ANSWER KEY

Q.1 (a) $X(f) = \text{sinc}(0.25f)e^{-j4\pi f}$

(b) $Y(f) = \left[\text{sinc}\left(\frac{f-400}{4}\right) + \text{sinc}\left(\frac{f+400}{4}\right)\right]e^{-j4\pi f}$

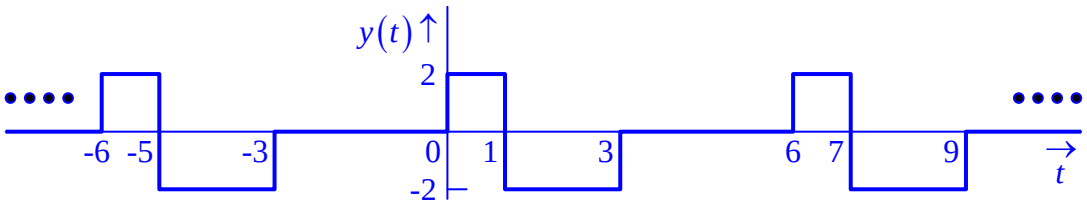
(c) Energy: 8 J

1st-null Bandwidth: 8 Hz

Q.2 (a) $x(t) = 2\text{rect}(t-0.5) - 2\text{rect}\left(\frac{t-2}{2}\right)$

(b) Energy = 12 J

(c)(i)



(c)(ii) $c_k = \frac{1}{T}X\left(\frac{k}{T}\right) = \frac{1}{3}e^{-j\frac{\pi k}{6}}\text{sinc}\left(\frac{k}{6}\right) - \frac{2}{3}\text{sinc}\left(\frac{k}{3}\right)e^{-j\frac{2\pi k}{3}}$ ..... $\forall$ integer k

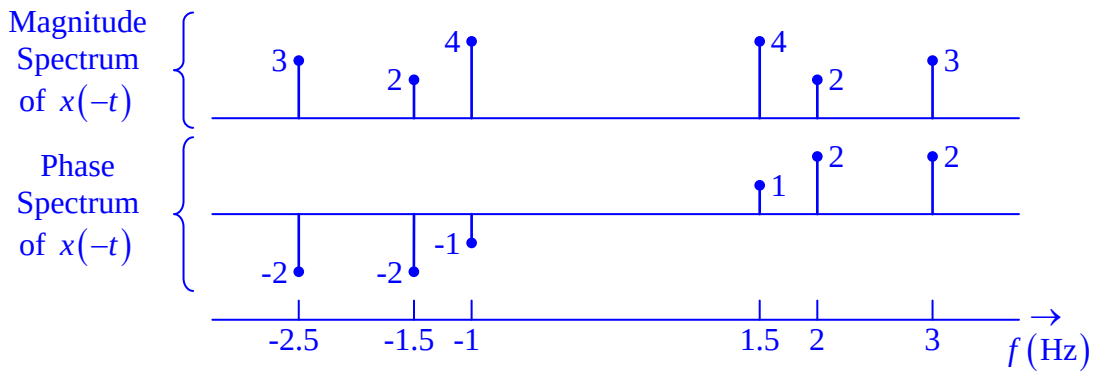
ignore the f ignore the f

Average Power: 2 W

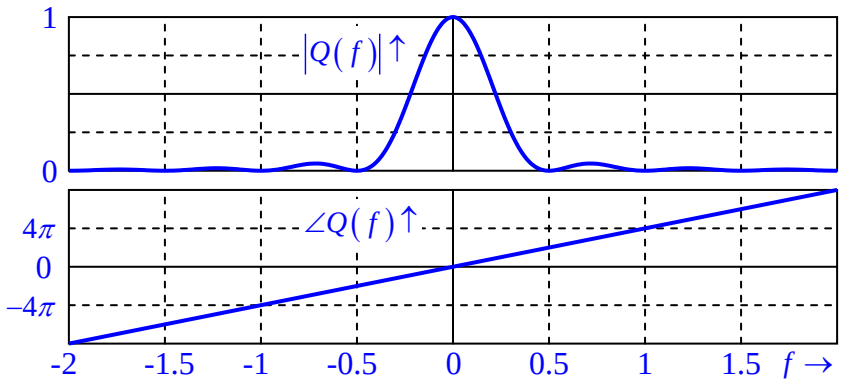
Q.3 (a) Complex, power and periodic. REASONS?

(b) Average Power of $x(\alpha t) = 58$ W . JUSTIFY?

(c)



Q.4 (a)



(b) ESD: $\text{sinc}^4(2f)$

Energy: $\frac{1}{3}$ J

(c) $S(f) = 8\text{sinc}^2(4f) - 2\text{sinc}^2(2f)e^{-j12\pi f}$