S&S QUIZ-1 SOLUTIONS

SOL(1) :

(5X1) POINTS

Energy of signal $x(t)$, $E = \int_{-\infty}^{\infty} |x(t)|^2 . dt$

Power of signal $x(t)$, $P = \begin{cases} \frac{1}{T_0} \int_0^{T_0} |x(t)|^2 . dt & \text{For Periodic Signal} \\ \lim_{\tau \to \infty} \frac{1}{\tau} \int_{-\tau/2}^{\tau/2} |x(t)|^2 . dt & \text{For Non-Periodic Signal} \end{cases}$

(a) No evaluation

(b) Infinite extension signals with amplitude/Peak amplitude decreasing in nature. → $x(t) = e^{-a|t|}$, $a>0$
Energy Signal

(c) Infinite extension signals with Peak amplitude decreasing in nature. Hence Energy Signal
$x(t) = Sa(t)$ OR $x(t) = sinc(t)$

(d) Infinite extension signals with Peak amplitude decreasing in nature. Hence Energy Signal
$x(t) = -e^{-at} . u(t)$; $a>0$

(e) Infinite extension signals with constant Peak amplitude/constant amplitude. Hence Power Signal
$x(t) = \sin(t)$

(f) Infinite extension signals with Peak amplitude increasing in nature. Hence Neither Energy Nor Power Signal

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SOL(2):

(4 POINTS)

Given signal, $x(t) = \sin^2(4\pi t)$

$$= \left(\frac{1}{2}\right) - \frac{\cos(8\pi t)}{2}$$

↓ Periodic Signal (DC signal)

↓ Periodic Signal $\omega_0 = 8\pi$

$\therefore$ FTP of signal $x(t) = T_0 = \frac{2\pi}{\omega_0} = \frac{2\pi}{8\pi} = \left(\frac{1}{4}\right)$ sec

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