CS ①

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Ans:

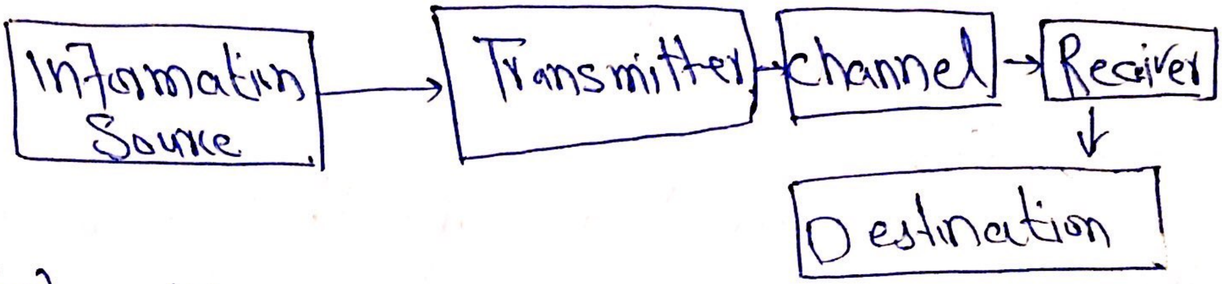
The SNR of an access point measured at the user device decreses the range to the user increse because the applicable free space loss b/w the user and the acess point reduce signal level. SNR directly impacts the performances of a wirless LAN connection. A higher SNR value means the signal strength is stronger in relation to the noise levels. A lower SNR requirs wirless LAN device to operate at lower data rates.

Q①(C)

Ans: The baseband signal are incompatible for direct transmission for such signal to travel longer distance its strength has to be increased by strength has to be increased ~~by~~ ~~mod~~ with high frequency carrier wave which doesn't effect the parameters of modulating signal.

Q1 (B)

The Basic block diagram of a Communication System will have five blocks.



Explaination:

Information Source: originates a message

Transmitter: convert The message into signal to be Transmitted

Channel: Transports The signal over a Certain medium.

Receievers: converts The Signal back into a readable messages

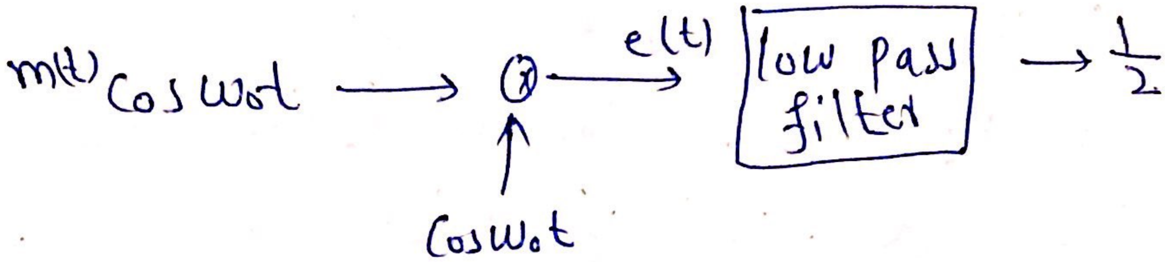
Destination: it is The final block which reccievers The message signal and process it to comprehand The informat present In it.

Q(1)(d) If you send digital data directly Through The air you will Probably Interfering with other transmitter So to Separate different Channel The Signal is modulated in a given Frequency band. obviously you can do This by digital modulation but due to harmonics you will Impact other channel (Modulation with a Square Signal has lots of harmonics) and during you demodulation depending on The other channel your Signal will be distorted Moreover you can Suffer of bandwith Problem of your Power amplifier which will distorted also you transmission.

