My Family

Tuesday

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QPSK (Quadrature Phase Shift Keying)

Week 4 / Day 17

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In ASK, FSK and BPSK, we transmit 1 bit Per Symbol (is the each discrete waveform or carrier)

In BPSK we transmit 0° Phase Shift for binary Symbol '1' and 180° Phase Shift for binary Symbol '0'

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But in QPSK we transmit 2 bits Per Symbol.. So these 2 bits have 4 Combination, '00' '01' '10' '11' and we need 4 Phase (Quadrature)

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No. of Symbol $M = 4$ ---(1)

No bit/Symbol $b = \log_2 M = 2$ (dibit)

Symbol duration $T = T_b \log_2 M$

$= 2T_b$

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So, Transmitted QPSK signal.

E Symbol energy.

$$S_i(t) = \sqrt{E} \cdot \sqrt{\frac{2}{T}} \cos(2\pi f_c t + \varphi_i)$$

$i = 1, 2, 3, 4.$

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$$\varphi_i = \left[\frac{2\pi}{M}(i-1) + \text{Costant}\right]$$

this constant may 0° or $\pi/4$ depending on this it may called Conventional QPSK or $\pi/4$- QPSK respectively.

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$\frac{\pi}{4}$-QPSK

$$\therefore S_1(t) = \sqrt{E} \cdot \sqrt{\frac{2}{T}} \cos\left(2\pi f_c t + \frac{\pi}{4}\right)$$

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$$S_2(t) = \sqrt{E} \cdot \sqrt{\frac{2}{T}} \cos\left(2\pi f_c t + \frac{3\pi}{4}\right)$$

$$S_3(t) = \sqrt{E}\sqrt{\frac{2}{T}} \cos\left(2\pi f_c t + \frac{5\pi}{4}\right)$$

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Thursday

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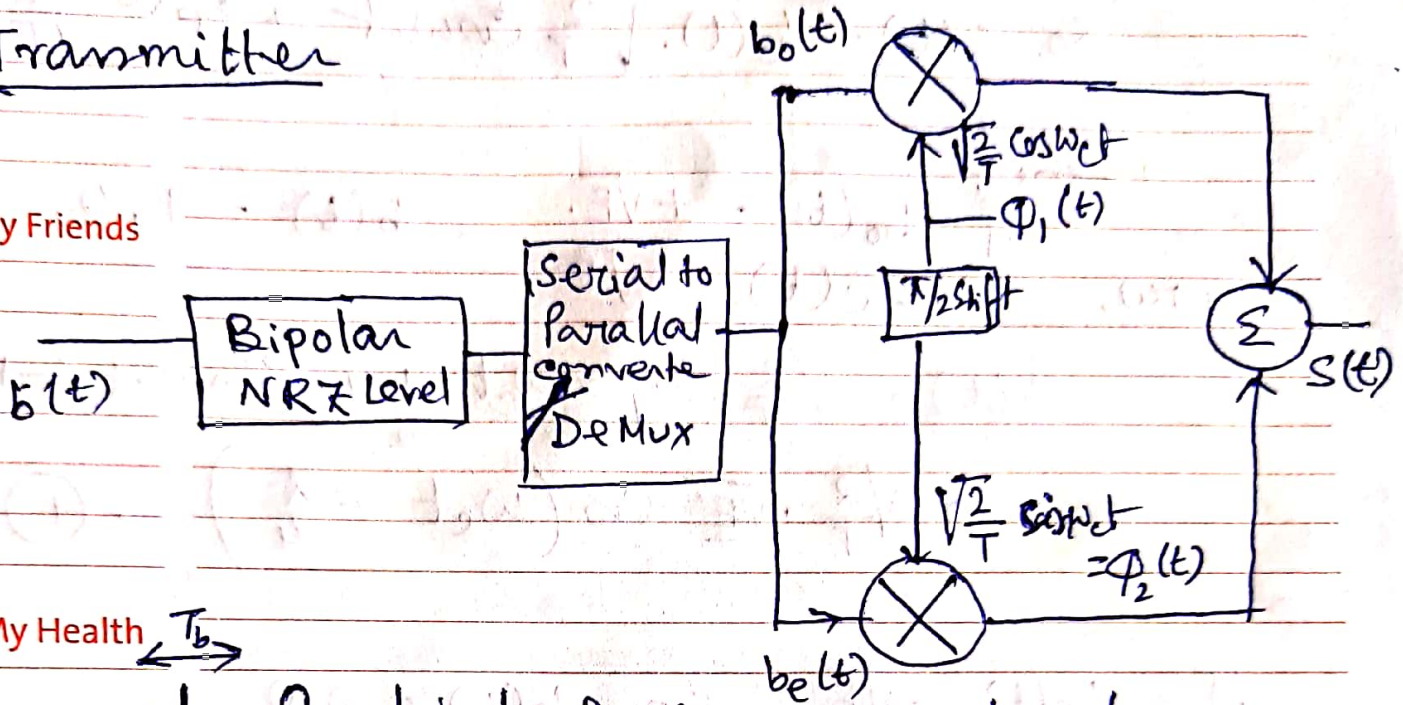
Week 4 / Day 19

