark]

A. $\frac{1}{2}\delta[n]$
B. $\delta[n]$
C. $2\delta[n]$
D. None of these

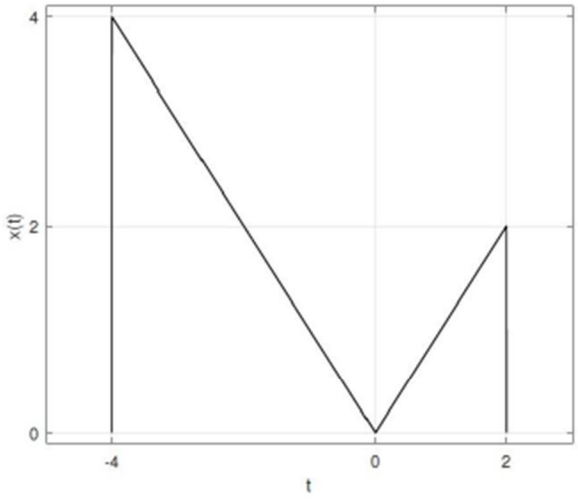
Ans: Option B

8. Given an energy signal $x(t)$ with energy E_x, energy of the signal $x(t/2-1)$ will, [1 mark]

A. increase
B. decrease
C. remains same
D. None of these

Ans: Option A

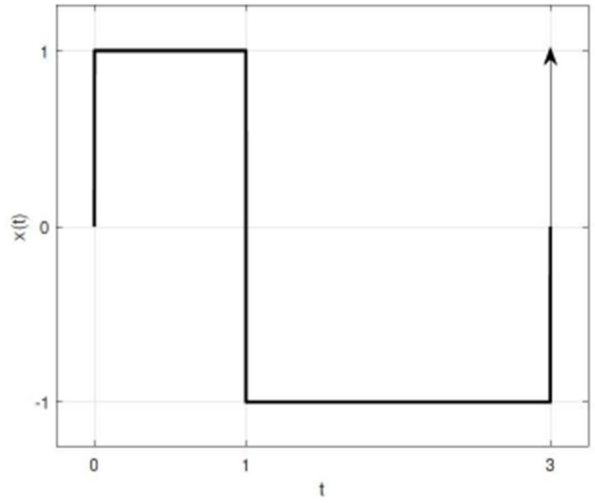
9. Consider the signal depicted below which is applied to a differentiator. The output signal of the differentiator will be, [2 marks]



A. $2u(t-1)+4*\text{tri}(\frac{t}{2}-2)$
B. $2[u(t-1)-u(t-4]+\text{tri}(t-2)$
C. $\text{tri}(t-1)+(t-1)*[u(t-2)-u(t-3)]$
D. $\text{tri}(t-1)-(t-2)*[u(t-2)-u(t-3)]$

Ans: Option D

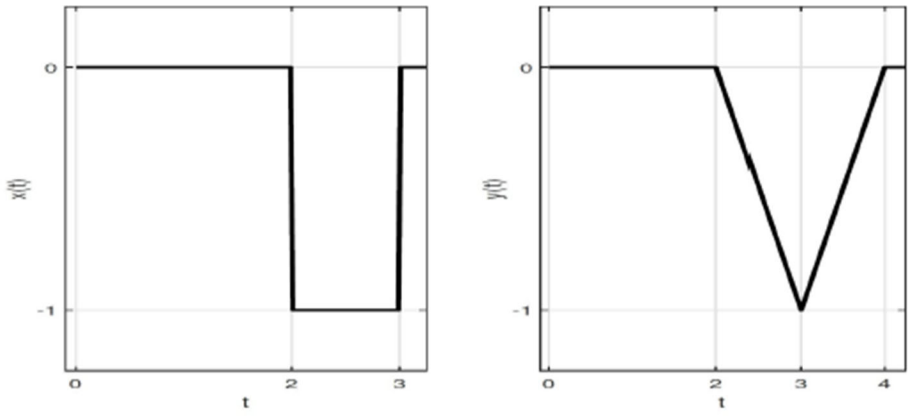
10. Consider the signal depicted below which is applied to an integrator. Note, there is an impulse at $t = 3$. The output signal at $t = 3$ will be, [2 marks]



