King Fahd University of Petroleum and Minerals

University Diploma Programs
Electronic Equipment Maintenance

EET 029, Introduction to Communication

MAJOR EXAM # 1

Date: 4th November 2003

Instructor: M. Ajmal Khan, Lecturer, EE Dept.

Student's Name : _____   ID # : _____

Time Allowed: 2 Hours

QUESTION #	POINTS	SCORE
1	22	
2	5	
3	3	
4	10	
5	10	
6	10	
7	5	
8	5	
9	10	
Total	**80**	

Question # 1: Circle the correct Answer for each of the following questions:

I. The SNR is _____ along the length of the channel.

    a. Increasing
    b. Constant
    c. Decreasing
    d. None of the above.

II. The signal level _____ and the noise level increases with distance from the transmitter.

    a. Increases
    b. Constant
    c. None of the above.

III. In _____ systems, there are ways to avoid accumulation of noise and distortion along the path.

    a. Digital
    b. Analog
    c. Combined analog and digital
    d. None of the above.

IV. The two primary communication resources are:

    a. Channel bandwidth and channel noise
    b. Channel bandwidth and transmitted power
    c. Transmitted power and noise
    d. Transmitted power and modulation

V. The process of Amplitude Modulation shifts the spectrum of the modulating signal to _____ by ω_C.

    a. Either left or right.
    b. The left only
    c. The right only
    d. The left and the right

VI. In DSB modulation, the modulated signal spectrum is composed of :

    a. three parts; USB, LSB and Carrier
    b. two parts; USB and LSB
    c. three parts; USB, LSB and reduced carrier.
    d. None of the above.

VII. The balanced modulator is used:

    a. to add full carrier
    b. to add a reduced carrier
    c. to suppress carrier.
    d. None of the above.

VIII. In a communication systems, noise is most likely to affect the signal:

    a. At the transmitter
    b. In the channel
    c. In the information source
    d. At the destination

IX. C3F modulation is normally used for:

    a. HF point-to-point communications
    b. Monaural broadcasting
    c. TV broadcasting
    d. Stereo broadcasting.

X. If the carrier of a 100 percent modulated AM wave is suppressed, the percentage power saving will be:

    a. 50
    b. 150
    c. 100
    d. 66.66

XI. R3E modulation is sometimes used to:

    a. Allow the receiver to have a frequency synthesizer
    b. Simplify the frequency stability problem in reception
    c. Reduce the power that must be transmitted
    d. Reduce the bandwidth required for transmission

XII. To provide two or more voice circuits with the same carrier, it is necessary to use:

    a. ISB
    b. Carrier reinsertion
    c. SSB with pilot carrier
    d. Lincompex

XIII. The modulation index of an AM wave is changed from 0 to 1. The transmitted power is:

    a. Unchanged
    b. Halved
    c. Doubled
    d. Increased by 50 percent

XIV. Amplitude modulation is used for broadcasting because:

    a. It is more noise immune than other modulation systems
    b. Compared with other systems it requires less transmitting power
    c. Its use avoids receiver complexity
    d. No other modulation system can provide the necessary bandwidth for high fidelity.

XV. The most commonly used filters in SSB generation are:

    a. Mechanical
    b. RC
    c. LC
    d. Low-pass

XVI. Indicate in which one of the following only one sideband is transmitted:

    a. H3E
    b. A3E
    c. B8E
    d. C3F

XVII. One of the following cannot be used to remove the unwanted sideband in SSB:
    a. Filter system
    b. Phase-shift method
    c. Balanced modulator
    d. Third method.

XVIII. In the spectrum of a frequency-modulated wave:

    a. The carrier frequency disappears when the modulation index is large.
    b. The amplitude of any sidebands depends on the modulation index.
    c. The total number of sidebands depends on the modulation index.
    d. The carrier frequency cannot disappear.

XIX. The difference between phase and frequency modulation:

    a. Is purely theoretical because they are the same in practice
    b. Is too great to make the two systems compatible
    c. Lies in the poorer audio response of phase modulation
    d. Lies in the different definitions of the modulation index.