Q No 1

e

$$f(t) = \cos(w_0 t + Q)$$



$$f(t) = m(t) \cos^2 w_0 t$$

$$f(t) = m(t) \left\{ \frac{1 + \cos(2w_0 t)}{2} \right\}$$

$$f(t) = \frac{m(t)}{2} + \frac{m(t) \cos(2w_0 t)}{2}$$

Q No 2 A

(i) $5 \cos 2\pi 10^6$
(ii) $3 \cos 2\pi 10^3$

(i) $f_1 = 2 \times 10^6$

We know That That

$$\lambda = \frac{c}{f_1}$$

C = Speed of light

$$\lambda = \frac{3 \times 10^8}{2 \times 10^6}$$

$$\lambda = \frac{3}{2} \times 10^{8-6}$$

$$\lambda = \frac{3}{2} \times 10^2$$

$$\lambda = 1.5 \times 10^2 m$$

(ii) $f_2 = 2 \times 10^3$

$$\lambda = \frac{c}{f_2}$$

$$= \frac{3 \times 10^3}{2 \times 10^3}$$

$= 1.5 \times 10^5$ Ans.

Q No 2
B

AM Modulation :

$$X_m(t) = A_m \cos w_m(t)$$

$$X_c[t] = A_c \cos w_c t$$

$$X_{AM}[t] = A_c[1 + m \cos w_m(t)] \cos w_c(t)$$

$\cos w_c(t)$ = multiplied to eq

$$X_{AM}(t) = A_c \cos w_c[t] + X_m(t) \cos w_c t$$

$$X_{AM}(t) = X_1(t) + X_2(t)$$

As we know that

$$\cos w(t) = \frac{1}{2}\{e^{jwt} + e^{-jwt}] \quad — ②$$

Comparing eq ① and eq ②

$$X_{AM}(t) = \frac{A_c}{2}(e^{jwt} + e^{-jwt}) + \frac{X_m(t)}{2}(e^{jwt} + e^{-jwt}) \longrightarrow ③ \text{ eq}$$

$$X_m(t) e^{jw_c t} \longrightarrow X(w_c - w_m)$$

$$X_m(t) e^{-jw_c t} \longrightarrow X(w_c + w_m)$$

The eq ③ becomes

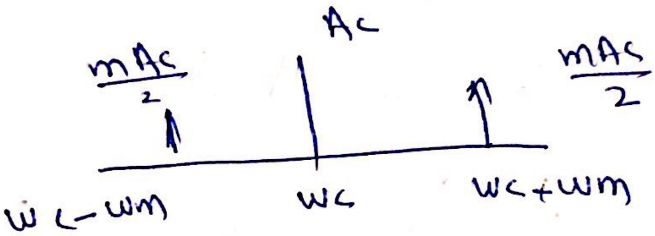
$$X_{AM}(t) = \frac{1}{2} X_m(t) e^{jw_c t} + \frac{1}{2} X_m(t) e^{-jw_c t}$$

$$X_2(t) = \frac{1}{2}(w_c - w_m) + \frac{1}{2}X(w_c + w_m)$$

$$X_1(t) = \pi A\left(\delta(w - w_c) + \delta(w + w_c)\right)$$

$$X_{AM}(t) = \pi A\left[\delta(w + w_c) + \delta(w + w_c) + \frac{1}{2}\left(X(w_c - w_m) + X(w_c + w_m)\right)\right]$$

<u>Power of Am Waves</u>



$$X_{Am}(t) = A_c \cos w_c t = \frac{mA_c}{2}\left(\cos(w_c - w_m t)\cos(w_c + w_m)\right)$$

$$X_m(t) = \pi A\left(\delta(w - w_c) + \delta(w + w_c) + \frac{1}{2}\left(X(w_c - w_m) + X(w_c - w_m)\right)\right)$$

Power = Power(lower Side band) + P(upper S.B) + Pc

$$V_{c,Rms} = V_c/\sqrt{2}$$

$$V_{m}\text{-}Rms \quad V_m/\sqrt{2}$$

$$P_c = \frac{V_c^2}{R} \Rightarrow V_c^2/\sqrt{2}R$$

$$P_m = V_m^2/R \Rightarrow V_m^2/R$$

$$\Rightarrow \left(\frac{mV_c}{2}\right)^2/2R.$$

⑧

$$\frac{m^2 V_c^2}{4 - 2R} \Rightarrow m^2 \cdot P_c$$

$$P_t = P_c\left(1 + \frac{m^2}{2}\right)$$

$$\text{Band with} = f_H - f_c$$

$$B = (w_c + w_m) - (w_c - w_m)$$

$$B = 2w_m$$

Q3 (A)

