Data Communication Section L Week 10 Lab Class

1. What is FDM?
   1. FDM is a way of combining multiple signals to better utilize the bandwidth of communication link.
2. Communication link in our hand has a bandwidth of 500 Hz and it resides from 600 to 1100 Hz frequencies.
3. First analog signal is of 40 Hz bandwidth and it resides from 0 to 40 Hz frequencies. Second analog signal is of 70 Hz bandwidth and it resides from 0 to 70 Hz frequencies. Third analog signal is of 60 Hz bandwidth and it resides from 0 to 60 Hz frequencies.
4. Combining analog signals:
   1. The analog signals cannot overlap with each other in frequency domain.
   2. After combining the signals, while transmission we need to make sure that the bandwidth of the combined signal is less than the bandwidth of communication link.
5. We will move first Analog signal to 660-700 Hz frequencies. So, for modulation, frequency of carrier signal will be 680 Hz.
6. We will move second Analog signal to 730-800 Hz frequencies. So, for modulation, frequency of carrier signal will be 765 Hz.
7. We will move third Analog signal to 870-930 Hz frequencies. So, for modulation, frequency of carrier signal will be 900 Hz.
8. Signals are transmitted through the given communication link in a combined state. This FDM multiplexing.
9. Now in receiving side, the receivers will receive a combined signal.
10. Intended recipient of first analog signal will filter the combined signal using a band pass filter where cut off frequencies are 650 and 710 Hz. Intended recipient of second analog signal will filter the combined signal using a band pass filter where cut off frequencies are 720 and 810 Hz. Intended recipient of third analog signal will filter the combined signal using a band pass filter where cut off frequencies are 860 and 940 Hz. This process is called de-multiplexing.
11. We need to take the analog signals back to their original frequency region. This process is called demodulation. For demodulation I will use same carrier signals as modulation respectively.
12. So, first signal is inside 0-40 Hz, second signal is inside 0-70 Hz, third signal is inside 0-60 Hz.
13. So we will use a low pass filter with 45 Hz cut off for first signal, a low pass filter with 75 Hz cut off for second signal, a low pass filter with 65 Hz cut off for third signal.