$$S_4(t) = \sqrt{E}\sqrt{\frac{2}{T}}\cos\left(2\pi f_c t + \frac{7\pi}{4}\right)$$

Transmitter



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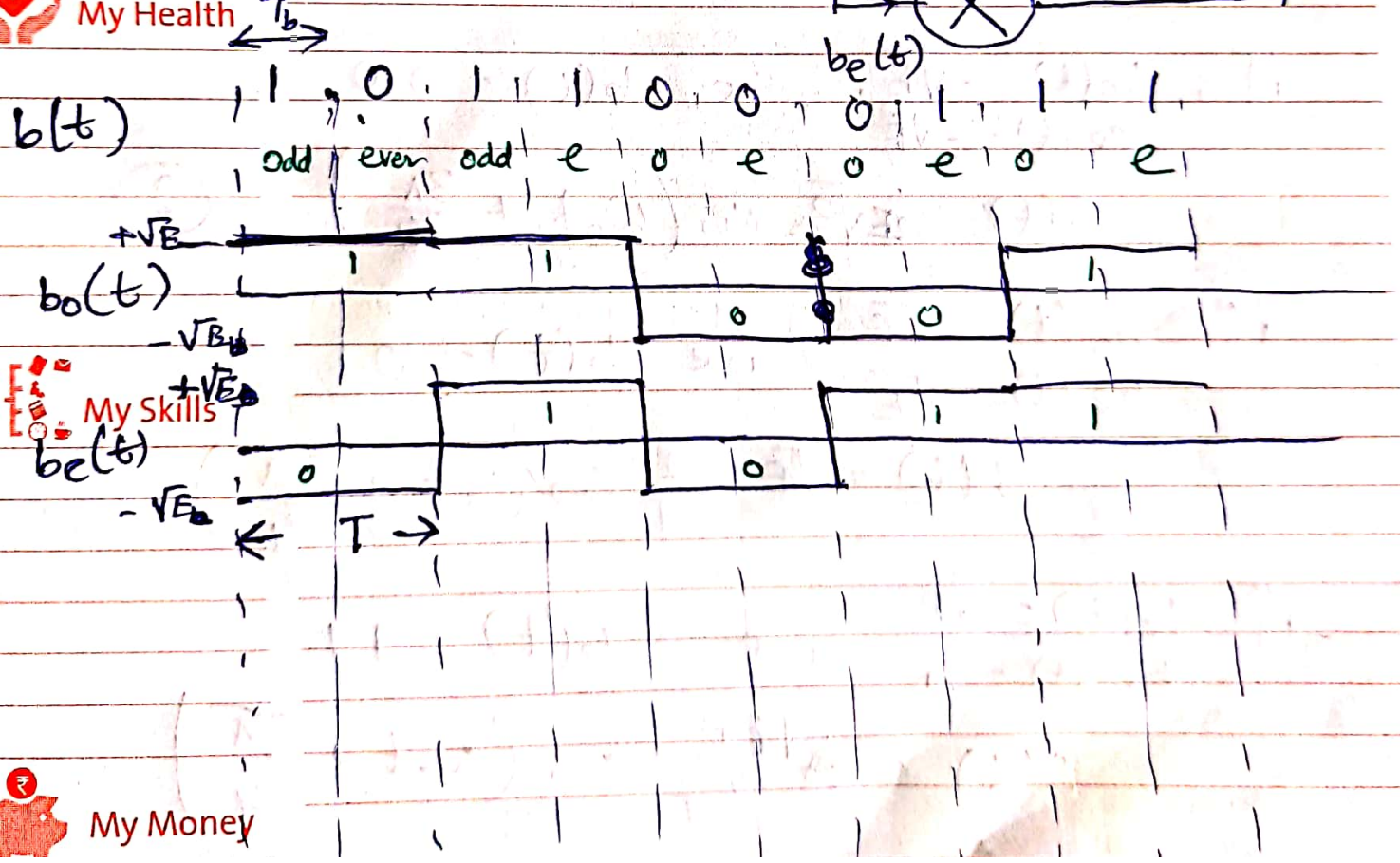

