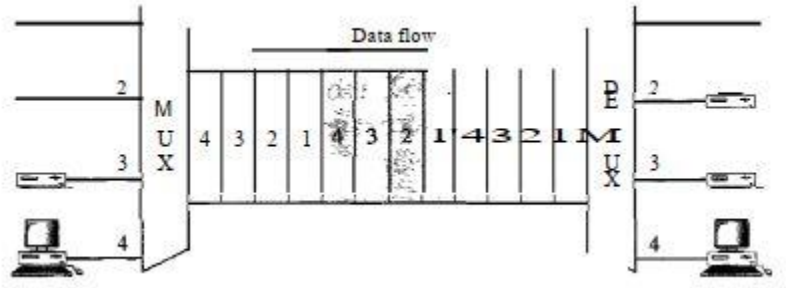
Part 1

Answer a ny five .

1. Why are guard bands used in FDM?

2. Using appropriate diagrams, distinguish between the two basic multiplexing techniques (FDM and TDM). [5 marks]



3. Assume that a voice channel occupies a bandwidth of 6 kHz. We need to multiplex 15 voice channels with guard bands of 500 Hz using FDM. Calculate the required bandwidth.

4. Why is statistical TDM more efficient than a synchronous TDM multiplexer? Why is the synchronization bit required in TDM?

5. Suppose, you have 6 voice channels, each of 60MBps. You have to use synchronous TDM to multiplex these channels. If 2 characters at a time are multiplexed (2 characters in each output slot), answer the following:
    a. What is the size of an output frame in bits?
    b. What is the output frame rate?
    c. What is the duration of an output frame?
    d. What is the output data rate?
    e. Input bit duration?
    f. Output bit duration?
    g. Output slot duration?

6. We have 14 sources, each creating 500 characters per second. Since only some of these sources are active at any moment, we use statistical TDM to combine these sources using character interleaving. Each frame carries 6 slots at a time, but we need to add four-bit addresses to each slot. Answer the following questions:
    a. What is the size of an output frame in bits?
    b. What is the output frame rate?
    c. What is the duration of an output frame?
    d. What is the output data rate?
7. Two channels, one with a bit rate of 190 kbps and another with a bit rate of 180 kbps, are to be multiplexed using pulse stuffing TDM with no synchronization bits. Answer the following questions: [4 marks]
    a. What is the size of a frame in bits?
    b. What is the frame rate?
    c. What is the duration of a frame?
    d. What is the data rate?

8. Suppose, you have 11 channels, each of 55 MBps. You have to use synchronous TDM to multiplex these channels. If each channel passes 3 characters during each input slot, answer the following: [6]
    1. What is the size of an output frame in bits?
    2. What is the input bit duration?
    3. What is the output slot duration?
    4. What is the output bit duration?
    5. What is the output frame rate?
    6. What is the output data rate?

Part 2

Answer a ny three with no.4 as mandatory .

1. Why must the guard band be used in FDM, not TDM? Assume twelve 5.2 kHz channels are multiplexed in a 69 kHz channel using FDM. Calculate the bandwidth of the guard bands. Illustrate with visual representation.
2. In a CDMA/CD network with a data rate of 10 Mbps, the maximum distance between any station pair is found to be 2500 m for the correct operation of the collision detection process. What should be the maximum distance if we increase the data rate to 100 Mbps? To I Gbps? To 10 Gbps?

3. A network with one primary and four secondary stations uses polling. The size of a data frame is 1000 bytes. The size of the poll, ACK, and NAK frames are 32 bytes each. Each station has 5 frames to send. How many total bytes are exchanged if there is no limitation on the number of frames a station can send in response to a poll?
4. Show the staircase in the following graph and generate the digital data from the given analog signal using the Delta Modulation (DM) technique.