

# [ Q03 ]

$$G_{\text{FOPT}}(s) = \frac{(1)e^{-s}}{2s+1}$$

$$\mathcal{Z}\{H_{\text{ZOH}}(s) G_{\text{FOPT}}(s)\} = \mathcal{Z}\left\{ \frac{1-e^{-sT}}{s} \frac{e^{-s}}{2s+1} \right\}$$

$$= (1-z^{-1}) z^{-T} \mathcal{Z}\left\{ \frac{1}{s(2s+1)} \right\}$$

$$\Rightarrow \frac{1}{s(2s+1)} = \frac{A}{s} + \frac{B}{2s+1}$$

$$\frac{2As + A}{Bs + 1}$$

$$A=1$$

$$B=-2$$

$$= (1-z^{-1}) z^{-T} \mathcal{Z}\left\{ \frac{1}{s} + (-2) \frac{1}{2s+1} \right\}$$

$$= (1-z^{-1}) z^{-T} \mathcal{Z}\left\{ \frac{1}{s} + (-1) \frac{1}{s+(\frac{1}{2})} \right\}$$

$$= (1-z^{-1}) z^{-T} \left[ \frac{1}{1-z^{-1}} + (-1) \frac{1}{1-e^{(-\frac{T}{2})} z^{-1}} \right]$$

$$= z^{-T} \left[ 1 - \frac{1-z^{-1}}{1-e^{(-\frac{T}{2})} z^{-1}} \right]$$

$$= z^{-T} \left[ \frac{(1-e^{(-\frac{T}{2})}) z^{-1}}{1-e^{(-\frac{T}{2})} z^{-1}} \right]$$