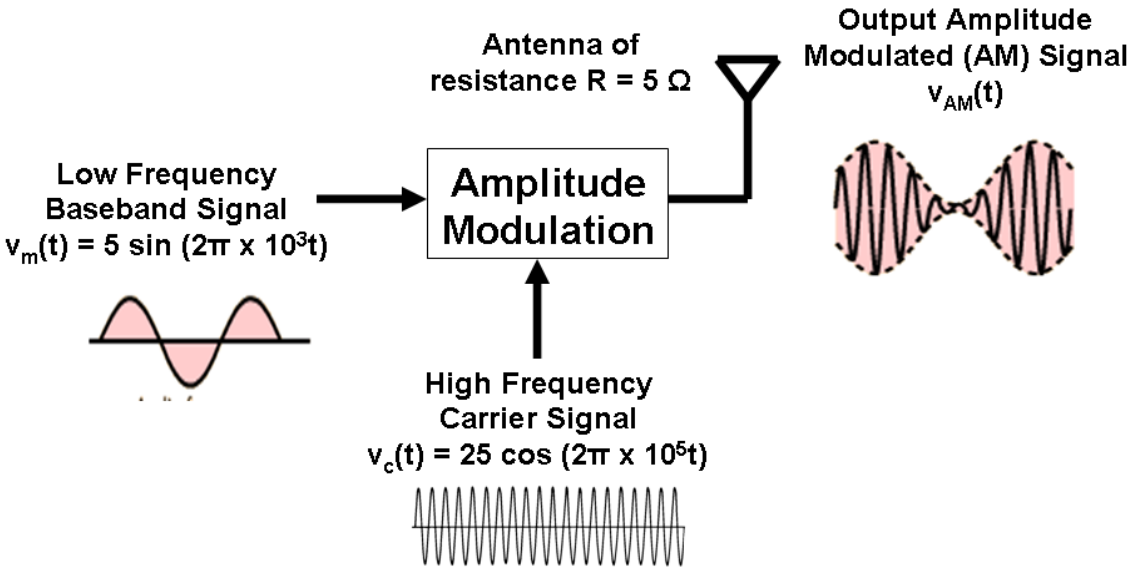
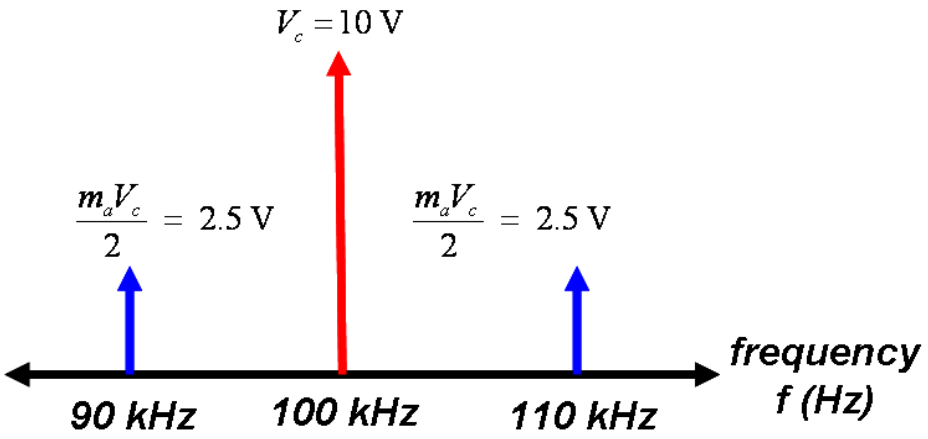
NUMERICAL EXAMPLES ON AMPLITUDE MODULATION (AM)

1. Given below is a wireless DSB-FC amplitude modulation (AM) system :-



(a) Determine modulation index (m_a) of the AM wave.
(b) Write output equation $v_{AM}(t)$ of the AM waveform.
(c) Calculate the amplitudes of the upper & lower sidebands (USB & LSB).
(d) Calculate bandwidth of the AM wave (BW).
(e) Calculate total power in the AM wave (P_T).
(f) Calculate overall efficiency of the AM wave (η).

2. The diagram below shows frequency / amplitude spectrum of DSBFC AM waveform which is transmitted through a 10 Ω antenna.



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3. An unmodulated carrier signal having initial 100 W power experiences 20 % increase in power level after undergoing amplitude modulation (DSB-FC AM). What is the modulation index (m_a) & the efficiency of transmission (η) ? If the same value of modulation index (m_a) was used for DSB-SC AM & SSB-SC AM, what would be the actual power savings in each case ?