**Review Questions**

1. **Differentiate between an analog and a digital electromagnetic signal.**
   1. An analog signal is any constant electromagnetic signal, in which the strength of the signal varies in an even manner over time. A digital signal is an electromagnetic signal, in which the strength of the signal maintains constant level for certain time and then turns into another constant level (0s and 1s).
2. **What are three important characteristics of a periodic signal?** 
   1. The three important characteristics of a periodic signal is as follows: Amplitude, Frequency and Phase.
3. **How many radians are there in a complete circle of 360 degrees?**
4. **What is the relationship between the wavelength and frequency of a sine wave?** 
   1. The relationship between wavelength and frequency of a sine wave is velocity. The equation for it is Velocity (v) = wavelength (**)** x frequency (f).
5. **What is the relationship between a signal's spectrum and its bandwidth?** 
   1. A signal’s spectrum defines the frequencies range that the signal covers when the bandwidth defines the width of the spectrum. With the relationship between the two is the width and the information carrying capability amount of the signal.
6. **What is attenuation?** 
   1. It happens when a signal travels distance, the strength of the signal will be reduced gradually and the process of reducing the signal strength over distance is referred to as attenuation.
7. **Define channel capacity.** 
   1. It is the maximum data transmission rate over a specified communication channel, under certain conditions.
8. **What key factors affect channel capacity?** 
   1. There are 3 key factors of channel capacity: Bandwidth, Noise and Error rate.
9. **Differentiate between guided media and unguided media.** 
   1. Guided media are electromagnetic waves that are guided along a solid medium, and transmits signal through fiber optic, copper twisted pair, or copper coaxial cable, whereas unguided media electromagnetic waves are not guided and transmits it’s electromagnetic waves through wireless medium. It also transmits its signal through air, space or water.
10. **What are some major advantages and disadvantages of microwave transmission?**
    1. Advantages:  
       Microwaves transmissionhas a high data rate and less attenuation, it has multiple channels available as well as a wide bandwidth and most importantly, it does not require cables for transmission.
    2. Disadvantages:  
       Microwave transmission are affected by rainfall, requires line-of-sight, will be disrupted by other microwave transmissions, and requires a costly budget to construct towers to transmit the signals.
11. **What is direct broadcast satellite (DBS)?** 
    1. It is the latest satellite technology application to television distribution, used to transmit satellite video signals directly to the home-based user for continuous operation.
12. **Why must a satellite have distinct uplink and downlink frequencies?** 
    1. They must have these frequencies to have uninterrupted operation. The frequencies must be different because a satellite cannot transfer and receive signals on the same frequency.
13. **Indicate some significant differences between broadcast radio and microwave.** 
    1. Broadcast radio uses many different things vs microwave transmitters. Here are a couple examples: BR uses VHF and part of the UHF band, dish shaped antennas are not required to broadcast a signal, the antennas are not required to be in fixed alignment.
14. **Why is multiplexing so cost-effective?** 
    1. It is cost-effective because if the data rate is higher, then the transmission of data will take more cost; as the data rate of multiplexing is greater, the transmission facility has become most cost-effective.
15. **How is interference avoided by using frequency division multiplexing?** 
    1. By using guard bands, the interference can be avoided under FDM. The guard bands are frequency spectrum’s idle portions between subchannels.
16. **Explain how synchronous time division multiplexing (TDM) works.**
    1. A synchronous time division multiplexing inserts bits from each signal and starts to transmit bit from each signal in a round-robin method.