Southern University of Science & Technology (SUSTech)
Department of Electrical and Electronic Engineering

EE 206 COMMUNICATION PRINCIPLES

Assignment No. 1

1. Sketch the amplitude spectrum of each of the following signals:
   (a) $2\cos^2(2000\pi t)$
   (b) rect(2000t) filtered by an ideal lowpass filter with 4KHz bandwidth

2. Determine the power of the signal $s(t) = 6\cos(200\pi t) + 8\sin(200\pi t)$ using the time-domain and frequency-domain formulas. Do not use superposition of power.

   Note: PSD of $A\cos(2\pi f_0 t + \theta)$ is $\frac{A^2}{4}\left[\delta(f - f_0) + \delta(f + f_0)\right]$, where θ is any phase angle and $\delta(f)$ is a delta dirac function in f.

3. Determine and compare the bandwidths of the following signals:
   (a) $\text{sinc}\left(\frac{t}{50}\right)$
   (b) $\text{sinc}\left(\frac{t-4}{50}\right)$
   (c) $\text{sinc}\left(\frac{t}{50}\right) - 4$
   (d) $\text{sinc}\left(\frac{t}{50}\right)\sin(5000\pi t)$

Note: Please submit your assignment to TA before the tutorial class in next week. Either handwritten or typed is fine. Late submission is NOT allowed.