**EE 304P**
**Communication Theory Lab**

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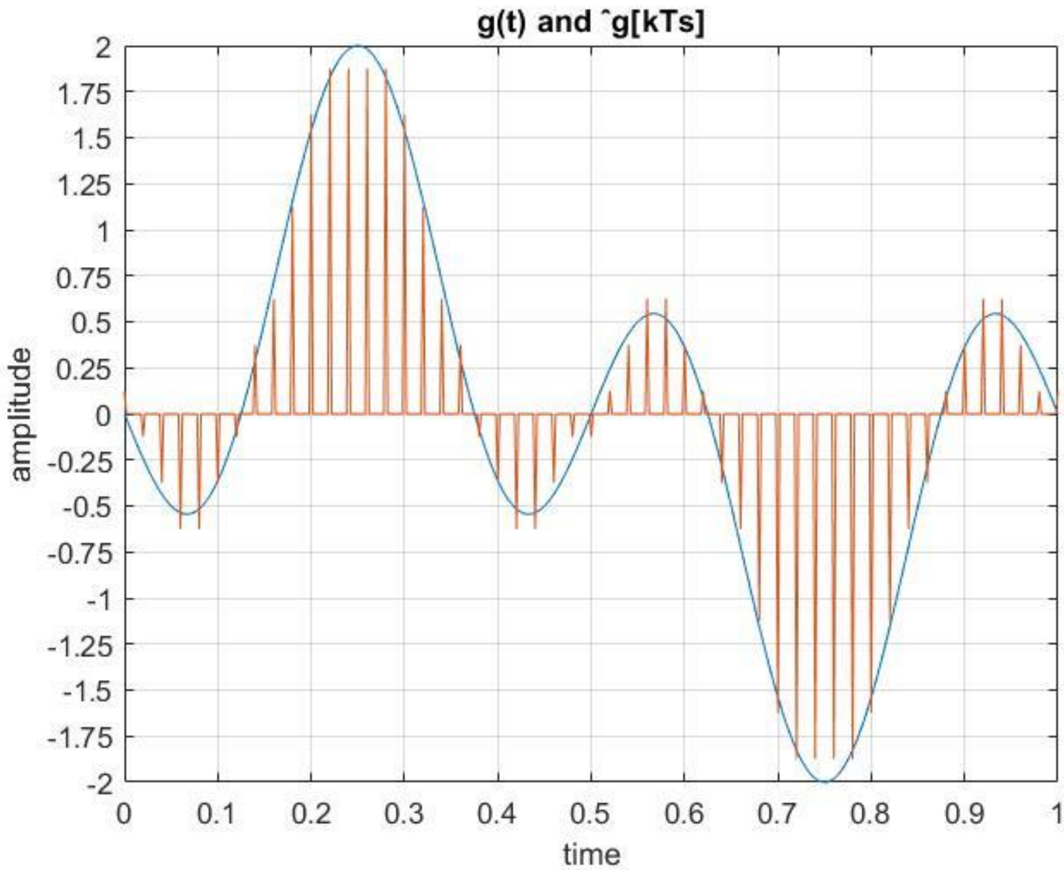
# Lab assignment – 8

1.

A.

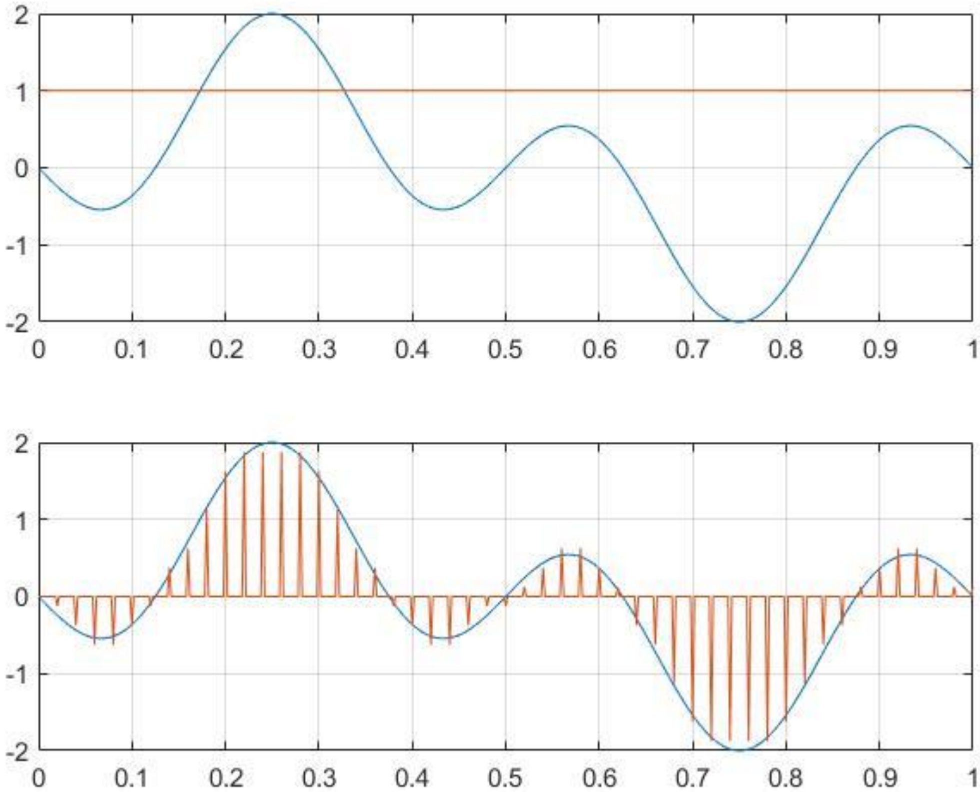



g(t) = sin(2*pi*t)- sin(6*pi*t)
sampling frequency = 50 Hz = 1/Ts
gkts = g(t).*y;

