ساسان وحیدی نیا ۹۷۳۲۴۶۹۹

1) a)

$$10 \log\left(\frac{S}{N}\right) = 12 \Rightarrow \log\left(\frac{S}{N}\right) = 1{,}2 \Rightarrow \frac{S}{N} = 10^{1{,}2}$$

$$C = BW \times \log_2\left(1+\frac{S}{N}\right)$$

$$C = 2wm \Rightarrow 2wm = w \log_2\left(1+\frac{S}{N}\right)$$

$$\Rightarrow 2m = \log_2\left(1+\frac{S}{N}\right) \Rightarrow 2m = \log(1+10^{1{,}2})$$

$$\Rightarrow m = \frac{\log(1+10^{1{,}2})}{2} \Rightarrow m = \frac{\log(16{,}84)}{2} = \frac{4.07}{2} = 2.035$$

$$\log_2^{n} = 2.035 \Rightarrow n = 4.098$$

$\Rightarrow$ 4 سطح

b) $C = w \log_2\left(1+\frac{S}{N}\right) \Rightarrow C = 4 \times 10^3 \times 4.07 = 16{,}280$ kbps

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21 [redacted]

$$10\log_{10}\left(\frac{E_b}{N_0}\right) = 10\log_{10}\left(\frac{S}{N}\right) + 10\log_{10} W - 10\log_{10} R$$

$$12 = 25 + 10\log_{10}\frac{S}{R} \quad \rightarrow (1)$$

$$-13 = 10\log_{10}\frac{W}{R} \rightarrow [redacted] \log\frac{W}{R} = -1.3$$

$$\frac{W}{R} = 10^{-1.3} \Rightarrow \frac{R}{W} = 10^{1.3} = 19.9$$

B

3)

$$C = w \log_2\left(1+\frac{S}{N}\right) \Rightarrow C = w \log_2(1001)$$

$$10\log\left(\frac{S}{N}\right) = 30 \Rightarrow \log\left(\frac{S}{N}\right) = 3 \Rightarrow 10^3 = \frac{S}{N}$$

$$\Rightarrow 4\times10^3 \times \log_2(1001) = 4\times10^3 \times 9.96 = 39840$$

$C = C_2$ çünkü $C_2 > C_1$

4)

$C = 2\omega rm$

$$T_m = \frac{T_s}{n} \Rightarrow T_m = \frac{5\times10^{-7}}{1,2\times10^{2}} = \frac{5\times10^{-9}}{1,2} = \frac{1}{C}$$

$$\Rightarrow C = \frac{1,2}{5\times10^{-9}} = 2.4\times10^{8} = 240\times10^{6}\ bps$$

$$\Rightarrow C = 2\omega rm \longrightarrow 240\times10^{6} = 2\times\omega\times1 \Rightarrow$$

$$\omega = 120\times10^{6}\ Hz$$