



Arab Academy for Science & Technology and Maritime Transport – Cairo Branch

College of Engineering & technology
Electronics & Communication Engineering Department



Course: Introduction to Communication System.

Course Code: EC322

Lecturer: Dr. Hussein El Attar

Week : 1,2,3

Tutors: Eng. Mohamed Atef Abbas, Eng. Mohamed Atef El khoriby

Problem set 1

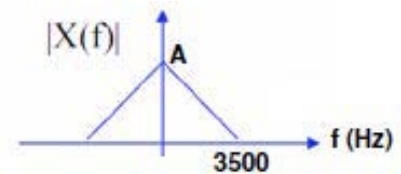
P1] What is the antenna size required to transmit a base band signal with a 10 KHz bandwidth.
Comment on the result.

P2] Find the 3-dB bandwidth for the signal $x(t) = e^{-700t} \cdot u(t)$.

P3] Find the first null bandwidth for the signal $x(t) = A \cdot \text{rect}\left(\frac{t}{\tau}\right)$; $-\frac{\tau}{2} < t < \frac{\tau}{2}$, $\tau = 10 \text{ ms}$.

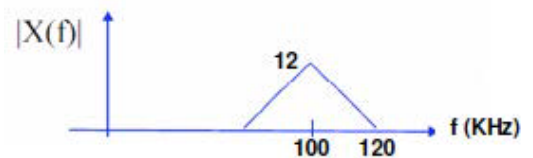
P4] For a signal $x(t)$ with a spectrum as shown:

- What is the bandwidth of $x(t)$.
- Find and sketch the magnitude spectrum of $x(t) \cos(\pi 20000 t)$.
- What is the bandwidth of the signal of part (b).



P5] For a signal $x(t)$ with a spectrum as shown:

- What is the bandwidth of $x(t)$.
- Find and sketch the magnitude spectrum of $x(t) \sin(4\pi 10^5 t)$.
- What is the bandwidth of the signal of part (b).



P6] Sketch the spectrum of the following signals:

- $x(t) = 10 \cos^2(2\pi 5000 t)$
- $x(t) = 20 \cos^3(\pi 10^4 t)$
- $x(t) = 6 \sin(2\pi 4000 t) + 8 \cos(\pi 6000 t)$.

P7] For a signal $x(t)$ with a spectrum as shown, sketch the spectrum of:

- $x_1(t) = x(t) \cdot \cos(16\pi 10^4 t)$.
- $x_1(t) = x(t) \cdot \cos^2(2\pi 10^5 t)$.
- $x_1(t) = x(t) \cdot (\cos(12\pi 10^4 t) + \cos(22\pi 10^4 t))$.

