Continuing Education Course #094
A Gentle Introduction to
Ultra-wide Band (UWB) Radio Technology
Test Worksheet

1. What frequency range comprises the radio frequency spectrum?
   a. 10 Hz to Gamma Rays
   b. 9 kHz to 275 GHz.
   c. AM and FM bands
   d. DC to blue light

2. How are radio signals traditionally separated one from another?
   a. By their operating frequency
   b. Geographically
   c. Along State line
   d. Based on broadcast content

3. What is traditionally the ideal bandwidth of a signal?
   a. Zero frequency like a sine wave
   b. Plus/minus 60 Hz
   c. As wide as possible according to Shannon
   d. Smallest BW needed by the modulation information

4. How is best spectrum capacity traditionally achieved?
   a. Each user operates with maximum power
   b. Each user occupies the smallest bandwidth
   c. Antennas are located on high towers

5. In traditional radio system unintentional emissions are a factor in limiting the spectral capacity.
   a. True
   b. False

6. The bandwidth of a traditional radio signal is controlled by what?
   a. The size of the radio dial
   b. The emitted power
   c. Bandwidth is not controlled
   d. The bandwidth of the modulating signal.

7. Calculate the fraction bandwidth in % of a pulse containing 5 cycles of a sine wave.
   a. 5 Hz
   b. 100%
   c. 40%
   d. 20%

8. How is the best capacity achieved with impulsive signals?
   a. When impulses are long in time
   b. When they are allocated their own frequencies
   c. When each user occupies the smallest time slice

9. What is the objective of optimizing a communications receiver?
   a. Maximize the output Eb/N0
   b. Minimize power consumption
   c. Drive to the lowest cost
   d. Tune for peak signal

10. What dominates the signal to noise performance of a ‘matched filter’ receiver?
    a. Good antenna match
    b. A notch filter
    c. Filter bandwidth
    d. A low noise audio filter

11. What dominates the signal to noise performance of a ‘matched template’ receiver?
    a. A long information bit pattern
    b. A very narrow RF filter
    c. A linear audio filter
    d. Template signal shape

12. What cost and benefit does wide-band FM have over AM in commercial broadcasting?
    a. Bandwidth is exchanged for noise immunity
    b. FM has a larger audience share
    c. FM can be digitized
    d. AM can be represented by I(t) and Q(t)

13. Shannon’s finding on the relationship between power density, noise and information capacity meant that:
    a. More power improves signal to noise ratio
    b. Noise power density is smaller in narrower filters
    c. The bigger the bandwidth the stronger the signal
    d. The wider the bandwidth, the more sharing can occur and the more total information can be conveyed

14. Spectrum usage in the USA is administered by whom?
    a. FCC alone
    b. The Federal Radio Commission
    c. FCC and NTIA
    d. United Nation Radio Commission

15. What is a the minimum bandwidth of a UWB transmitter above 3.1 GHz?
    a. BW ≥0.20
    b. Bandwidth ≥500 MHz

16. UWB pulses cannot be polarity modulated.
    a. True
    b. False