$x_{in}(t)$

(i) If $m < 1$

(ii) $m \neq 1$

(iii) $m > 1$

$x_c(t)$

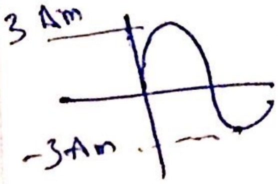
$$m = \frac{A_m}{A_c}$$

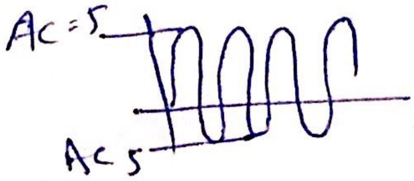
$m < 1 = A_c > A_m$

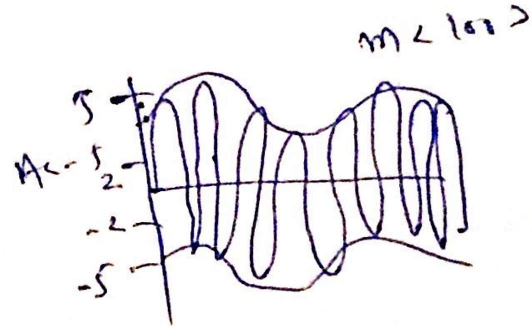
$m = 1 \Rightarrow A_c = A_m$

$m = 1 \Rightarrow A_c < A_m$

$A_m(t)$







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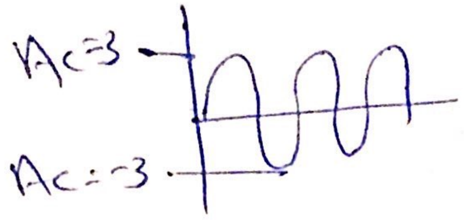

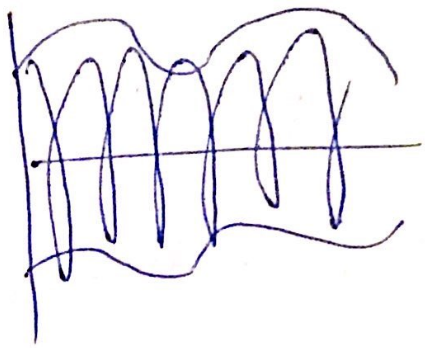

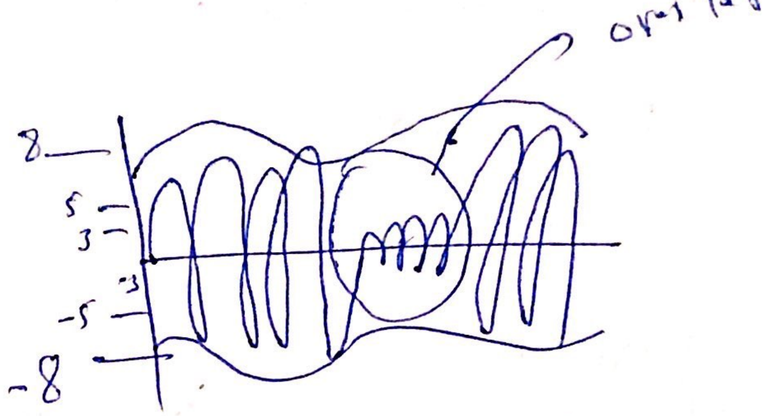

Q 3 B

1 message Equation = $3.5 \cos 5 \times 10^3$ Hz

Carrier Equation = $7 \cos 1 \times 10^6$ Hz

modulated Signal = $7(1 + 0.5 \cos 1 \times 10^3)$
$\cos 1 \times 10^6 t$

modulation Index = $\frac{E_m}{E_c}$

$= \frac{3.5}{7}$

$= 0.5$

2 $f(t) = E_c(1 + m \cos \omega_m t) \cos \omega_c t$

$7(1 + 0.5 \cos(2\pi \times 5 \times 10^3 t) \cos(2\pi \times 10$