

Signals and Systems

Duration: 40 Minutes

Maximum marks: 30

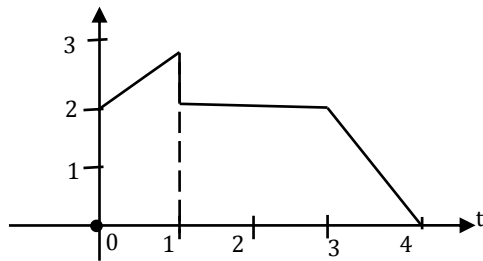
Q.1 - Q.10 Carry One Mark each.

1. The Z-T of the signal $x(n] = [3(2^n) - 4(3^n)]u(n)$ When ROC of the signal is

$|Z| > 3$, $X(z) = -\frac{az^2 + bz}{cz^2 + dz + e}$, then $a + b + c + d + e = \underline{\hspace{2cm}}$?

2. The Energy of the signal $x(t) = \sin c(5t)$ is $\underline{\hspace{2cm}}$?

3. Determine the Laplace transform of the signal in the figure.



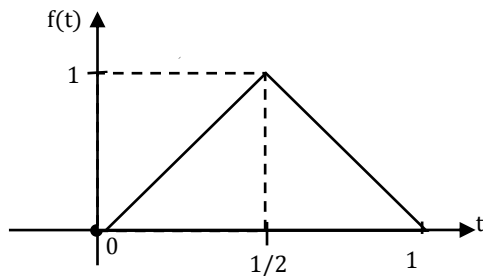
(A) $\frac{1}{s} \left(\frac{1}{2} - e^{-s} \right) + \frac{1}{s^2} \left(1 - \frac{1}{2}e^{-s} - e^{-3s} + \frac{1}{2}e^{-4s} \right)$

(C) $\frac{1}{s} (1 - e^{-s}) + \frac{1}{s^2} (1 - 2e^{-s} + e^{-3s} - 2e^{-4s})$

(B) $\frac{1}{s} (2 - 4e^{-s}) + \frac{1}{s^2} (2 - e^{-s} - 2e^{-3s} + e^{-4s})$

(D) $\frac{1}{s} (2 - e^{-s}) + \frac{1}{s^2} (1 - e^{-s} - 2e^{-3s})$

4. Laplace transform of the function $f(t)$ is



(A) $\frac{2}{s^2} [1 - e^{-0.5s}]^2$

(C) $\frac{2}{s^2} [1 - e^{+0.5s}]^2$

(B) $\frac{2}{s^2} [1 + e^{-0.5s}]^2$

(D) $\frac{2}{s^2} [1 + e^{+0.5s}]^2$

5. The Fourier transform of $e^{-\pi t^2}$ is $e^{-\pi f^2}$; Then the FT of $e^{-\alpha t^2}$ in

(A) $\left(\frac{1}{\alpha}\right) e^{-\alpha f^2}$

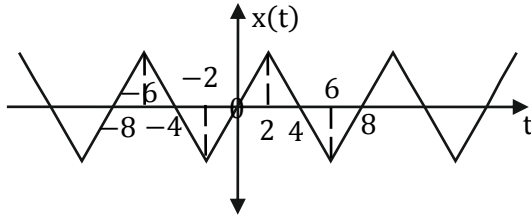
(C) $\frac{1}{\sqrt{\pi\alpha}} e^{-\pi^2 f^2}$

(B) $\sqrt{\frac{\pi}{\alpha}} e^{-\frac{\pi^2 f^2}{\alpha}}$

(D) $\sqrt{\pi\alpha} e^{-\frac{f^2}{\pi^2\alpha}}$

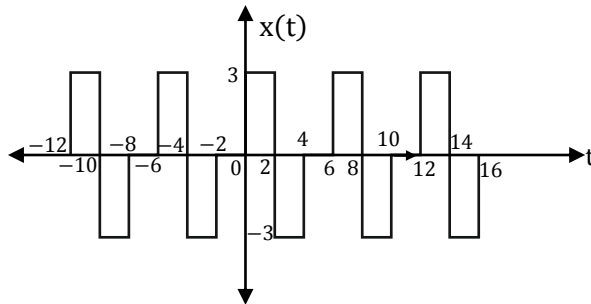
Q.6 - Q.10 Carry Two Mark each.

6. The trigonometry Fourier series representation of a continuous time signal $x(t)$ will contain



- (A) All harmonics of sine term
 (B) Odd harmonics of sine term
 (C) All harmonics of cosine term
 (D) Odd harmonics of cosine term
7. A discrete time signal $x(n)$ and $h(n)$ are both non-zero for $n = 0, 1, 2$ and zero otherwise. If is given that $x(n) = 2\delta(n) + \delta(n - 1) + 3\delta(n - 2)$ & $h(n) = 8\delta(n) + x\delta(n - 1) + y\delta(n - 2)$ Let $y(n) = x(n) * h(n)$ and given that $y(1) = 6, y(2) = 3$ Then the energy of signal $y(n)$ is _____ (units)

8. A continuous time signal $x(t)$ is shown below



The average power of $y(t) = x\left[\frac{1}{3}t + 2\right]$ is _____ ?

9. Let a discrete time signal $x(n) = 3[-0.25]^{-n}u(n) - 8\left[\frac{1}{6}\right]^{-n}u(-n - 1)$ The region of convergence[Roc] of the z-transform of $x(n)$ is
 (A) $|z| < 4$
 (B) $4 \leq |z| \leq 6$
 (C) $|z| > 6$
 (D) $[0.25]^{-1} < |z| < \left(\frac{1}{6}\right)^{-1}$
10. The impulse response of an LTI system is $n(t) = e^{+5t}u(3 - t)$. The system is
 (A) Stable and causal
 (B) Unstable and causal
 (C) Stable and Non-causal
 (D) Unstable and Non causal