Serial # 0

-1 point for no number

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE370: Communications Engineering I (102)
Quiz 3: Amplitude Modulation (DSB-SC)

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Name: KEY ver.2

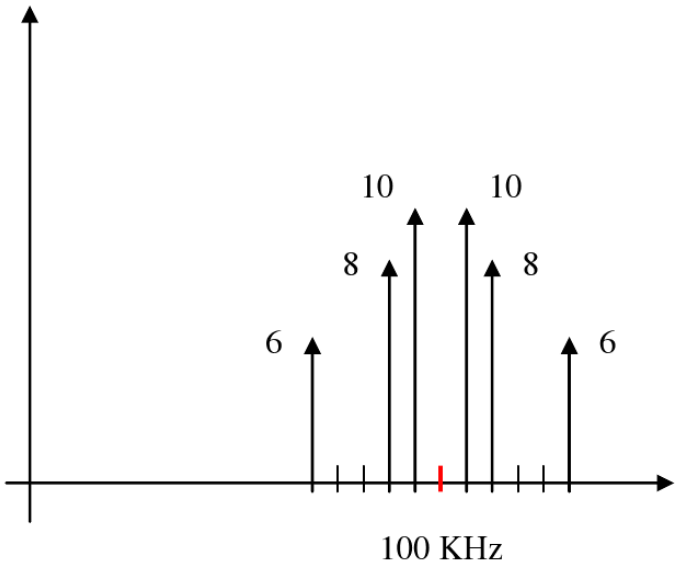
A 100 KHz carrier $2\cos(2\pi\cdot10^5\cdot t)$ is amplitude-modulated (DSB-SC) by a signal $s(t)$ given as:

$$s(t) = 10\cdot\cos(2\pi\cdot10^3\cdot t) + 8\cdot\cos(4\pi\cdot10^3\cdot t) + 6\cdot\cos(10\pi\cdot10^3\cdot t)$$

What frequencies are contained in the resultant modulated signal?

Frequencies in resultant modulated signal: $f_c\pm f_1$, $f_c\pm f_2$, $f_c\pm f_3$, or more precisely:
95, 98, 99, 101, 102, 105 [KHz]

Sketch the frequency spectrum of the resultant signal.



You can also sketch the double sided spectrum. You may also use the radian frequency and all deltas will be scaled by 2π

How much is the power of the modulated signal?

$P_{s(t)}=10^2/2+8^2/2+6^2/2=50+32+18=100$

The sideband power (after multiplying by 2*cos)=100/2*4=200.
This is because multiplying by cos gives half the power and multiplying by 2 gives 4 times the power because the power is proportional to the square of the amplitude.