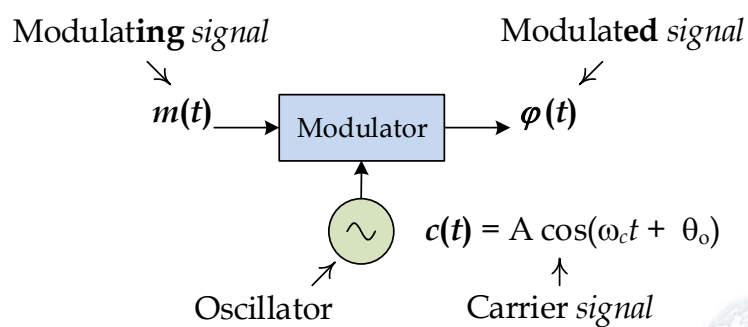


# Lecture 1: Communication Blocks for Amplitude Modulation

Prof. Mohammed Hawa  
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EE423: Communication Electronics.

## Notation



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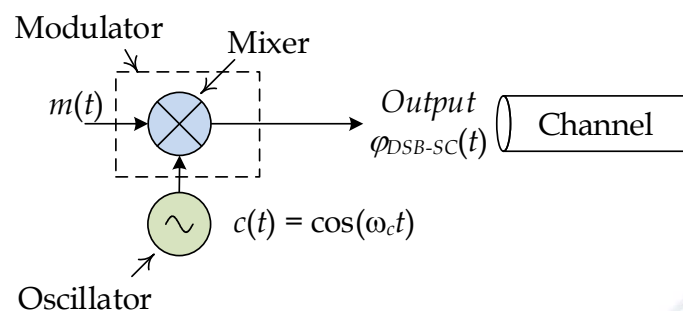
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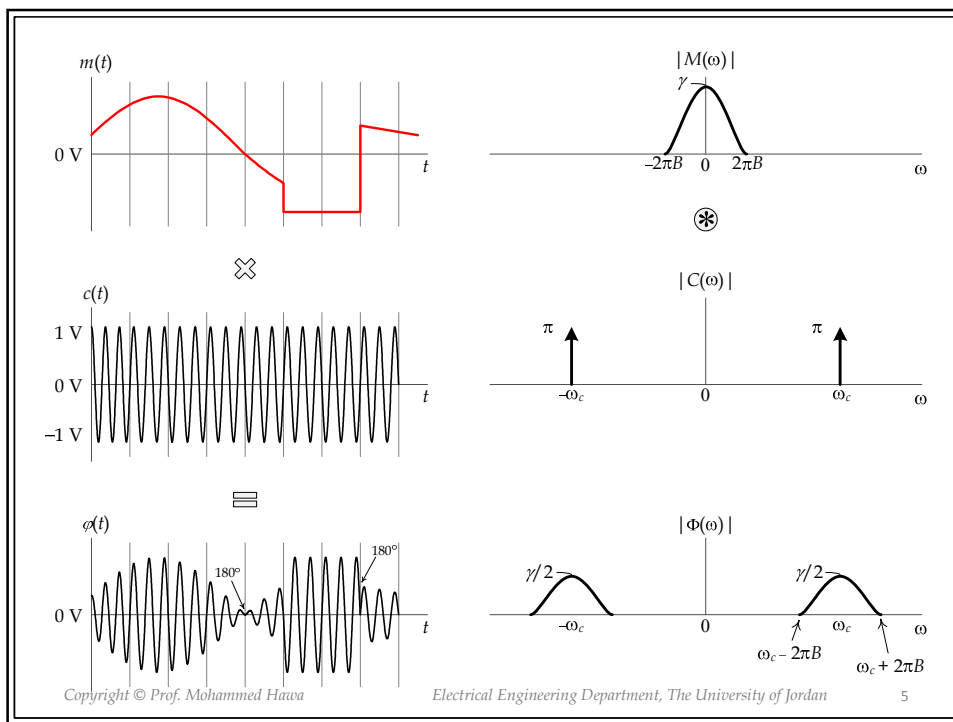
## Three Modulation Types

