



APECE-302: Radio & Television Engineering

Applied Physics, Electronics & Communication Engineering

Lecture # 08



University of
Dhaka | APECE
DU

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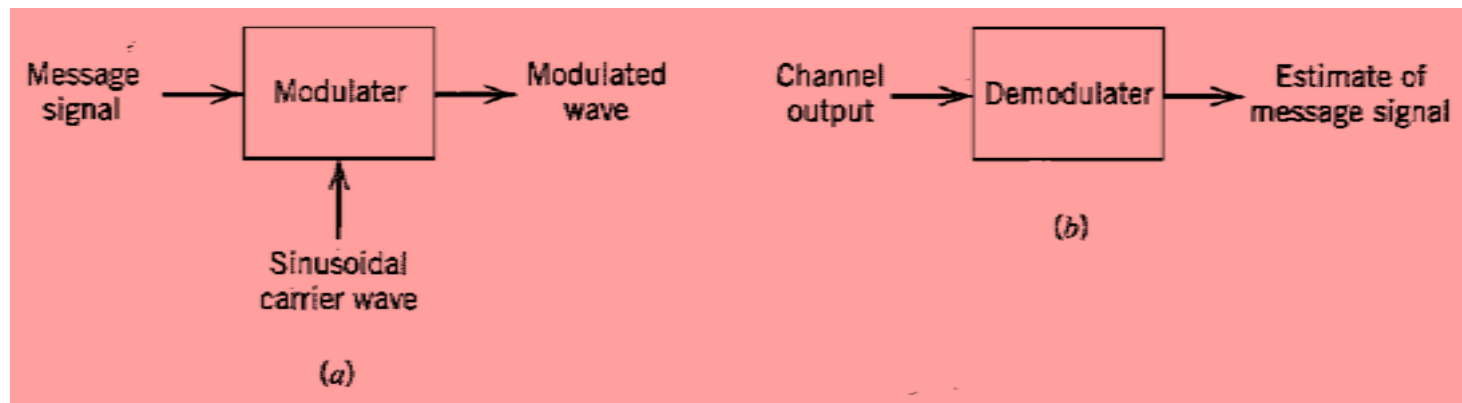
Contents

- ❑ Introduction to modulation
 - ❑ What is it?
 - ❑ Why do we need it?

- ❑ Amplitude modulation

Introduction to Modulation

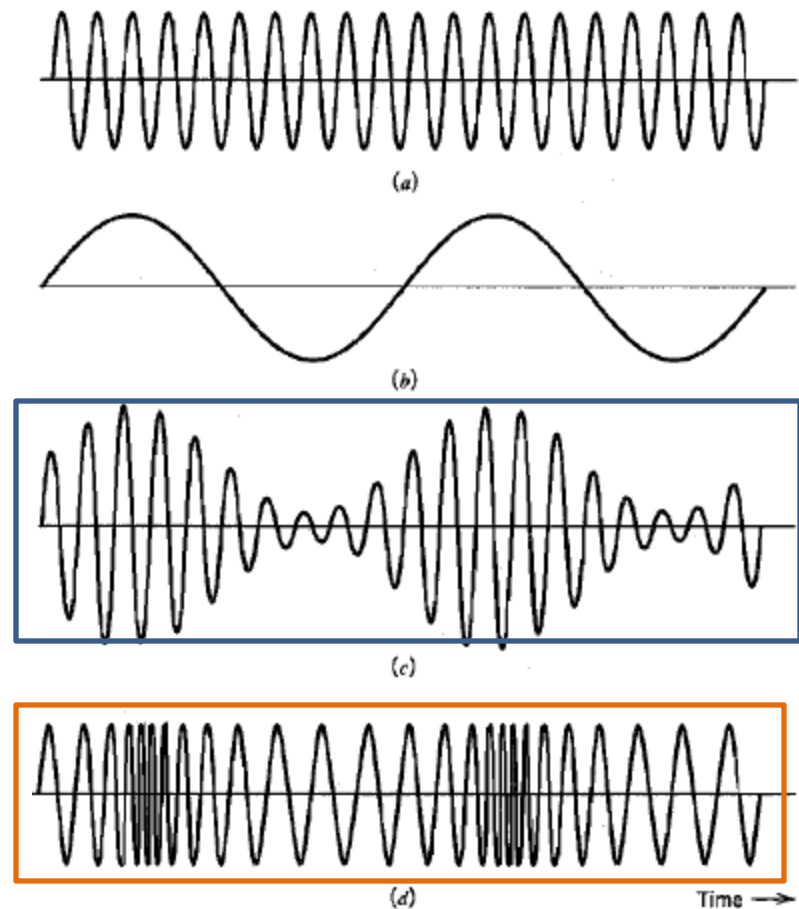
- ❑ Information-bearing signals from Tx to Rx
 - ❑ Baseband signals
 - ❑ Modulating and modulated signal
 - ❑ Demodulation
- ❑ Several reasons!