A. 0
B. 1
C. 2
D. Undefined

Ans: Option A

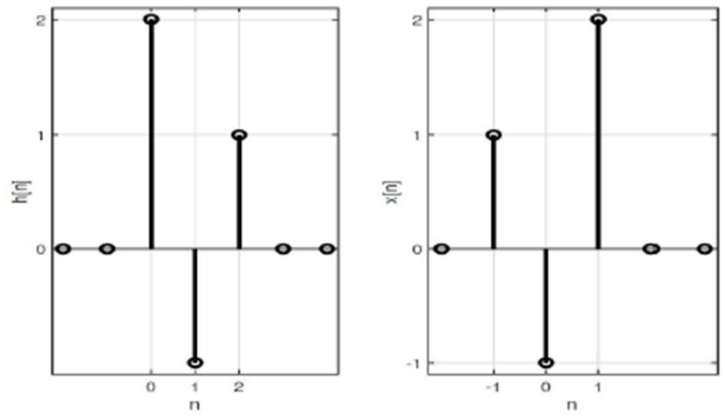
11. Consider the input ($x(t)$) & output ($y(t)$) signal of a LTI system below. The system is, [1 marks]



A. Memoryless & causal
B. Memoryless & non-causal
C. Non-memoryless & causal
D. Non-memoryless & non-causal

Ans: Option C

12. Consider the impulse response ($h[n]$) of a linear, time-invariant discrete system below. The system is subjected to input signal $x[n]$ shown on the right of the figure below. System response will be, [2 marks]



A. $\delta[n+1] + 3\delta[n] + 4\delta[n-1] - 2\delta[n-2] - 3\delta[n-3]$
B. $\delta[n+1] - 3\delta[n] + 6\delta[n-1] - 3\delta[n-2] + \delta[n-3]$
C. $2\delta[n+1] - 2\delta[n] - 4\delta[n-1] - 2\delta[n-2] + \delta[n-3]$
D. $\delta[n+1] + 2\delta[n] - \delta[n-1] + 4\delta[n-3]$

Ans: Option B

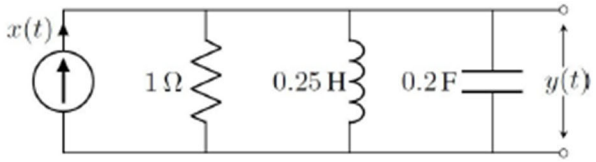
13. A system is governed by the following equation. The system is, [1 mark]

$$y(t) = \sqrt{\int_a^b [x(\tau)]^2 \, d\tau}$$

A. Homogeneous
B. Additive
C. Linear
D. None of these

Ans: Option A

14. Consider the RLC circuit given below. Assuming some constants a, b, & c, the functional form of the unit impulse response, $y(t)$, of the circuit will be, [**Hint:** *current cannot change instantaneously through an inductor and voltage cannot change instantaneously across a capacitor.* Also, $x(t) = i_R(t) + i_L(t) + i_C(t)$] [2 marks]



A. $a\cos(ct)$
B. $a\sin(ct)$
C. $a\,e^{-bt}\cos(ct)$
D. $a\,e^{-bt}\sin(ct)$

Ans: Option C

15. Consider a system whose impulse response is $h(t) = -\delta(t) + 2e^{-t}u(t)$ and it is subjected to input $x(t) = e^{t}u(-t)$. The system response will be, [2 marks]

A. $\delta(t)$

B. $u(t)$

C. $e^{t}u(t)$

D. $e^{-t}u(t)$

Ans: Option D