- $A \propto m(t)$ ;  $\omega_c = \text{constant}$ ;  $\theta_o = \text{constant}$ 
  - Amplitude Modulation (AM)
  - Amplitude Shift Keying (ASK)
- $A = \text{constant}$ ;  $\omega_c \propto m(t)$ ;  $\theta_o = \text{constant}$ 
  - Frequency Modulation (FM)
  - Frequency Shift Keying (FSK)
- $A = \text{constant}$ ;  $\omega_c = \text{constant}$ ;  $\theta_o \propto m(t)$ 
  - Phase Modulation (PM)
  - Phase Shift Keying (PSK)

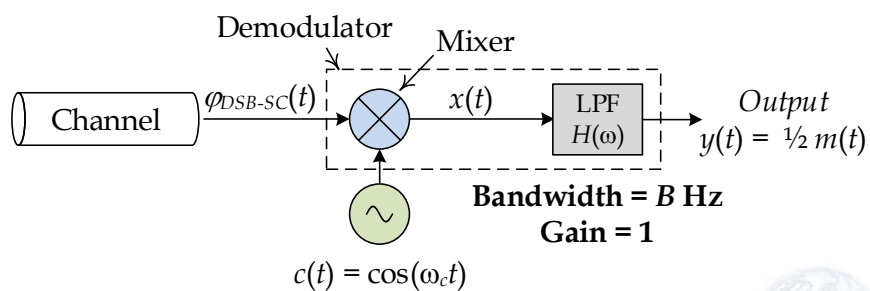


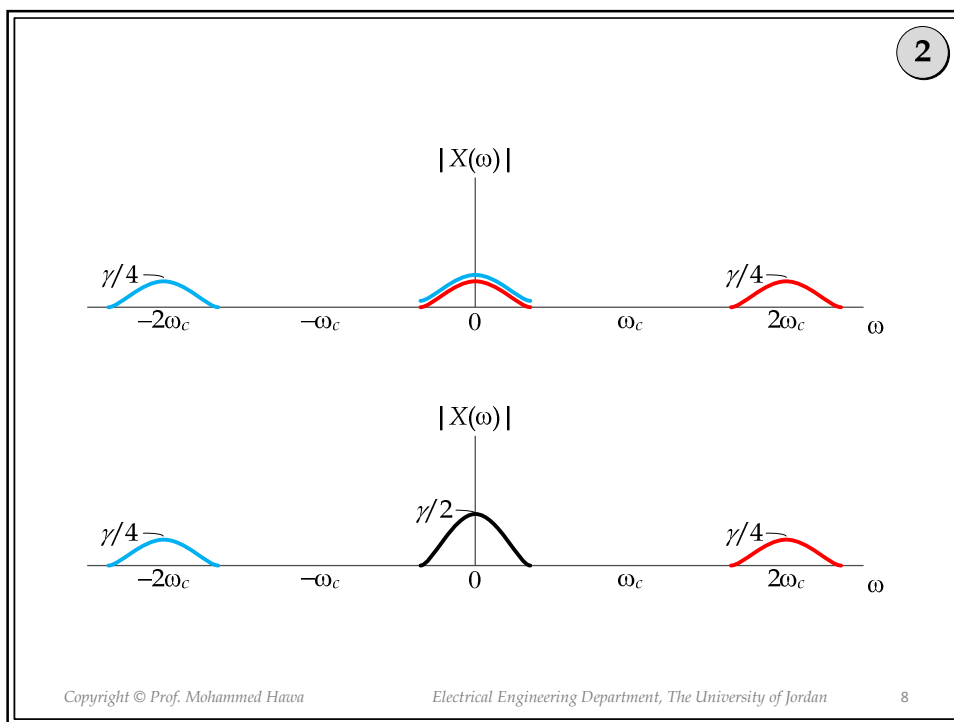
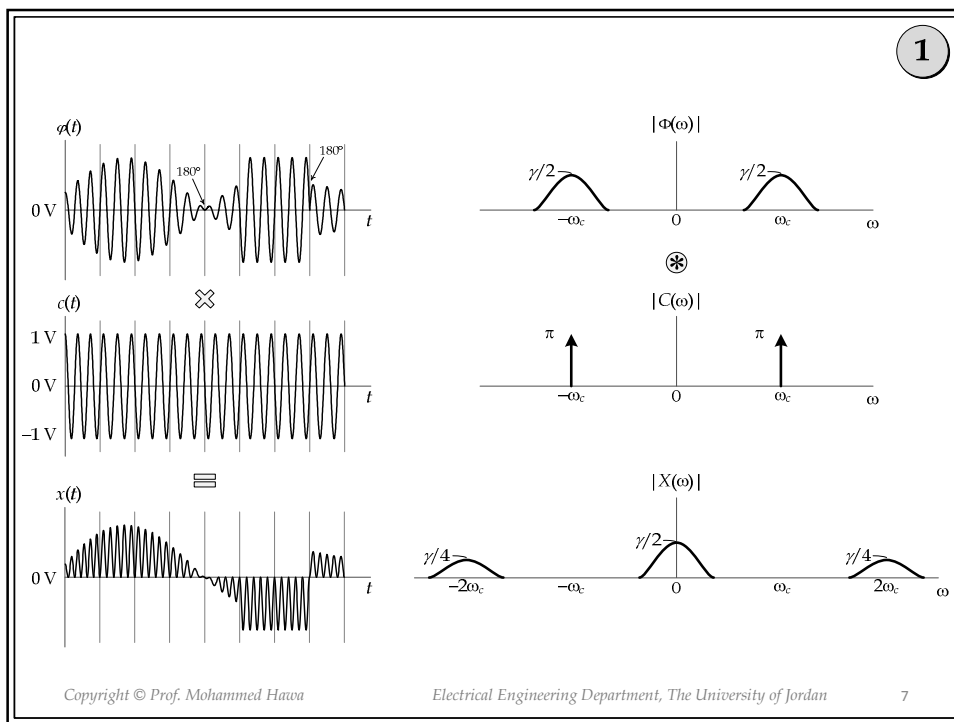
## Double Sideband Suppressed Carrier (DSB-SC) Modulator





