Short Answer Type Questions

Multiplexing

Q1.In what situation multiplexing is used?

Ans. Multiplexing is used in situations where the transmitting media is having higher bandwidth, but the signals have lower bandwidth. Hence there is a possibility of sending number of signals simultaneously. In this situation Multiplexing can be used to achieve the following goals:

- To send a large number of signals simultaneously.
- To reduce the cost of transmission
- To make effective use of the available bandwidth •

Q2. Distinguish between the two basic multiplexing techniques?

Ans. The two basic multiplexing techniques are:

1. Frequency division multiplexing (FDM)
2. Time division multiplexing (TDM)

FDM can be used with analog signals. A number of signals are carried simultaneously on the same medium by allocating to each signal a different frequency band.

TDM (also known as synchronous time division multiplexing) can b used with digital signals or analog signals carrying digital data. In TDM, data from various sources are carried in respective frames. Each frame consists of a set of time slots, and each source is assigned a time slot per frame.

Q3.Why guard bands are used in FDM?

Ans: In FDM, a number of signals are sent simultaneously on the same medium by allocating separate frequency band or channel to each signal. Guard bands are used to avoid interference between two successive channels.

Q4. Why sync pulse is required in TDM?

Ans: In TDM, in each frame time slots are pre-assigned and are fixed for each input sources. In order to identify the beginning of each frame, a sync pulse is added at the beginning of every frame.

5. How is the wastage of bandwidth in TDM overcome by Statistical- TDM?

Ans: It dynamically allocates the time slots on demand to separate input channels, thus saving the channel capacity. As with Synchronous TDM, statistical multiplexers also have many I/O lines with a buffer associated to each of them. During the input, the multiplexer scans the input buffers, collecting data until the frame is filled and send the frame. At the receiving end, the demultiplexer receives the frame and distributes the data to the appropriate buffers. In case of statistical TDM, the data in each slot must have an address part, which identifies the source of data.

Q**6. What is the difference between Frequency Division Multiplexing and Wave Division Multiplexing?**

Ans: Wave-division multiplexing (WDM) is conceptually the same as FDM, except that the multiplexing and demultiplexing involves light signals transmitted through fibre-optic channels. The idea is the same: we are combining different frequency signals. However, the difference is that the frequencies are very high.

Q7. What is Orthogonal Frequency Division Multiplexing?

Ans Orthogonal FDM's (OFDM) spread spectrum technique distributes the data over a large number of carriers that are spaced apart at precise frequencies. This spacing provides the "orthogonality" in this technique which prevents the demodulators from seeing frequencies other than their own. The benefits of OFDM are high spectral efficiency, resiliency to RF interference, and lower multi-path distortion.

Q8. What limitation of TDM is overcome in ATM and how?

Ans: In TDM, each frame consists of a set of time slots, and each source is assigned one slot per frame. In a particular frame, if a source is not having data, then that time slot goes empty. As a result, many of the time slots are wasted. This problem of TDM is overcome in ATM. In ATM, the time slots are not pre-assigned to a particular data source. Rather, slots are dynamically allotted to sources on demand, depending on the availability of data from different sources.