Chapter - 6

Multiplexing: Multiplexing is the set of techniques that allows the simultaneous transmission of multiple signals across a single data link.

- input time slot = T
  output " " = $\frac{T}{n}$

  n = number of connection

- If data rate = a
  then bit duration = $\frac{1}{a}$
- Duration of frame = duration of an input unit
- Output bit duration = $\frac{\text{input bit duration}}{\text{time slot}}$
- Output bit rate = output data rate
- frame rate = input rate

6.b

(a) Data rate = 3 kbps

: duration of each input slot = $\frac{1}{\text{Data rate}}$

$= \frac{1}{3000 \text{ bps}}$

$= 0.0003333 \text{ sec}$

$= 0.333 \text{ ms}$

$= 333.3 \mu s$

(b) Given that, each frame = 3 slots

each output slot = T/3

(a) Data rate = 3 kbps

a) bit rate = 1 kbps

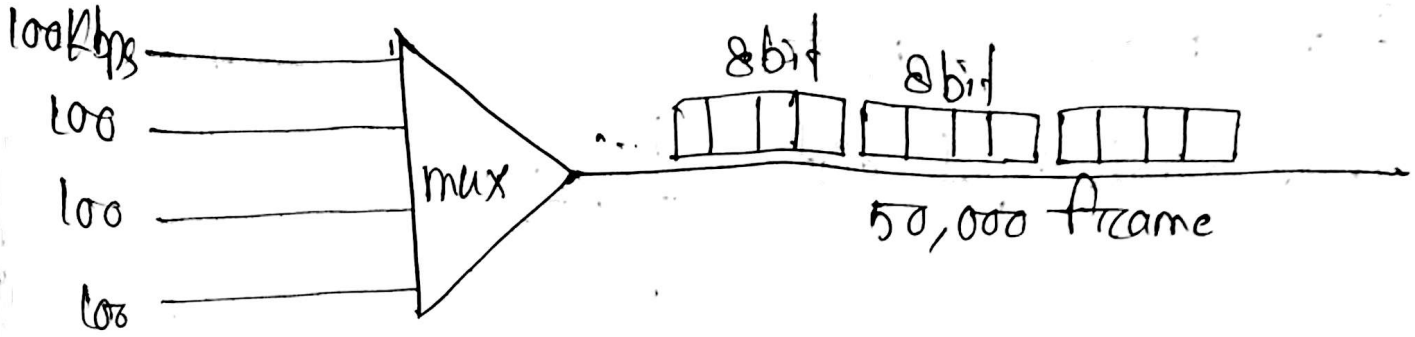
input slot / bit duration = $\frac{1}{1 \text{ kbps}}$ = 1 ms

output = $\frac{\text{input bit duration}}{\text{time slot}}$

$= \frac{1}{3}$ ms

duration of frame = 3 × $\frac{1}{3}$ ms

same as input.