## DSB-SC Demodulator





### Final step: LPF

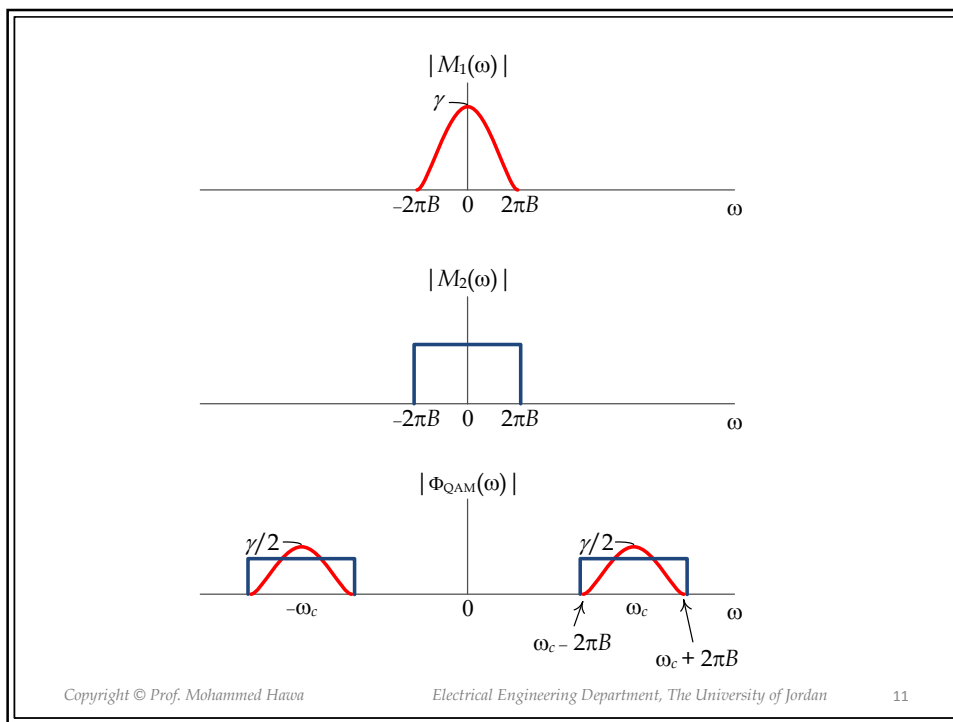
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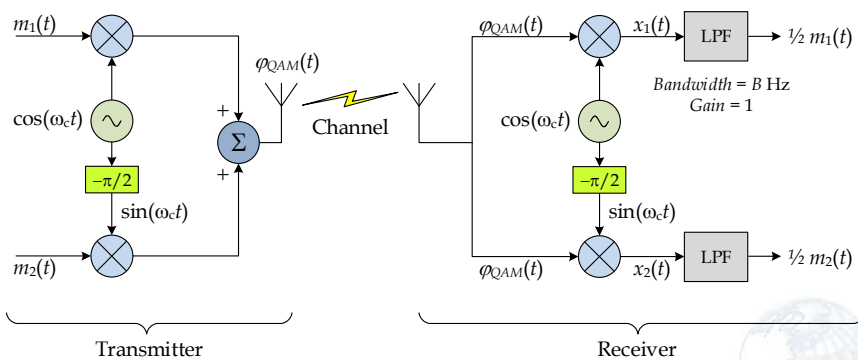
### QAM (Quadrature Amplitude Modulation)

