1. (a) Using a word processing package, type the passage below as it appears and save it as A:\Multi l (30mks)

Multiplexing

Multiplexing is a technique that enables broadband media to support multiple data channels. Multiplexing makes sense under a number of circumstances:

✓ *When media bandwidth is costly*. A high-speed leased line, such as a T1or T3, is expensive to lease. If the leased line has sufficient bandwidth, multiplexing can enable the same line to carry mainframe, LAN, voice, video conferencing, and various other data types.
✓ *When bandwidth is idle*. Many organizations have installed fiber-optic cable that is used to only partial capacity. With the proper equipment, a single fiber can support hundreds of megabits—or even a gigabit or more—of data per second
✓ *When large amounts of data must be transmitted through low capacity channels*. Multiplexing techniques can divide the original data stream into several lower bandwidth channels, each of which can be transmitted through a lower-capacity medium. The signals then can be recombined at the receiving end.

Multiplexing refers to combining multiple data channels for transmission on a common medium. *Demultiplexing* refers to recovering the original separate channels from a multiplexed signal. Multiplexing and demultiplexing are performed by a multiplexer (also called a mux), which usually has both capabilities.

Frequency Division Multiplexing

This technique works by converting all data channels to analog form. Each analog signal can be modulated by a separate frequency (called a "carrier frequency") that makes it possible to recover that signal. During the demultiplexing process. At the receiving end, the demultiplexer can select the desired carrier signal and use it to extract the data signal for that channel.

FDM can be used in broadband LANs. (A standard for Ethernet also exists.) One advantage of FDM is that it supports bidirectional signaling on the same cable. That is, a frequency can originate from both ends of the transmission media at once.

Time-Division Multiplexing

Time-division multiplexing (TDM) divides a channel into time slots that are allocated to the data streams to be transmitted, If the sender and receiver agree on the time-slot assignments, the receiver can easily recover and reconstruct the original data streams. TDM transmits the multiplexed signal in base band mode. Interestingly, this process makes it possible to multiplex a TDM signal as one of the data channels on an FDM system. Conventional TDM equipment utilizes fixed time divisions and allocates time to a channel, regardless of that channel's level of activity.

If a channel isn't busy, its time slot isn't being fully utilized. Because the time divisions are programmed into the configurations of the multiplexers, this technique is often referred to as synchronous TDM. If using the capacity of the data medium more efficiently is important, a more sophisticated technique,
Statistical time-division multi plexing (StatTDM), can be used. A stat-mux uses the time-slot technique but allocates time slots based on the traffic demand on the individual channels, and that Channel C is allocated the fewest time slots. Channel D is idle, so no slots are allocated to it. To make this procedure work, the data transmitted for each time slot includes a control field that identifies the channel to which the data in the time slot should be assigned.

(b) (i) Spell check the document. (2mks)

(ii) Indent the paragraph starting with "If a channel isn't busy, it's ...." (2mks)

(c) Insert page numbering at the bottom center of each page (2mks)

(d) Copy the paragraph in a table to a new document change the page orientation to landscape (3mks)

(e) Insert a header "Multiplexers" and footer with your name save it as A:\Multi2 (3mks)

(f) Open Multi 1 and Copy the paragraph starting with "Frequency Division ..." to be the first paragraph save it as Multi3 (2mks)

(g) Print Multi 1, Multi2 and Multi3 (6mks)