Introduction to Modulation

- Continuous Modulation:
Amplitude and Angle
- Example: Amplitude and
frequency modulation at
RHS

AM



FM



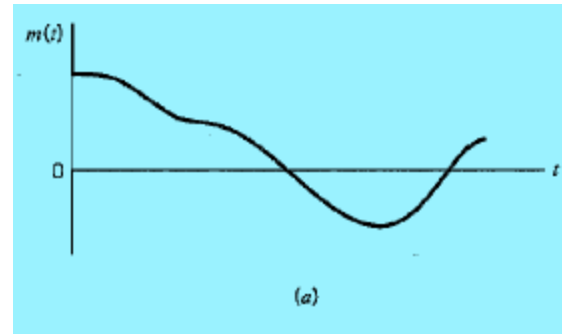
Amplitude Modulation

$$c(t) = A_c \cos(2\pi f_c t)$$

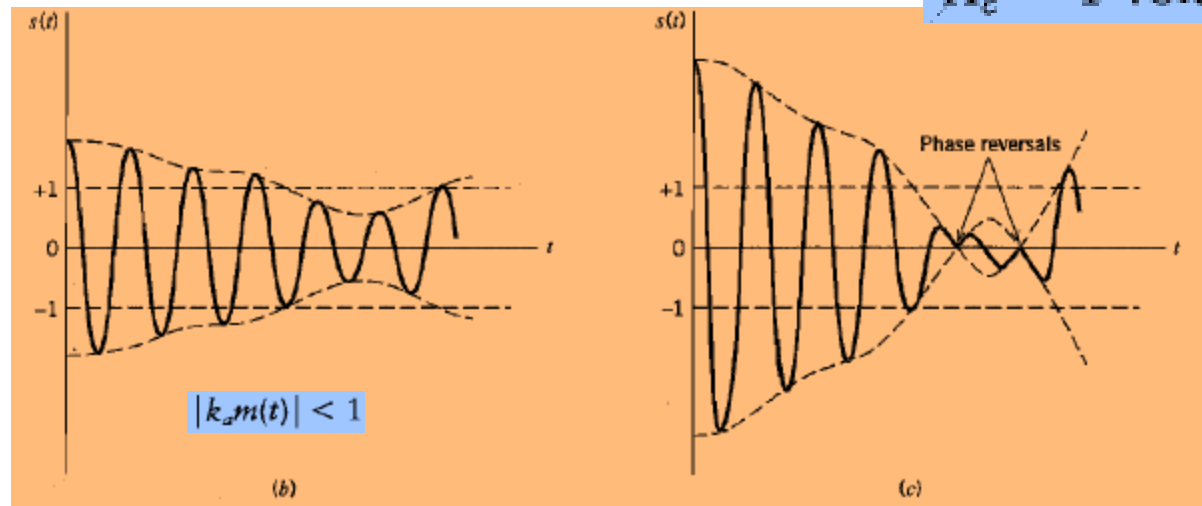
$$s(t) = A_c [1 + k_a m(t)] \cos(2\pi f_c t)$$



