

# PRINCIPLES OF ELECTRONICS ENGINEERING

## Tutorial –4

1. A sinusoidal carrier signal of frequency 1MHz, amplitude 4V and power of 1KW is amplitude modulated by a sinusoidal signal with a frequency of 10KHz. The depth of modulation is 70%. Determine (a) Side band frequencies (b) Bandwidth (c) Total power of the modulated wave (d) Amplitude of the side bands.
2. The total power of an AM signal is 2.64KW with a modulation index of 0.8. Determine the carrier power and the power in each side band.
3. The current drawn by the antenna of an AM transmitter is 8A when only carrier is present and this increases to 8.93A when the carrier is modulated by a sine wave. Find the percentage modulation. Determine the antenna current when the depth of modulation changes to 0.8.
4. If  $V_{AM}=10(1+0.5\sin 6280t)\sin 62.8 \times 10^6 t$  and  $P_c=1KW$ , then find  $f_c$ ,  $f_m$ , bandwidth and the total power.
5. A carrier wave with amplitude 14V and frequency 12MHz is amplitude modulated to 50% level with a modulating frequency 1 KHz, write the equation of AM and sketch the frequency spectrum.
6. An amplitude modulated wave with a modulation index of 50%, produces sideband frequencies of 8.824MHz and 8.854MHz. The amplitude of each sideband is 60V. Determine the amplitude and frequency of the carrier.
7. An AM transmitter radiates 14.8KW power without modulation, and 20KW when the carrier is modulated with a sinusoidal signal. Calculate the modulation index. If another sinusoidal signal corresponding to 40 percent modulation is also transmitted, determine the total radiated power.
8. Differentiate between Microprocessor and Microcontroller.

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