$\therefore f_{max} = 150Hz$

$\therefore f_N = 2 \times 150$

$= 300Hz$ (minimum frequency required)

$f_s = 350Hz$ (Depends on user)

- f_s should be near f_N

$$x(n) = 3\cos\left(50\pi n \frac{1}{f_s}\right) + 10\sin\left(300\pi n \frac{1}{f_s}\right) - \cos\left(100\pi n \frac{1}{f_s}\right)$$

$$= 3\cos\left(\frac{50\pi}{350} n\right) + 10\sin\left(\frac{300\pi}{350} n\right) - \cos\left(\frac{100\pi n}{350}\right)$$

$$\therefore x(n) = 3\cos\left(\frac{\pi}{7} n\right) + 10\sin\left(\frac{6\pi}{7} n\right) - \cos\left(\frac{2\pi}{7} n\right)$$ ← DT signal.

Now, converting the DT signal back to CT signal.

Previously, we see that, $\Omega = 2\pi \frac{f_a}{f_s}$

Analogue frequency:

$\omega_1 = 50\pi \Rightarrow \Omega_1 = \frac{\pi}{7}$ rad/sec

$\omega_2 = 300\pi \Rightarrow \Omega_2 = \frac{6\pi}{7}$ rad/sec

$\omega_3 = 100\pi \Rightarrow \Omega_3 = \frac{2\pi}{7}$ rad/sec

} Digital frequency

(i) $\Omega_1 = 2\pi \frac{f_a}{f_s}$

$\frac{\pi}{7} = 2\pi \frac{f_a}{f_s}$

$\frac{\pi}{7} = 2\pi \frac{f_a}{350}$

$f_a = 25Hz$

(ii) $\Omega_2 = 2\pi \frac{f_a}{f_s}$

$\frac{6\pi}{7} = 2\pi \frac{f_a}{f_s}$

$f_a = 150Hz$

(iii) $\frac{2\pi}{7} = 2\pi \frac{f_a}{f_s}$

$f_a = 50Hz$