1. Pulse Amplitude Modulation:

Pulse amplitude modulation is defined as a process of varying the amplitude of the single pulse in accordance to the modulating signal variations. PAM is the basic form of analog pulse modulation in which the width and position characteristics of the pulse are kept constant while varying the amplitude. There are two sampling techniques used for sampling the modulating signal in PAM, which are Flat top sampling and Natural sampling. There are two types of PAM which are based on the criteria of signal polarity, these are given below:

i. Single polarity PAM: in single polarity PAM, there is fixed level of DC bias added to the modulating signal, so the modulating signal output is always positive.

ii. Double polarity PAM: In the double polarity PAM, the output of modulating signal will comprise of both positive and negative sides.

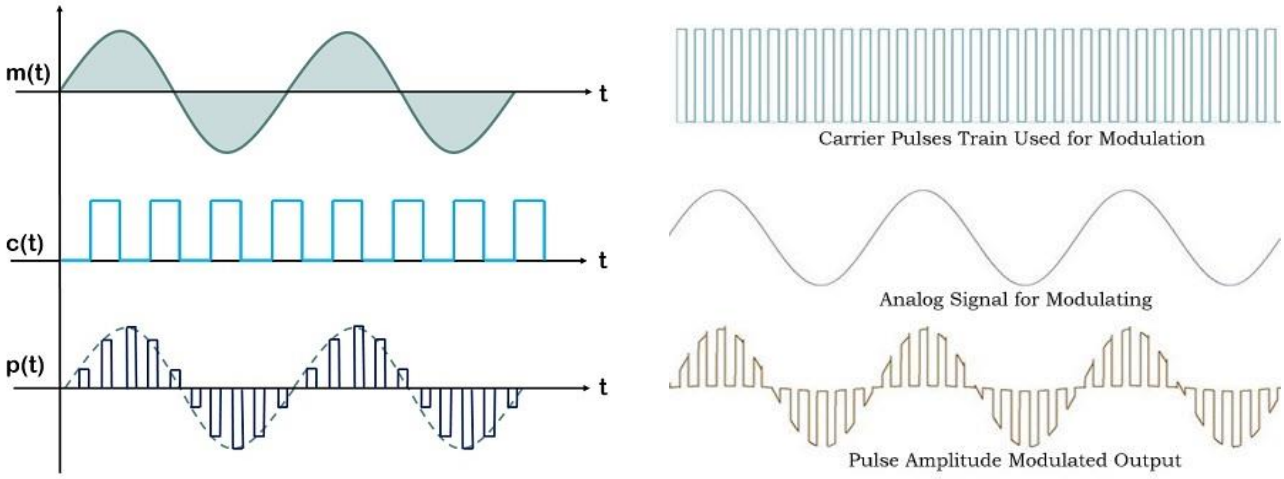

Figure: Flat-top sampling (at the left) and natural sampling (at the right)

2. Matlab Code:

```
%PAM(Pulse Amplitude Modulation) waveform generation
clc;
clear all;
close all;
fc=20;
fm=2;
fs=1000;
t=1;
n=[0:1/fs:t]
n=n(1:end-1)
duty=20;
s= square(2*pi*fc*n,duty);
s(find(s<0)) =  0;
figure(1);
m=sin(2*pi*fm*(n-1));
period_samp=length(n)/fc;
ind=1:period_samp:length(n);
on_samp=ceil(period_samp*duty/100);
on_samp
pam=zeros(1,length(n));
for i=1:length(ind)
   pam(ind(i):ind(i)+on_samp) = m(ind(i));
end
subplot(3,1,1);plot(n,s);ylim([-0.2 1.2]);
subplot(3,1,2);plot(n,m);ylim([-1.2 1.2]);
subplot(3,1,3);plot(n,pam);ylim([-1.2 1.2]);
```

3. Output:

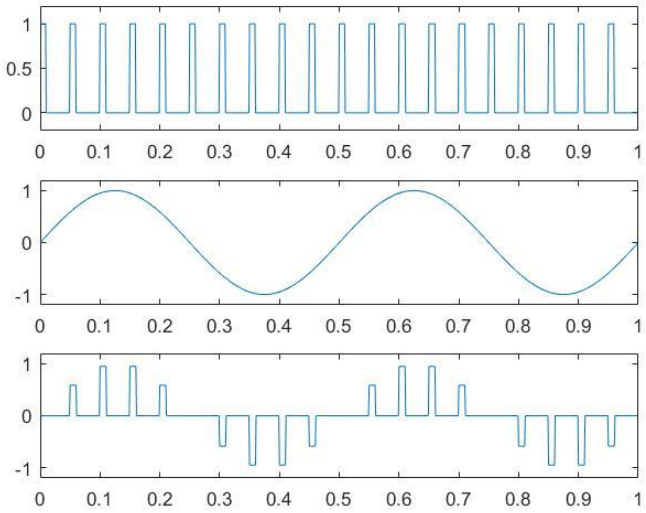

Figure: PAM Signal with corresponding message signal and square wave.

4. Draft: