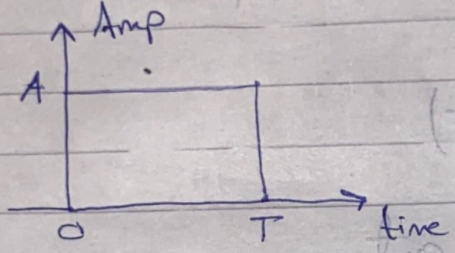
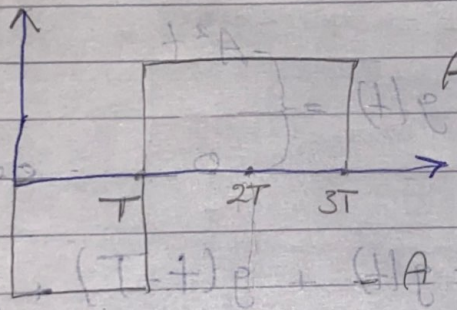
Assignment 2

Req. 1

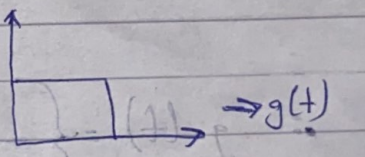
$g(t) =$



(a)

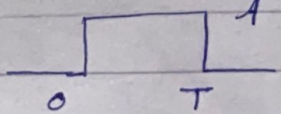


(b) $h(t) = g(T-t)$

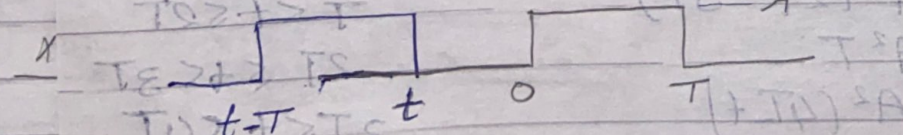


$$g_0(t) = h(t) * \delta(t)$$
$$= h(t) * (g(t) + g(t-T) + g(t-2T))$$

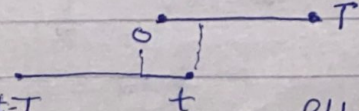
$$f(t) = g(t) * g(t) \quad , \quad g(t) =$$



$$= \int_{-\infty}^{\infty} g(\tau)\, g(t-\tau)\, d\tau$$



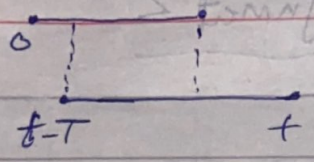
Case # 1)



* partial overlap in $0 \le t < T$

$$f(t) = \int_0^t A \cdot A \, d\tau = A^2 t$$

Case #1 2)



$f(t) = A^2(T-(t-T))$

$0 \le t-T < T$

$(T \le t \le 2T)$

* partial overlap out

$$\therefore f(t) = g(t) * g(t) = \begin{cases} A^2 t & 0 \le t < T \\ & T < t \le 2T \\ 0 & \text{otherwise} \end{cases}$$

$$\therefore g_0(t) = h(t) * (-g(t) + g(t-T) + g(t-2T))$$

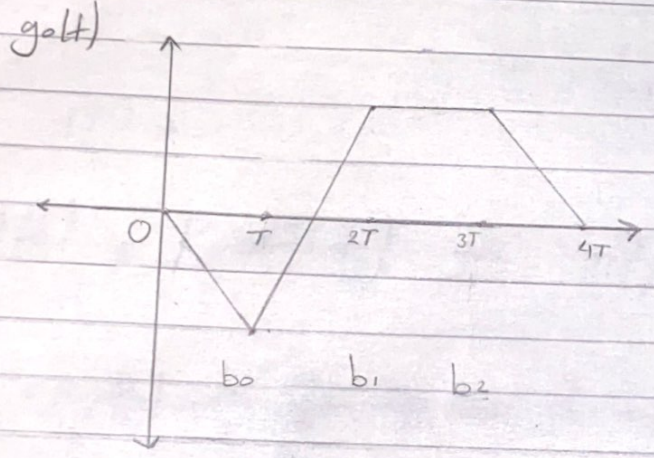
$$= -f(t) + f(t-T) + f(t-2T)$$

$$\therefore g_0(t) = \begin{cases} -At^2 & (0 \le t < T) \\ -A^2(2T-t) + A^2(t-T) & (T < t \le 2T) \\ 0 + A^2(2T-(t-T)) & 2T \le t < 3T \\ \quad + A^2(t-2T) & \\ A^2(2T-(t-2T)) & 3T \le t < 4T \\ 0 & 0.w \end{cases}$$

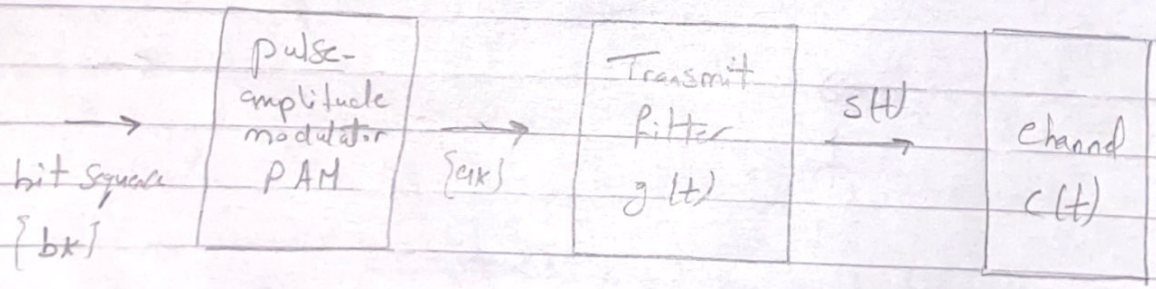
$$\therefore g_0(t) = \begin{cases} -At^2 & 0 \le t < T \\ A^2(2t-3T) & T < t \le 2T \\ A^2 T & 2T \le t < 3T \\ A^2(4T-t) & 3T \le t < 4T \end{cases}$$

(c)

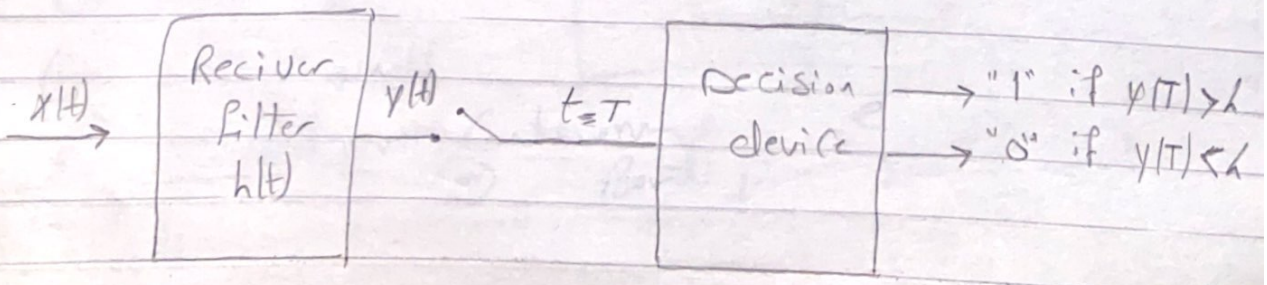
t	0	T	2T	3T	4T
$g_0(t)$	0	$-A^2T$	A^2T	A^2T	0



(d) Transmitter



(e) Reciver



$x(t) = s(t) + w(t)$
AWGN