6.9 frame rate $= \frac{4 \times 100 \times 1000}{2 \times 4}$

$= 50,000$

frame duration $= \frac{1}{50,000}$ s

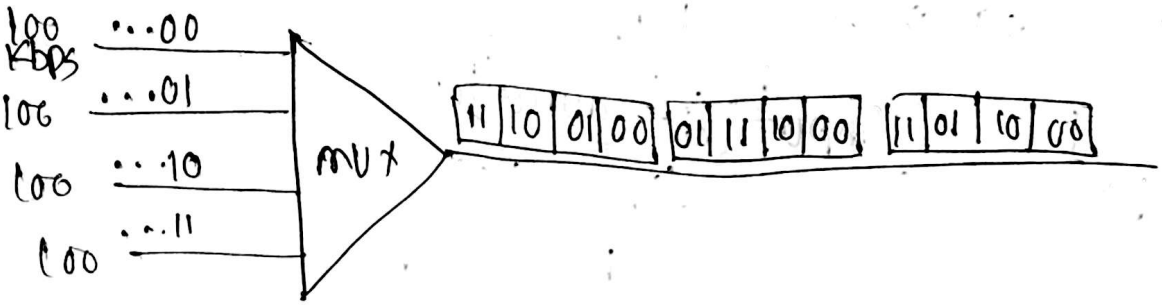
$= 2 \times 10^{-5}$ s

$= 20$ μs

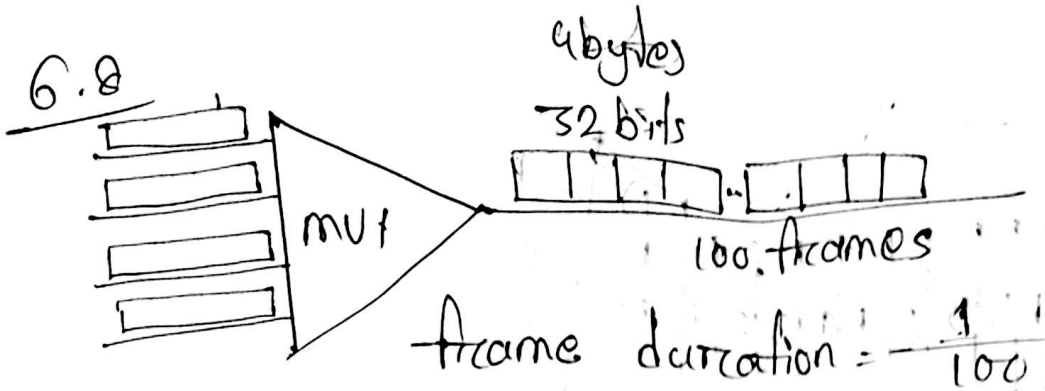
bit rate $= 50,000 \times 8$

$= 400000$

bit duration $= \frac{1}{4,00000} = 2.5$ μs