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So, $s(t) = b_0(t) \cdot \sqrt{\frac{2}{T}} \cos\omega_c t + b_e(t) \sqrt{\frac{2}{T}} \sin\omega_c t$

My Friends if $b_0(t) = +\sqrt{E}$, $b(t) = 1, 0$

Now, $b_e(t) = -\sqrt{E}$

$$s(t) = \sqrt{\frac{2}{T}} \sqrt{E} \left[\cos\omega_c t \cdot 1 + \sin\omega_c t \cdot (-1)\right]$$

$$= \sqrt{\frac{2}{T}} \cdot \sqrt{E} \cos\left(\omega_c t + \frac{\pi}{4}\right) \quad \text{--- (1)}$$

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if, $b_0(t) = -\sqrt{E}$, , i.e, $b(t) = 0, 0$.
$b_e(t) = -\sqrt{E}$

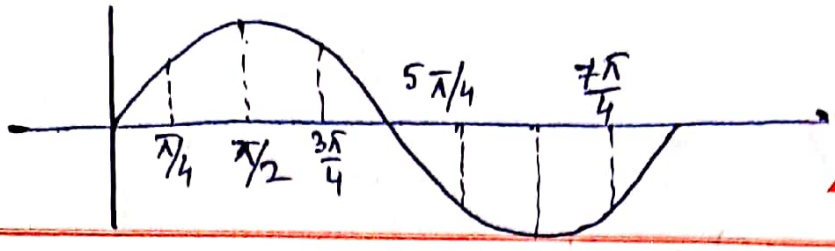
$$s(t) = \sqrt{E}\sqrt{\frac{2}{T}} \cos\left(\omega_c t + \frac{3\pi}{4}\right) \quad \text{--- (2)}$$

My Skills if $b_0(t) = -\sqrt{E}$ i.e $b(t) = 01$
$b_e(t) = \sqrt{E}$

$$s(t) = \sqrt{2E} \cdot \sqrt{\frac{2}{T}} \cos\left(\omega_c t + \frac{5\pi}{4}\right) \quad \text{--- (3)}$$

if $b_0(t) = \sqrt{E}$
$b_e(t) = \sqrt{E}$ i.e , $b(t) = 11$

My Money $s(t) = \sqrt{2E} \cdot \sqrt{\frac{2}{T}} \cos\left(\omega_c t + \frac{7\pi}{4}\right)$



