

### **Assignment**

9. An AM wave has a total transmitted power of 4kW when modulated 85%. How much total power should an SSB wave contain in order to have the same power content as that contained in the two sidebands?
  
10. An amplitude modulated waveform has the form
 
$$x(t) = 10(1 + 0.5 \cos 20,000\pi t + 0.5 \cos 40,000\pi t) \cos 200,000\pi t$$
  - a) Sketch the amplitude spectrum of  $x(t)$ .
  - b) Find the average power content of each spectral component including the carrier.
  - c) Find the total power, the sideband power, and power efficiency.
  - d) What is the modulation index ?
  
11. The signal  $v(t) = \left(1 + 0.4 \cos \frac{1}{3} \omega_m t\right) \cos \omega_c t$  is demodulated using a square-law demodulator having the characteristic  $v_o(t) = (v + 1)^2$ . The output  $v_o(t)$  is then filtered by an ideal low-pass filter having a cutoff frequency at  $f_M$  Hz. Sketch the magnitude spectrum of the output waveform in the frequency range  $0 \leq f \leq f_M$ .