

17B 6/1/20

ed/ 6.3.1 10P

$$A_m \geq \frac{\delta}{2\pi f_m T_s}$$

the input signal

$$x(t) = A_m \sin(2\pi f_m t)$$

slope of input signal

$$\frac{d x(t)}{dt} = |A_m \sin(2\pi f_m t)|$$

$$x(t) = A_m \cos(2\pi f_m t) \cdot 2\pi f_m$$

$$x(t) = A_m \cdot 2\pi f_m \cos(2\pi f_m t)$$

$\therefore \cos(2\pi f_m t)$ maximum value = 1

$$x(t) = A_m \cdot 2\pi f_m \cdot 1$$

$$x(t) = A_m \cdot 2\pi f_m$$

slope maximum of Delta modulator

$$= \frac{\delta}{T_s}$$

$$\left[A_m \cdot 2\pi f_m \right] \frac{\delta}{T_s}$$

$2\pi f_m$ - absolute frequency

$$A_m \left[\frac{\delta}{2\pi f_m T_s} \right]$$

A_m :- is the signal amplitude

δ :- is step size

f_m :- is signal frequency

T_s :- is sampling duration

الاستقارة

$$\frac{S}{N} = \frac{\text{signal power}}{\text{noise power}}$$

Signal power (P)

$$P = \frac{V^2}{R}$$

where $R=1$

$$\rho = v^2 \rightarrow v_{rms}$$

$$V_{rms} = \frac{A_m}{\sqrt{2}}$$

$$V_{rms} = \left(\frac{A_m}{\sqrt{2}} \right)^2 = \frac{A_m^2}{2}$$

$$\rho = \frac{Am^2}{2}$$

$$A_m = \frac{8}{2\pi \epsilon_m T_s}$$

$$P = \frac{\left(\frac{\delta}{2\pi F_m T_s} \right)^2}{2}$$

$$P = \frac{\delta^2}{2 \cdot 4\pi^2 F_m^2 T_s^2}$$

$$P = \frac{\delta^2}{8\pi^2 F_m^2 T_s^2}$$

$$\text{noise power} = \frac{\delta^2}{12}$$

$$\frac{S}{N} = \frac{\delta^2 / 8\pi^2 F_m^2 T_s^2}{\delta^2 / 12}$$

$$\frac{S}{N} = \frac{\cancel{\delta^2}}{8\pi^2 F_m^2 T_s^2} \cdot \frac{12}{\cancel{\delta^2}}$$

$$\frac{S}{N} = \frac{+12}{2} \cdot \frac{1}{8\pi^2 F_m^2 T_s^2}$$

$$\frac{S}{N} = \frac{3}{2\pi^2 F_m^2 T_s^2}$$

هذه نتائج

العام

13 July

11 : 8909bl

ex / 6.3.2 ¹²hp

in part $\rightarrow F_m = 2 \text{ KHz}$

جواب $F_m = 3 \text{ KHz (N r)}$

$A_m = ?$

$\delta = 250 \text{ mV}$

$$F(s) = 5 (2 F_m)$$

$$F_s = 5 (2 \times 3 \times 10^3)$$

$$F_s = 5 (8 \times 10^3)$$

$$F_s = 30 \times 10^3 \Rightarrow T_s = \frac{1}{F_s} = \frac{1}{30 \times 10^3} \text{ sec}$$

$$\delta = \frac{250}{1000} = 0.25 \text{ V}$$

$$A_m = \frac{\delta}{2\pi F_m T_s} = \frac{0.25}{2\pi \times 2 \times 10^3 \times \frac{1}{30 \times 10^3}}$$

$$A_m \sim 0.6 \text{ V}$$

ex/6.3.4 ¹⁴p

$$\delta = 1 \text{ V} \quad f_m = 100 \text{ Hz}$$

$$T_s = 1 \text{ m sec} \quad A_m = ?$$

$$A_m = \frac{\delta}{2\pi f_m T_s} = \frac{1}{2\pi \times 100 \times 1 \times 10^{-3}}$$

$$A_m \approx 1.6 \text{ V}$$

6.3.7 $\frac{1}{\beta}$

$$f_m = 10 \text{ kHz}$$

$$A_m = \frac{1}{2} = 0.5 \text{ V}$$

$$F(s) = 10 (2 \text{ km})$$

$$\delta = ? \quad \frac{\delta}{N} = ?$$

$$F(s) = 10 (2 \times 10^3) = 200 \text{ kHz}$$

$$T_s = \frac{1}{f_s} = \frac{1}{200 \times 10^3}$$

$$A_m = \frac{\delta}{2\pi f_m T_s}$$

$$0.5 = \frac{\delta}{2\pi \times 10 \times 10^3 \times \frac{1}{200 \times 10^3}}$$

$$\delta = 0.5 \times 2\pi \times 10 \times 10^3 \times \frac{1}{200 \times 10^3}$$

$$\delta = 0.5 \times 2\pi \times 10 \times \frac{1}{200}$$

$$\delta = 0.157$$

Signal to noise ratio = $\frac{S}{N}$

$$\frac{S}{N} = \frac{3}{2\pi^2 F m^2 \times 10^2}$$

$$\frac{S}{N} = \frac{3}{2\pi^2 \times (10 \times 10^3)^2 \times \left(\frac{1}{200 \times 10^3}\right)^2}$$

$$\frac{S}{N} = 60.79$$

$$\frac{S}{N} \text{ dB} = 10 \log_{10} (60.79)$$

$$\frac{S}{N} \text{ dB} = 17.83 \text{ dB}$$

$$64 / 64 \times 10^3$$

$$F_s = 64 \text{ KHz} \quad F_m = 3.5 \text{ KHz} \quad A_m = 1$$

$$\delta = ? \quad \frac{S}{N} = ? \quad T_s = \frac{1}{F_s} = \frac{1}{64 \times 10^3}$$

$$A_m = \frac{\delta}{2\pi F_m T_s}$$

$$\frac{1}{1} = \frac{\delta}{2\pi \times 3.5 \times 10^3 \times \frac{1}{64 \times 10^3}}$$

$$\delta = 2\pi \times 3.5 \times 10^3 \times \frac{1}{64 \times 10^3}$$

$$\delta = 0.34$$

$$\frac{S}{N} = \frac{3}{2\pi^2 F_m^2 T_s^2} = \frac{3}{2\pi^2 F_m^2 T_s^2}$$

$$= \frac{3}{2\pi^2 (3.5 \times 10^3)^2 \times \left(\frac{1}{64 \times 10^3}\right)^2}$$

$$\frac{S}{N} = 50.81$$

of implementation

$$\frac{5}{N} \alpha_B = 16 \log 590.81$$

$$\frac{5}{N} \alpha_B = 17.059$$