UNIVERSITY OF MORATUWA

Faculty of Information Technology

B.Sc. (Hons) in Information Technology
Level 1 Semester 2

IN1500 - Data Communication

Tutorial 1

Date Due: 07/03/2022

Name: Reg. No:

Multiple-Choice Questions

1. Before data can be transmitted, they must be transformed to _____

    a. Periodic signals

    b. Electromagnetic signals

    c. Aperiodic signals

    d. Low-frequency sine waves

2. A periodic signal completes one cycle in 0.001 s. What is the frequency?

    a. 1Hz

    b. 100Hz

    c.1KHz

    d. 1MHz

3. Which of the following can be determined from a time-domain graph of a signal?

    a. Frequency

    b. Phase

    c. Power

    d. All the above

4. Which of the following can be determined from a frequency-domain graph of a signal?

    a. Bandwidth

    b. Phase

    c. Power

    d. All the above

5. In a frequency-domain plot, the vertical axis measures the _____

    a. Peak amplitude

    b. Frequency

    c. Phase

    d. Slope

6. In a frequency-domain plot, the horizontal axis measures the _____

    a. Peak amplitude

    b. Frequency

    c. Phase

    d. Slope

7. In a time-domain plot, the vertical axis is a measure of _____

    a. Amplitude

    b. Frequency

    c. Phase

    d. Time

8. In a time-domain plot, the horizontal axis is a measure of _____

    a. Signal amplitude

    b. Frequency

    c. Phase

    d. Time

9. If the bandwidth of a signal is 5 KHz and the lowest frequency is 52 KHz, what is the highest frequency?

    a. 5KHz

    b. 10KHz

    c. 47KHz

    d. 57KHz

10. What is the bandwidth of a signal that ranges from 40 KHz to 4 MHz?

    a. 36 MHz

    b. 360 KHz

    c. 3.96 MHz

    d. 396 KHz

11. When one of the components of a signal has a frequency of zero, the average amplitude of the signal

    _____ .

    a. Is greater than zero

    b. Is less than zero

    c. Is zero

    d. (a) or (b)

12. A periodic signal can always be decomposed into _____

    a. Exactly an odd number of sine waves

    b. A set of sine waves

    c. A set of sine waves, one of which must have a phase of 0^0

    d. None of the above

13. As frequency increases, the period

    a. Decreases

    b. Increases

    c. Remains the same

    d. Doubles

14. Given two sine waves A and B, if the frequency of A is twice that of B, then the period of B is

    _____ that of A.

    a. One-half

    b. Twice

    c. The same as

    d Indeterminate from

15. A sine wave is _____

    a. Periodic and continuous

    b. Aperiodic and continuous

    c. Periodic and discrete

    d. Aperiodic and discrete

Short Answer Questions

1 . Show the frequency domain of the following signal:

s(t) = 8 + 3 sin l00πt+ 5 sin 200πt

2. What is the period of the following signal?

s(t) = 4 sin 628 t

3. Given the frequencies listed below, calculate the corresponding periods.

a. 24Hz

b. 8 MHz

c. 140KHz

4. Given the following periods, calculate the corresponding frequencies.

a. 5 s

b. 12 µs

c. 220 ns

5. What is the phase shift for the following?

a. A sine wave with the maximum amplitude at time zero

b. A sine wave with maximum amplitude after 1/4 cycle

c. A sine wave with zero amplitude after 3/4 cycle and increasing

6. What is the bandwidth of a signal that can be decomposed into five sine waves with frequencies at 0, 20, 50, 100, and 200 Hz? All peak amplitudes are the same. Draw the bandwidth.

7. A periodic composite signal with a bandwidth of 2000 Hz is composed of two sine waves. The first one has a frequency of 100 Hz with maximum amplitude of 20V; the second one has maximum amplitude of 5 V. Draw the bandwidth.


8. Which signal has a wider bandwidth, a sine wave with a frequency of 100 Hz or a sine wave with a frequency of 200 Hz?

9. What is the bit rate for each of the following signals?

a. A signal in which 1 bit lasts 0.00 1 s

b. A signal in which 1 bit lasts 2 ms

c. A signal in which 10 bits last 20 µs

10. A device is sending out data at the rate of 1000 bps.

   a. How long does it take to send out 10 bits?

   b. How long does it take to send out a single character (8 bits)?

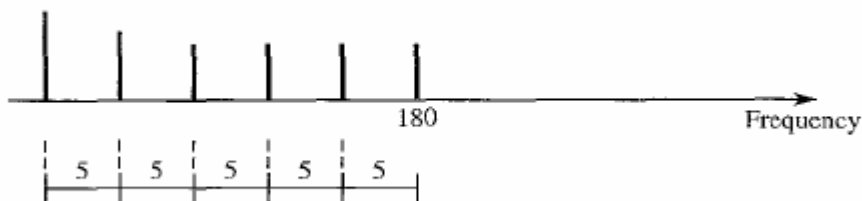   c. How long does it take to send a file of 100,000 characters?

11. What is the bit rate for the signal in the following figure?
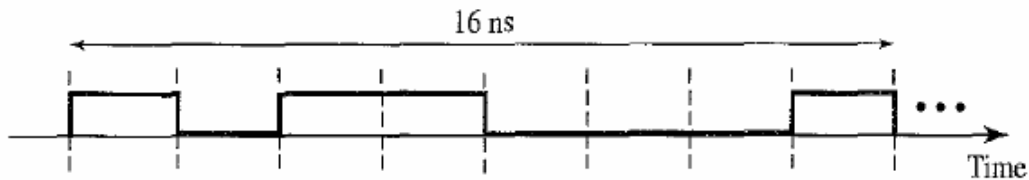
12. What is the frequency of the signal in the following?
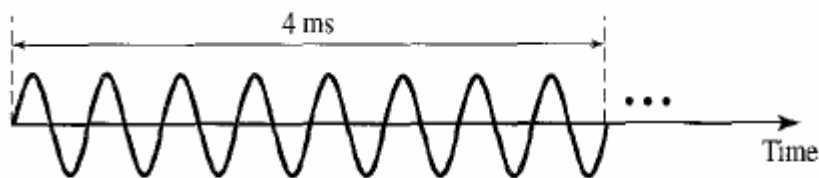
13. What is the bandwidth and the lowest frequency of the composite signal shown in the figure?

14. A periodic composite signal contains frequencies from 10 to 30 KHz, each with amplitude of 10 V. Draw the frequency spectrum.

15. A non-periodic composite signal contains frequencies from 10 to 30 KHz. The peak amplitude is 10 V for the lowest and the highest signals and is 30 V for the 20-KHz signal. Assuming that the amplitudes change gradually from the minimum to the maximum, draw the frequency spectrum.