```
% Amplitude Modulation
clc
fm=20;
Am=1;

t=[ 0:  0.0001:  0.1] ;
m=Am*cos(2*pi*fm*t);
subplot(4,3,1:3);
plot(t,m);title('Modulating or Message signal(fm=20Hz)');
xlabel('t--->'); ylabel('Amplitude');

Ac=1;
fc=500;
c=Ac*cos(2*pi*fc*t);
subplot(4,3,4:6);
plot(t,c);title('Carrier signal(fc=500Hz)');
xlabel('t--->'); ylabel('Amplitude');

k= Am / Ac;
u = 0.5 * k;  %u is modulation index
s1=Ac*(1+u*cos(2*pi*fm*t)).*cos(2*pi*fc*t);
subplot(4,3,7);
plot(t,s1);title('Under Modulated signal(Modulation index = 0.5)');
xlabel('t--->'); ylabel('Amplitude');

u = 1 * k;  %u is modulation index
s2=Ac*(1+u*cos(2*pi*fm*t)).*cos(2*pi*fc*t);
subplot(4,3,8);
plot(t,s2);title('Critical Modulated signal(Modulation index =1)');
xlabel('t--->'); ylabel('Amplitude');

u = 2.5 * k;   %u is modulation index
s3=Ac*(1+u*cos(2*pi*fm*t)).*cos(2*pi*fc*t);
subplot(4,3,9);
plot(t,s3);title('Over Modulated signal(Modulation index =2.5)');
xlabel('t--->'); ylabel('Amplitude');
```