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Saturday

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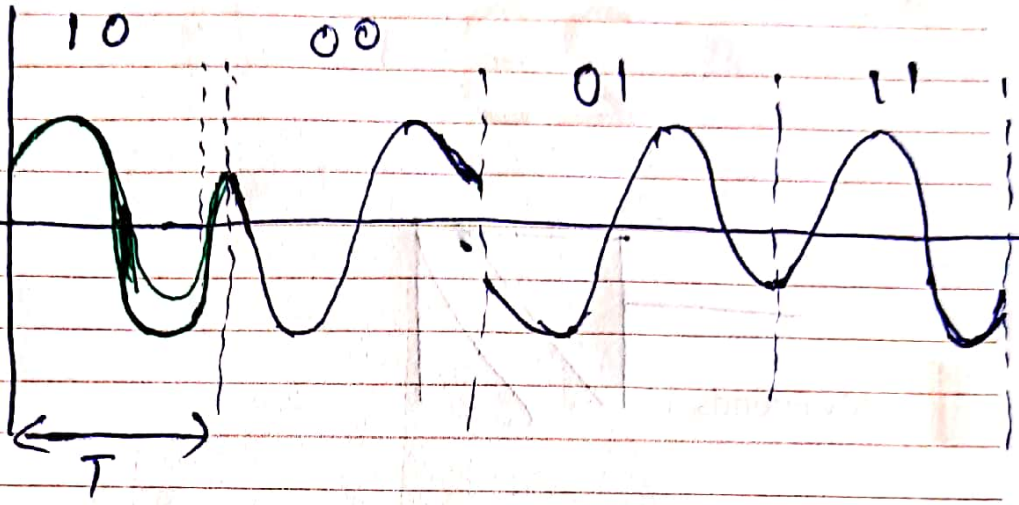
Week 4 / Day 21



QPSK signal timing diagram

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Constellation Diagram.

Sunday

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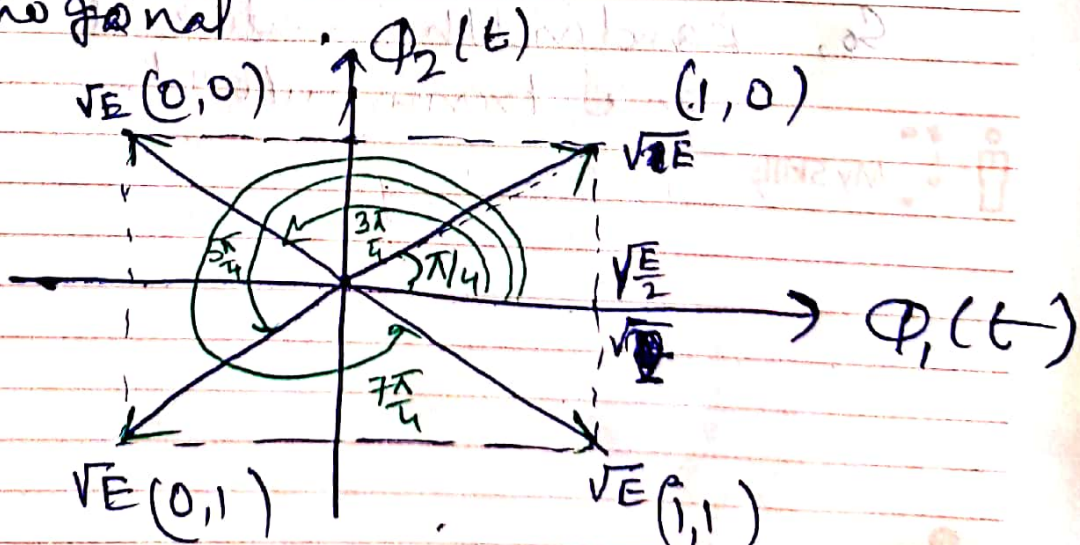
Week 4 / Day 22

