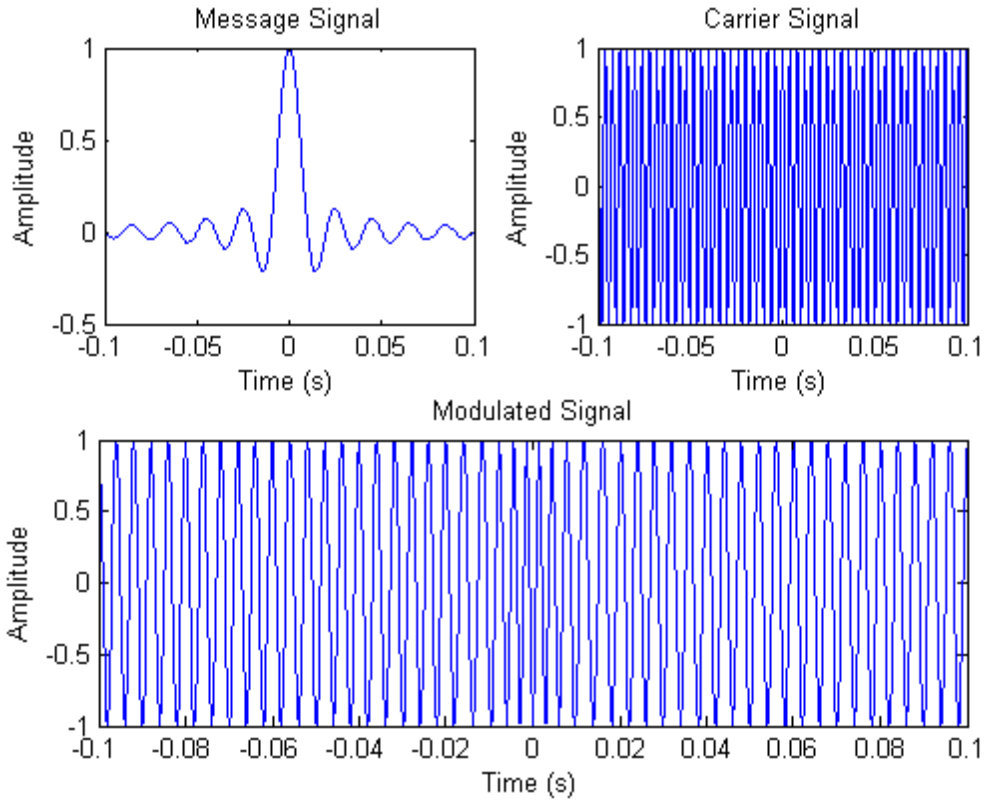
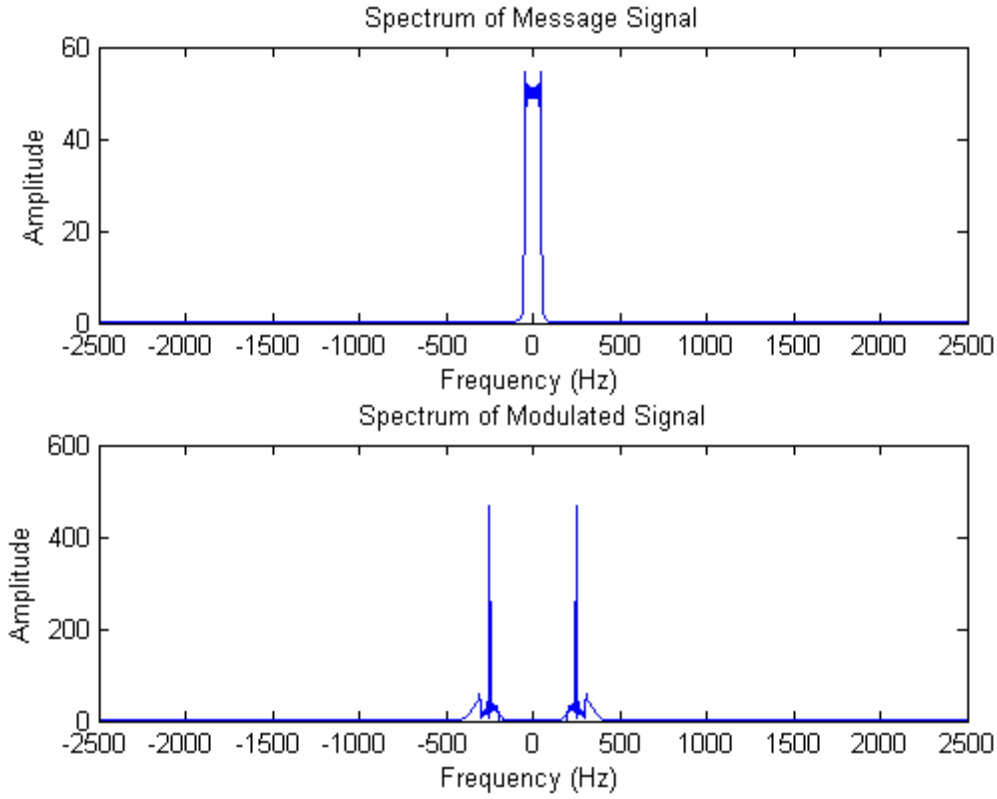
```
% Question 3.11
% --------------
clc;
clear all;
close all;

% Details given in the question
Fc = 250;
t0 = 0.1;
kf = 100;
T0 = 2*t0;

% Assumed values
Tstart = -0.1;
Tstop = 0.1;
Fs = 5000;

% Generating time
Ts = 1 / Fs;
t = Tstart : Ts : Tstop;
N = length(t);

% Generating the message signal
tk = mod(t - (T0/2), T0) - (T0/2);
m_t = sinc(100*t);
for i = 1 : N
    if(isnan(m_t(1, i)))
        m_t(1, i) = 100;
    end
end
subplot(2,2,1);
plot(t, m_t);
title('Message Signal');
xlabel('Time (s)');
ylabel('Amplitude');

% Generating the carrier signal
c_t = zeros(1, N);
for i = 1 : N
    c_t(1, i) = 1 * cos(2*pi*Fc*t(1, i));
end
subplot(2,2,2);
plot(t, c_t);
title('Carrier Signal');
xlabel('Time (s)');
ylabel('Amplitude');

% Generating the modulated signal
u_t = zeros(1, N);
sum = 0;
for i = 1 : N
    sum = sum + m_t(1, i);
    u_t(1, i) = 1 * cos(2*pi*Fc*t(1, i) + 2*pi*kf*(sum / Fs));
end
subplot(2,2,3:4);
plot(t, u_t);
title('Modulated Signal');
xlabel('Time (s)');
ylabel('Amplitude');

% Plot Spectra
figure;
subplot(2,1,1);
```

```
plot(linspace(-Fs/2, Fs/2, N), abs(fftshift(fft(m_t))));
title('Spectrum of Message Signal');
xlabel('Frequency (Hz)');
ylabel('Amplitude');
subplot(2,1,2);
plot(linspace(-Fs/2, Fs/2, N), abs(fftshift(fft(u_t))));
title('Spectrum of Modulated Signal');
xlabel('Frequency (Hz)');
ylabel('Amplitude');
```





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