XX. A pre-emphasis circuit provides extra noise immunity by:

    a. Boosting the bass frequencies
    b. Amplifying the higher audio frequencies
    c. Preamplifying the whole audio band
    d. Converting the phase modulation to FM.

XXI. When the modulating frequency is doubled, the modulation index is halved, and the modulating voltage remains constant. The modulation system is:

    a. Amplitude modulation
    b. Frequency modulation
    c. Phase modulation
    d. None of the above.

XXII. Indicate which one of the following is not an advantage of FM over AM:

    a. Better noise immunity is provided
    b. Lower bandwidth is required
    c. The transmitted power is more useful
    d. Less modulating power is required.

<u>Question # 2:</u> Circle the correct Answers (Check all that Apply) for each of the following questions:

I. Channel acts as a filter:

      a. To add noise in the signal
      b. To attenuate the signal
      c. To modulate the input signal
      d. To demodulate the signal
      e. To distort the signal's waveform

II. Noise is undesirable signals, which are:

      a. Random
      b. Predictable
      c. Uniform
      d. Unpredictable

III. The performance (accuracy) of analog-to-digital conversion system can be increased.

      a. By increasing the number of quantization levels.
      b. At sampling rate less than Nyquist rate.
      c. By decreasing the number of quantization levels.
      d. At sampling rate greater than Nyquist rate.

IV. If the signal power increases then

      a. The channel bandwidth must increase.
      b. One may reduce the channel bandwidth
      c. The effect of channel noise reduces
      d. The effect of channel noise increases.

V. In DSB modulation, which of the following exists:

      a. a portion that lies above ω_c is known as USB.

      b. a portion that lies below ω_c is known as LSB.

      c. a portion that lies below $-\omega_c$ is known as USB.

      d. a portion that lies above $-\omega_c$ is known as LSB.

Question # 3: Indicate the False statement for each of the following questions:

I. Modulation is used to:

    a. Reduce the bandwidth used
    b. Separate differing transmissions
    c. Ensure that intelligence may be transmitted over long distances
    d. Allow the use of practicable antennas

II. Indicate the false statement regarding the advantages of SSB over double sideband, full carrier AM.

    a. More channel space is available
    b. Transmitter circuit must be more stable, giving better reception
    c. The signal is more noise-resistant
    d. Much less power is required for the same signal bandwidth

III. Indicate which one of the following advantages of the phase cancellation method of obtaining SSB over the filter method is false:

    a. Switching from one sideband to the other is simpler
    b. It is possible to generate SSB at any frequency
    c. SSB with lower audio frequencies present can be generated
    d. There are more balanced modulators; therefore the carrier is suppressed better.

Question # 4:   Write the definitions of the following:

I. Sampling Theorem

II. Quantization.

III. Channel Bandwidth.

IV. Synchronous detection (coherent detection)

V. Modulation index

Question # 5: A 25 MHz carrier is modulated by a 400 Hz audio sine wave. If the carrier voltage is 4 V and the maximum deviation is 10 kHz, write the equation of this modulated wave for (a) FM and (b) PM. If the modulating frequency is now changed to 2 kHz, all else remaining constant, write a new equation for (c) FM and (d) PM.

Question # 6:   Calculate the percentage power saving in an AM wave modulated to a depth of 50 percent, when (a) the carrier is suppressed and (b) carrier and one of the sidebands are suppressed.

Question # 7: A 1000 kHz carrier is simultaneously modulated with 300 Hz, 800 Hz and 2 kHz audio sine waves. What will be the frequencies present in the output.

Question # 8: A broadcast AM transmitter radiates 50 kW of carrier power. What will be the radiated power at 85 percent modulation?

Question # 9: A 400 W carrier is modulated on a depth of 75 percent, calculate the total power in the modulated wave in the following forms of AM:

   a. Double-sideband with full carrier
   b. Double-sideband, suppressed carrier
   c. Single-sideband suppressed carrier.