$$\phi_{QAM}(t) = m_1(t) \cos(\omega_c t) + m_2(t) \sin(\omega_c t)$$

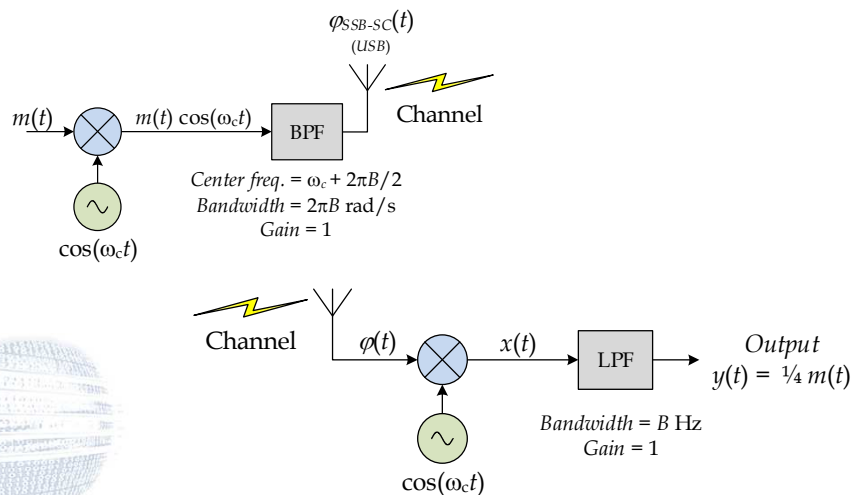
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## QAM Transmitter and Receiver



