**EEEN 462 – ANALOGUE COMMUNICATION**
**CONTINUOUS ASSESSMENT TEST 1**
**Friday, 5 December 2025**

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1. In a matched impedance system, an amplifier produces an output voltage of 4 volts when the input voltage is 200mV. What is the voltage gain in dB?
   - ◯ 20 dB
   - ◯ 26 dB
   - ◯ 6 dB
   - ◯ 13 dB
2. A receiver detects a signal power of -75dBm and the noise floor is measured at -95dBm. What is the Signal-to-Noise Ratio (SNR) in dB?
   - ◯ 1.26 dB
   - ◯ 170 dB
   - ◯ 20 dB
   - ◯ 20 dB
3. What is the maximum theoretical power efficiency of standard AM?
   - ◯ 25%
   - ◯ 33.3%
   - ◯ 50%
   - ◯ 66.7%
4. An AM transmitter produces a carrier signal of 500 kHz with an amplitude of 20V. It is modulated by a 5 kHz sinusoidal signal with a modulation index of 0.8. What is the amplitude of the lower sideband?
   - ◯ 4V
   - ◯ 6V
   - ◯ 8V
   - ◯ 10V
5. A 1 MHz carrier is amplitude modulated by a 400 Hz sine wave, resulting in upper and lower sideband frequencies. If the AM signal is passed through a bandpass filter that only allows frequencies between 999.5 kHz and 1000.5 kHz, which components will be present at the output?
   - ◯ Carrier only
   - ◯ Carrier and lower sideband
   - ◯ Carrier and upper sideband
   - ◯ All components (carrier and both sidebands)
6. An FM signal has a carrier frequency of 100 MHz and is modulated by a sinusoidal signal of 5 kHz. The frequency deviation is 75 kHz. What is the modulation index (β) of this FM signal?
   - ◯ 0.067
   - ◯ 1.33
   - ◯ 15
   - ◯ 0.75
7. An FM broadcast transmitter operates with a peak frequency deviation of 75 kHz and a maximum modulating frequency of 15 kHz. Using Carson's rule, what is the approximate bandwidth required for this FM signal?
   - ◯ 90 kHz
   - ◯ 150 kHz
   - ◯ 180 kHz
   - ◯ 210 kHz
8. A 10 MHz carrier is frequency modulated by a sinusoidal signal of 2 kHz, producing a frequency deviation of 10 kHz. What is the bandwidth occupied by the significant sidebands (using the universal curve or Bessel functions approach for β = 5)?
   - ◯ 4 kHz
   - ◯ 20 kHz
   - ◯ 24 kHz
   - ◯ 40 kHz
10. An FM system has a modulation index of 5 when the modulating frequency is 5 kHz. If the modulating frequency is increased to 10 kHz while keeping the deviation constant, what is the new modulation index and approximate bandwidth (using Carson's rule)?
    - ◯ β = 2.5, BW = 30 kHz
    - ◯ β = 5, BW = 60 kHz
    - ◯ β = 2.5, BW = 70 kHz
    - ◯ β = 10, BW = 120 kHz
11. An AM signal has total power of 1500 W with 80% modulation. If converted to SSB with the same modulation, what would be the approximate power saving?
    - ◯ 83.3%
    - ◯ 66.7%
    - ◯ 50%
    - ◯ 33.3%
12. The general expression for an Analog QAM signal is given by:
    $s(t) = A_c[m_1(t)\cos(2\pi f_c t) + m_2(t)\sin(2\pi f_c t)]$
    If $m_1(t) = 0.8\cos(2\pi f_m t)$ and $m_2(t) = 0.6\sin(2\pi f_m t)$, with $f_c \gg f_m$, the peak envelope amplitude of the QAM signal is:
    - ◯ 1.0 $A_c$
    - ◯ 0.8 $A_c$
    - ◯ 1.4 $A_c$
    - ◯ $A_c$
13. For a television system with 525 total lines per frame, 40 lines lost during vertical retrace, and a frame rate of 30 Hz, what is the approximate horizontal line frequency?
    - ◯ 15.75 kHz
    - ◯ 31.5 kHz
    - ◯ 45.5 kHz
    - ◯ 7.8 kHz
14. In a 2:1 interlaced scanning system with a frame rate of 30 Hz and 600 total lines per frame, how many complete frames are displayed per second, and how many fields per second?
    - ◯ 30 frames, 30 fields
    - ◯ 30 frames, 60 fields
    - ◯ 60 frames, 60 fields
    - ◯ 15 frames, 30 fields