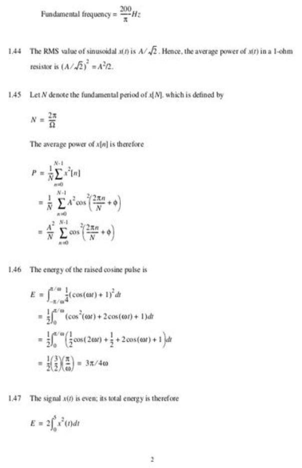

Fundamental frequency $= \frac{200}{\pi} Hz$

1.44 The RMS value of sinusoidal $x(t)$ is $A/\sqrt{2}$. Hence, the average power of $x(t)$ in a 1-ohm resistor is $(A/\sqrt{2})^2 = A^2/2$.

1.45 Let N denote the fundamental period of $x[N]$. which is defined by

$$N = \frac{2\pi}{\Omega}$$

The average power of $x[n]$ is therefore

$$\begin{aligned} P &= \frac{1}{N}\sum_{n=0}^{N-1} x^2[n] \\ &= \frac{1}{N}\sum_{n=0}^{N-1} A^2 \cos^2\left(\frac{2\pi n}{N}+\phi\right) \\ &= \frac{A^2}{N}\sum_{n=0}^{N-1} \cos^2\left(\frac{2\pi n}{N}+\phi\right) \end{aligned}$$

1.46 The energy of the raised cosine pulse is

$$\begin{aligned} E &= \int_{-\pi/\omega}^{\pi/\omega} \frac{1}{4}(\cos(\omega t)+1)^2 dt \\ &= \frac{1}{2}\int_0^{\pi/\omega} (\cos^2(\omega t) + 2\cos(\omega t) + 1) dt \\ &= \frac{1}{2}\int_0^{\pi/\omega} \left(\frac{1}{2}\cos(2\omega t) + \frac{1}{2} + 2\cos(\omega t) + 1\right) dt \\ &= \frac{1}{2}\left(\frac{3}{2}\right)\left(\frac{\pi}{\omega}\right) = 3\pi/4\omega \end{aligned}$$

1.47 The signal $x(t)$ is even; its total energy is therefore

$$E = 2\int_0^5 x^2(t) dt$$

2