In the above graph, gkts is indicated by the blue subplot, and the red subplot indicates g_kts, which is obtained by approximating the midpoints of 16 discrete levels, by uniformly dividing the peak-to-peak range of g(t).

In the graph, we can see the 16 discrete levels to which the signal has been quantised.

B.

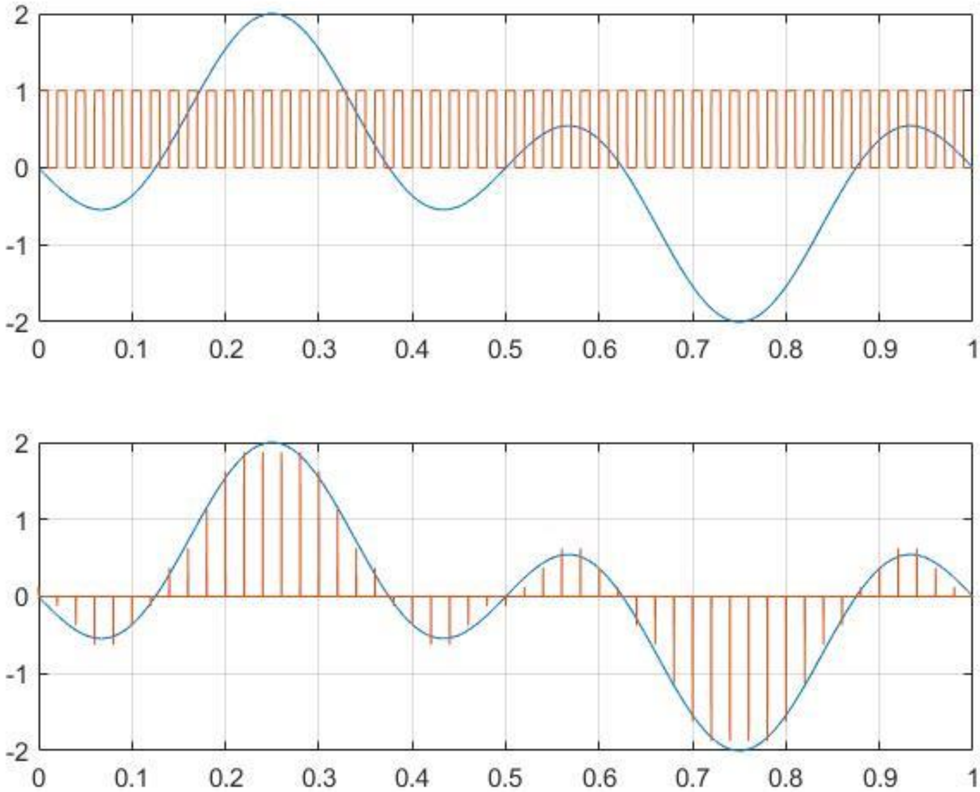



In the first graph, g(t) and p(t) are superimposed. g(t) is the message signal and p(t) is the rectangular pulse of duration Tb.

gqt is obtained by multiplying g_kts (the quantised signed) and p(t). gq(t) is equal to g_kts as we multiply g_kts with rectangular pulse of amplitude 1.

In the second graph, the red plot indicates gqt, and the blue plot indicates g(t).

C.




In the first graph, g(t) and p(t) are superimposed. g(t) is the message signal and p(t) is the rectangular pulse of duration Tb. The pulse is divided into two parts of duration Ts/2 and Ts/2. For the first half the amplitude of rectangular pulse is 1 (high) and for the second half is 0 (low).

We obtain gqt by multiplying g_kts with p(t).  gqt is equal to g_kts as we multiply g_kts with rectangular pulse of amplitude 1.

In the 2nd graph, the blue plot represents signals g(t) and the red plot represents gqt.

D.

| Time | g(t) | p(t) | gs(kTs) (gkts) | g^[kTs] (g_kts) |
|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 0 |
| Ts | -0.243 | 1 | -0.243 | -0.125 |
| 2Ts | -0.436 | 1 | -0.436 | -0.375 |
| 3Ts | -0.537 | 1 | -0.537 | -0.625 |
| 4Ts | -0.516 | 1 | -0.516 | -0.625 |
| 5Ts | -0.363 | 1 | -0.363 | -0.375 |
| 6Ts | -0.086 | 1 | -0.086 | -0.125 |

The encoding mentioned in the question is Pulse Code Modulation. It is not the best encoding method, especially when transmitting large number of bits.