Amplitude sensitivity; ?unit



$$A_c = 1 \text{ volt.}$$



Conditions for AM

The amplitude of $k_a m(t)$ is always less than unity, that is,

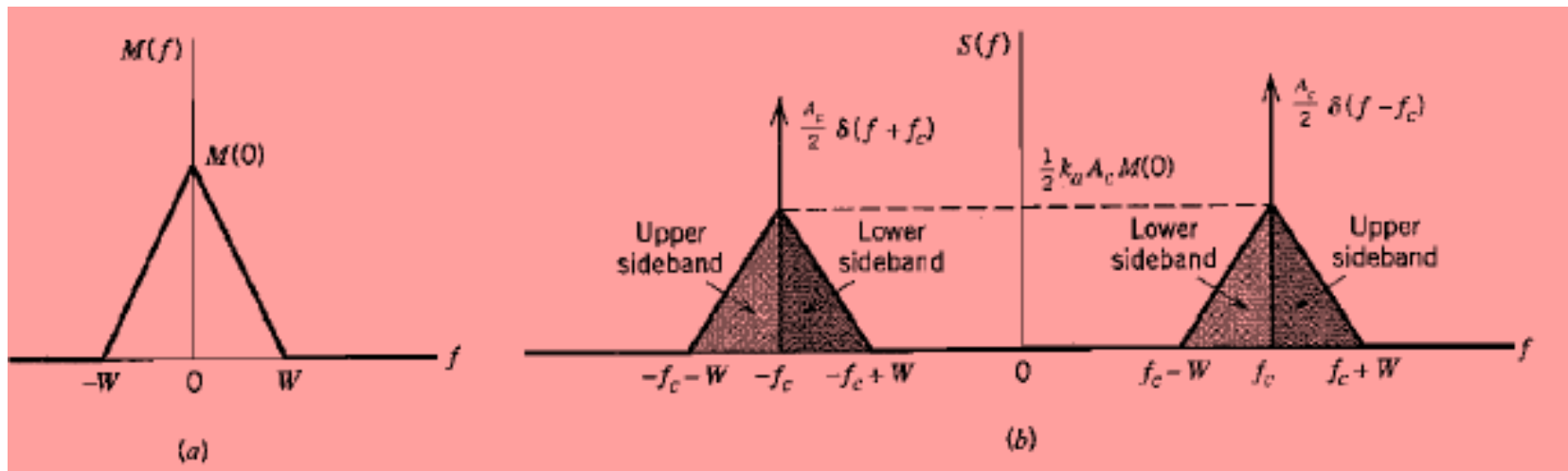
$$|k_a m(t)| < 1 \quad \text{for all } t$$

The carrier frequency f_c is much greater than the highest frequency component W of the message signal $m(t)$, that is

$$f_c \gg W \quad (2.4)$$

Spectrum Analysis in AM

$$S(f) = \frac{A_c}{2} [\delta(f - f_c) + \delta(f + f_c)] + \frac{k_a A_c}{2} [M(f - f_c) + M(f + f_c)]$$

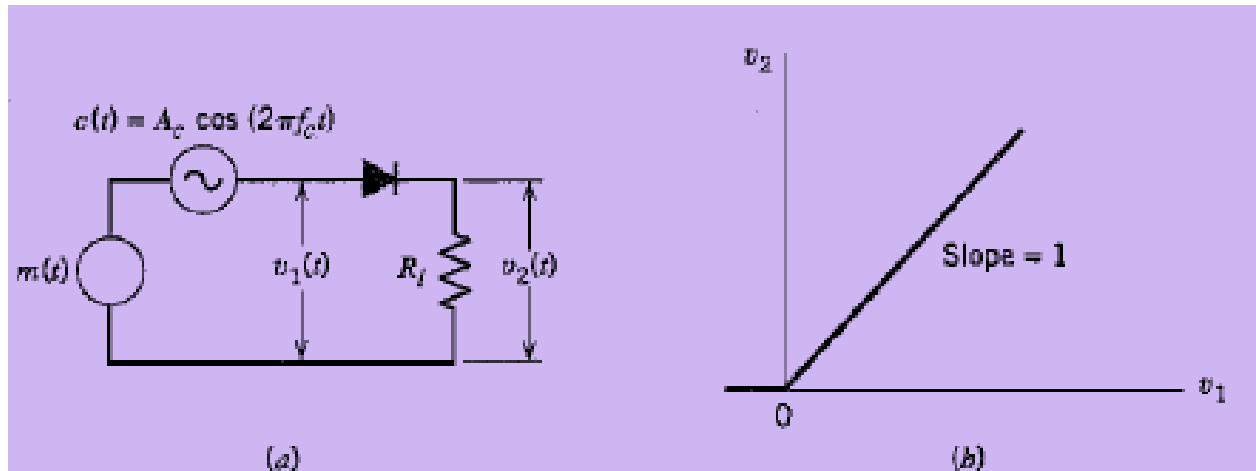


Spectrum Analysis of AM

- Realization of negative frequency!
- Must not be overlapped in LSB and USB
- Tx BW is twice the message BW

Virtues and Limitations of AM

- ❑ Oldest method and simplicity of implementation



Virtues and Limitations of AM

- ❑ Wasteful of power

- ❑ Wasteful of BW

- ❑ Overcome: DSB-SC, SSB w. system complexity
- ❑ ?Trade-off>>Linear modulation!

Q & A