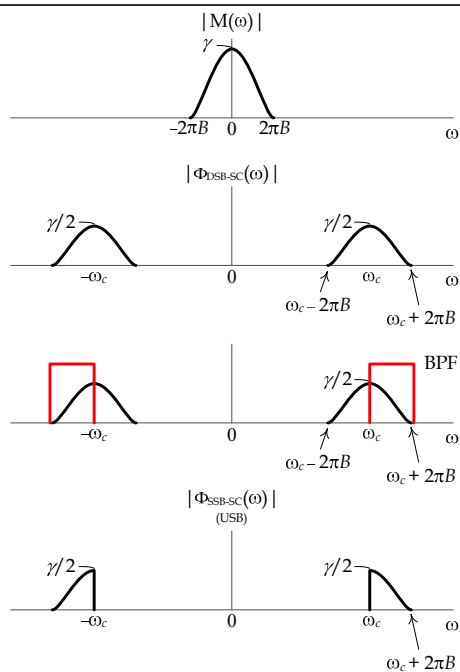
# SSB-SC (USB) Modulation



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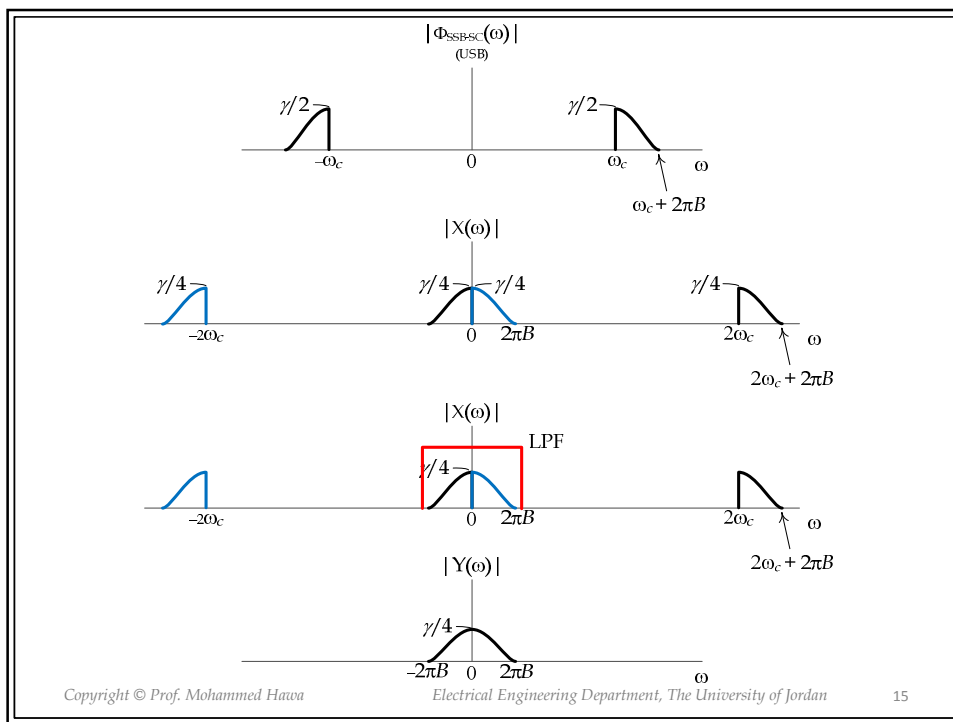
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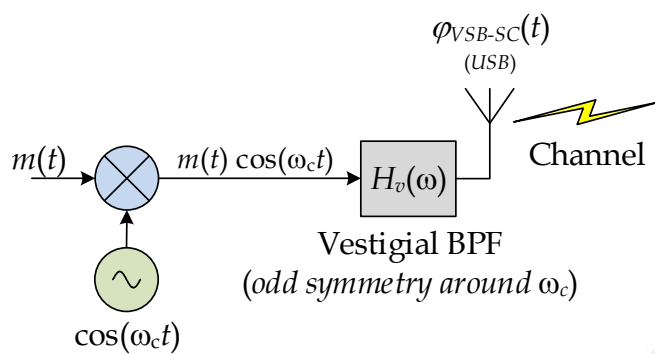
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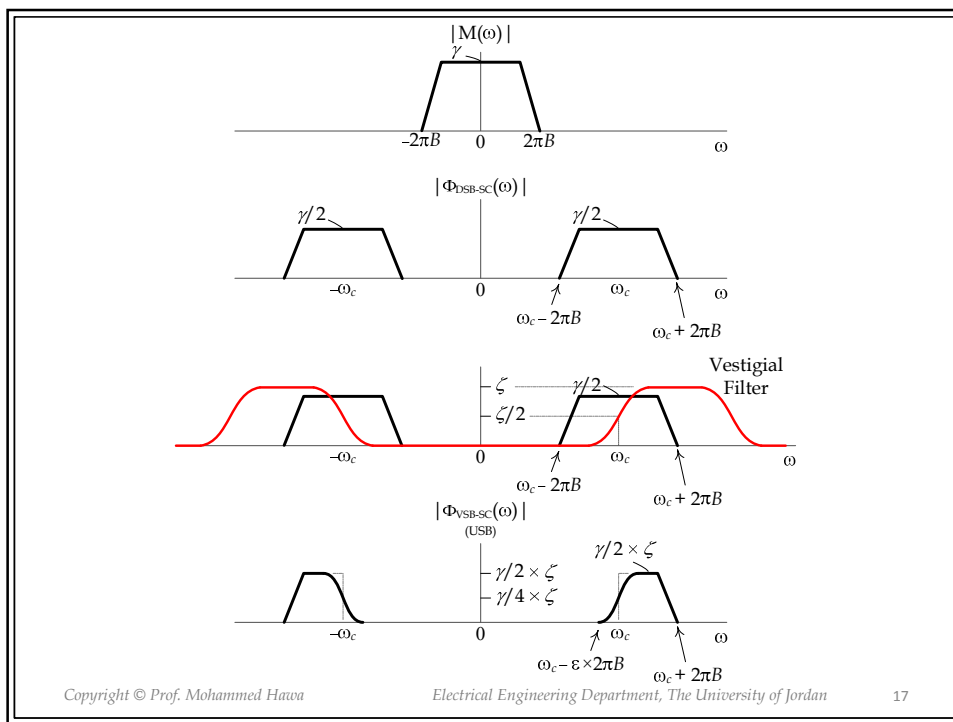
14



## VSB-SC (USB) Transmitter







17

## VSB-SC (USB) Receiver

