17. **[Ans. B]**

$y(t) = x[t + t_0]$

Let

$x(t) \xrightarrow{\text{F. S coefficient}} a_n$

$x(t) \xrightarrow{\text{F. S coefficient}} b_n \ldots .①$

$x(t + t_0) \xrightarrow{\text{F. S coefficient}} a_n e^{+jn\omega t_0} \ldots .②$

$b_n = a_n e^{+jn\omega t_0} \qquad \omega = \frac{2\pi}{T}$

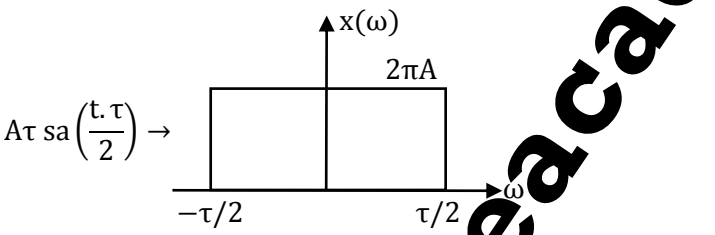
$b_n = a_n e^{+jn\frac{2\pi}{T}\times 2}$

$b_n = a_n e^{jn\pi} \quad \{e^{jn\pi} = \cos n\pi + j \sin n\pi\}$

$b_n = a_n(-1)^n$

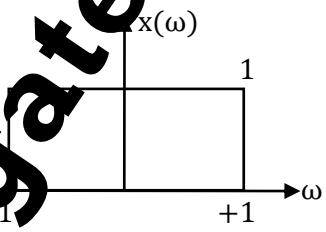
18. **[Ans. D]**

$x(t) = \frac{1}{\pi}Sa(t)$

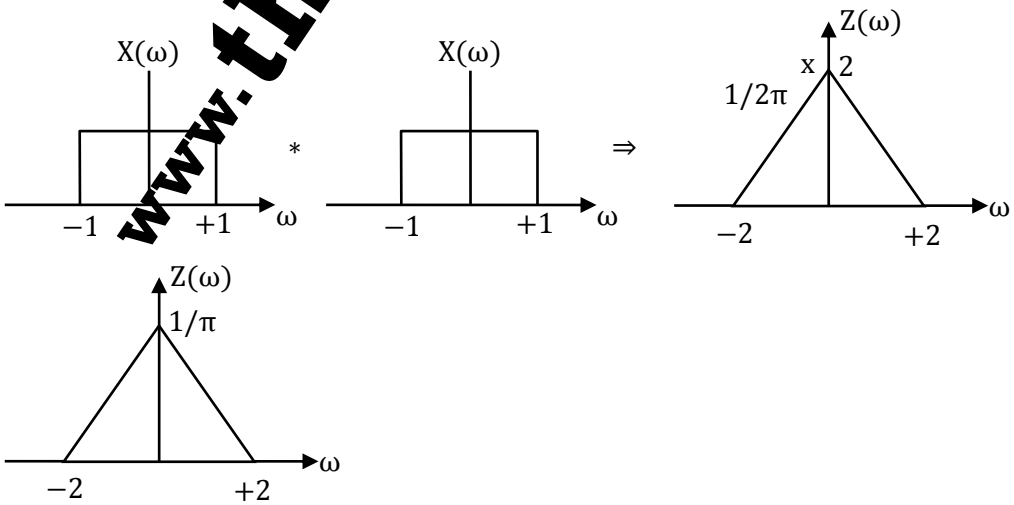


$A\tau = \frac{1}{\pi} \rightarrow A = \frac{1}{2\pi}$

$\frac{\tau}{2} = 1 \rightarrow \tau = 2$



$z(t) = x(t)x(t) \longrightarrow \frac{1}{2\pi}[X(\omega) * X(\omega)]$



19. **[Ans. C]**

x(t)	X(ω)
1. [Real + Even]	[Real + Even]
2. Real + odd	Imaginary + odd
3. Imaginary + even	Imaginary + even
4. Imaginary + odd	Real + odd

∴ Option (C) is Correct.

20. **[Ans. *] Range: 0.125 to 0.125**

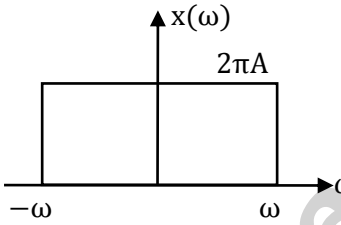
$$x(t) = \frac{\sin(8\pi t)}{8\pi t} = sa[8\pi t]$$

$$\int_{-\infty}^{\infty} |sa^2(8\pi t)| = \frac{1}{8} = 0.125 \rightarrow \text{"Smart Method"}$$

2nd Method:

$$x(t) = sa[8\pi t]$$

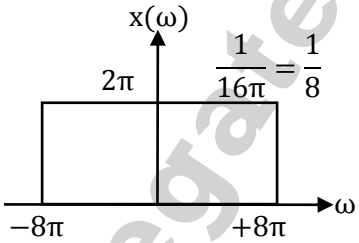
$$A\tau sa\left[\frac{t\tau}{2}\right] \xrightarrow{FT}$$



$$Sa[8\pi t] \rightarrow A\tau = 1$$

$$\frac{\tau}{2} = 8\pi$$

$$A = \frac{1}{16\pi} \xrightarrow{FT}$$



$$\int_{-\infty}^{\infty} sa^2(8\pi t) = \frac{1}{2\pi} = \int_{-8\pi}^{+8\pi} \left(\frac{1}{8}\right)^2 \cdot d\omega$$

$$= \frac{1}{2\pi}\left[\frac{1}{64}\omega\right]_{-8\pi}^{+8\pi}$$

$$= \frac{1}{2\pi}\left[\frac{16\pi}{64}\right] = \frac{1}{8} = 0.125$$