As their two basis function $\phi_1(t)$ and $\phi_2(t)$ are orthogonal



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Receiver of QPSK

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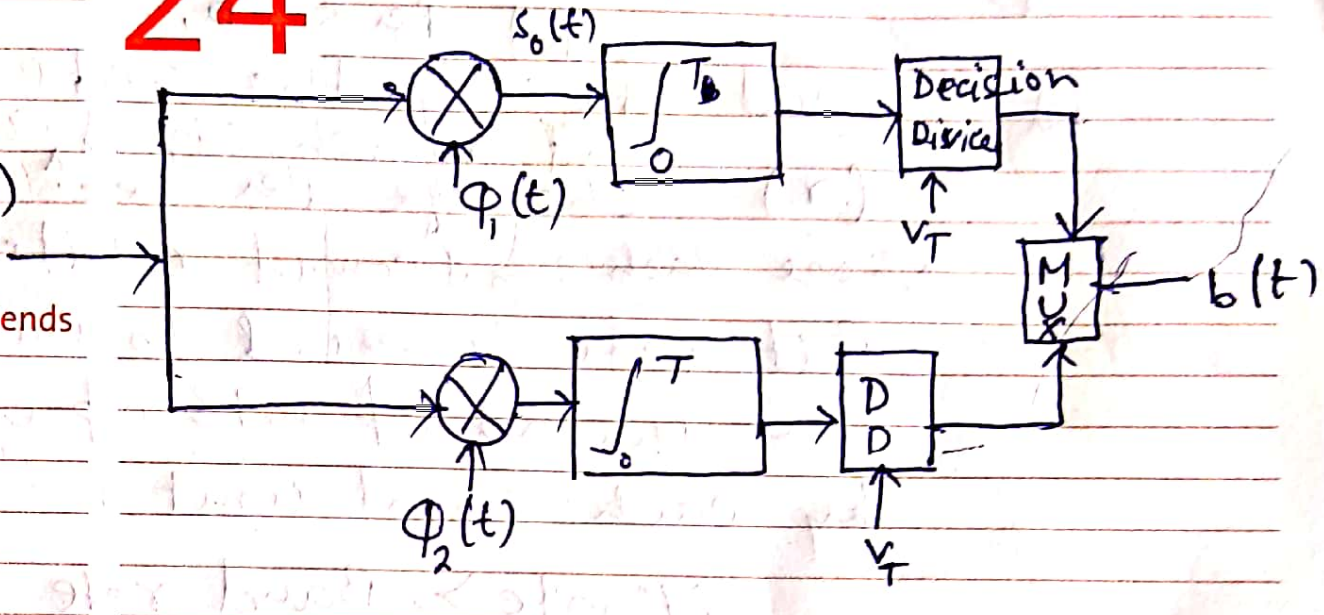

Let us take an example

$s(t) = \cos\omega_c t - \sin\omega_c t$

$s_0(t) = \cos^2\omega_c t - \sin^2\omega_c t \cos\omega_c t$

Passing through integrator,

$= \frac{1}{2}$

now through decision device

Similarly we get '1'

from lower Part,

$s_e(t) = \cos\omega_c t \sin\omega_c t - \sin^2\omega_c t$

Passing through integrator

$-\frac{1}{2}$

now through decision device we get '0'

received data: b(t) = '10'

Notes:

Bandwidth : $T = 2T_b$

Symbol duration

Bandwidth $= \frac{2}{T}$ (2bit transmitted per Symbol)

$= \frac{2}{2T_b} = \frac{1}{T_b} = f_b$,

So, Bandwidth reduced, more data are transmitted.

2017

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Wednesday 25 — Week 5 / Day 25

Bit rate & Baud rate

BPS

Bit rate: no of bit transmitted Per sec. (R)

Bd.

Baud rate: is the rate at which signal Can change Per sec (r)

where each signal consist n bits

Bit rate is equal to Baudrate time the no of bits represent by each signal unit

Bit rate >, Baud rate

$R = n.r$

Total no of ~~Symbols~~ Signals level

$= 2^n$