Quiz-5
Solution

From the figure, we get—

$y(t) = 10t \qquad -1 < t \leq 1$ (ie in one time period) — ① mark.

Also, since $T = 2$ — ② mark

$\omega_0 = \pi$ — ① mark.

Using the Fourier series expansion, we have

$$c_k = \frac{1}{2}\int_{-1}^{1} 10t\, e^{-jk\pi t}\, dt$$

$$= 5\int_{-1}^{1} t\, e^{-jk\pi t}\, dt$$

— 2 marks.

$$= 5\left[\frac{t\, e^{-jk\pi t}}{-jk\pi}\Bigg|_{-1}^{1} - \frac{e^{-jk\pi t}}{(jk\pi)^2}\Bigg|_{-1}^{1}\right]$$

$$= 5\left[\left(\frac{e^{-jk\pi}}{-jk\pi} + \frac{e^{jk\pi}}{-jk\pi}\right) - \left(\frac{e^{-jk\pi}}{(jk\pi)^2} - \frac{e^{jk\pi}}{(jk\pi)^2}\right)\right]$$

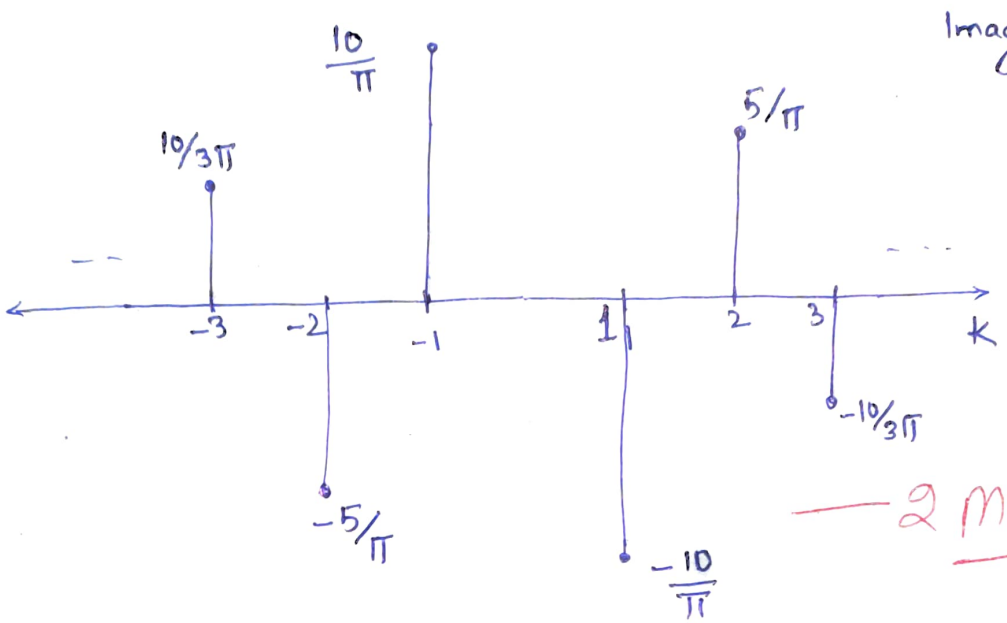
2 Marks

$\because\ e^{-jk\pi} = e^{jk\pi} = (-1)^k$

$$= \frac{10(-1)^k}{-jk\pi}$$

$$= \frac{10j(-1)^k}{k\pi} \qquad k \neq 0$$

— ① mark



— 2 Marks