6.8

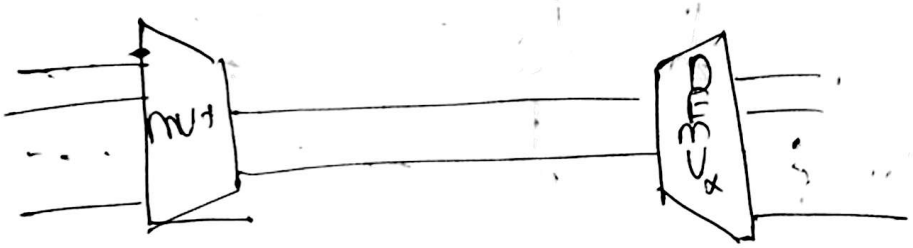


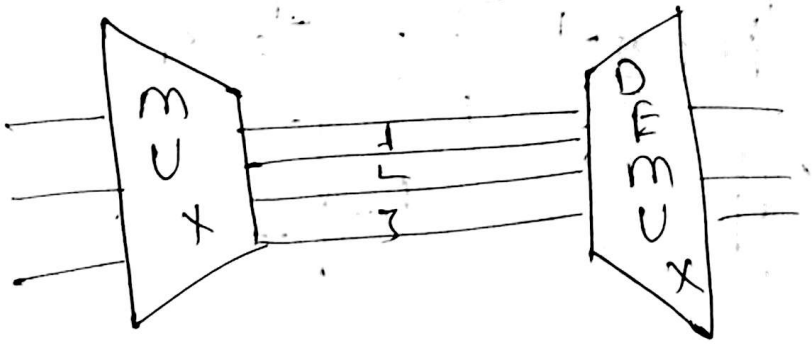
frame duration = $\frac{1}{100}$ s

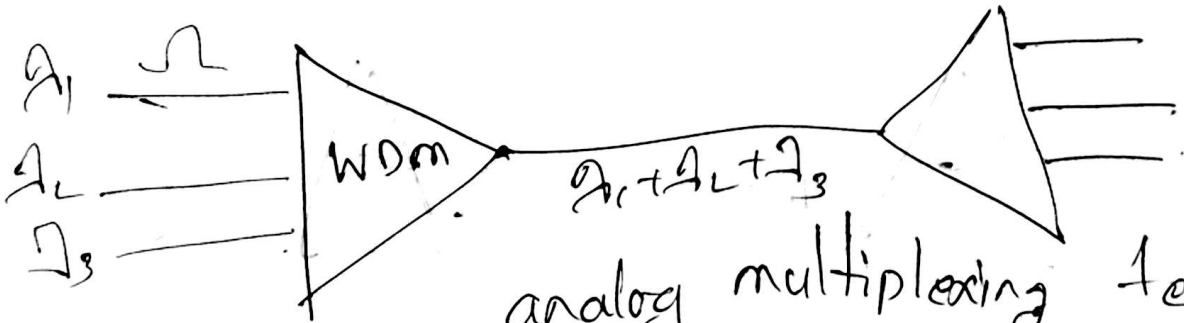
$= 10^{-2}$ s

bit rate = 100 x 32 = 3200bps

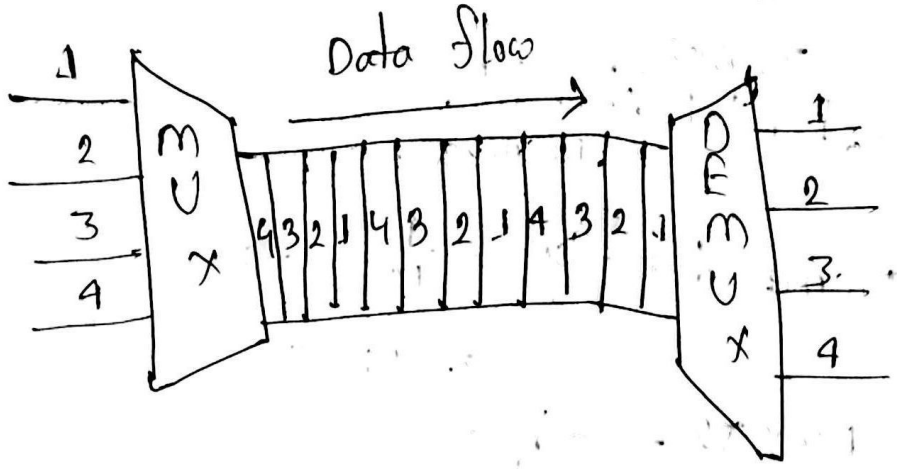
FDM, WDM

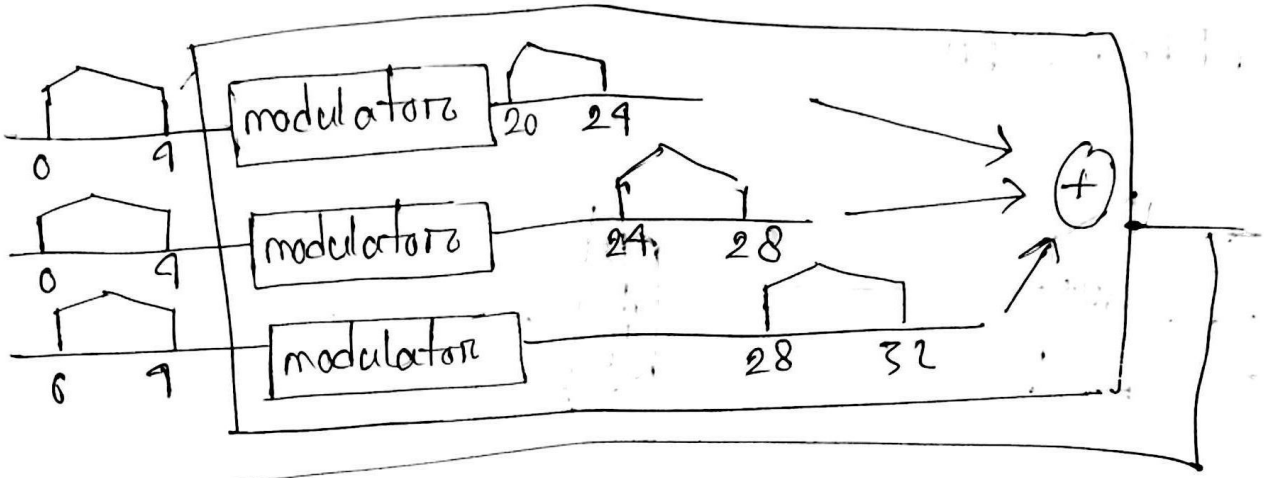


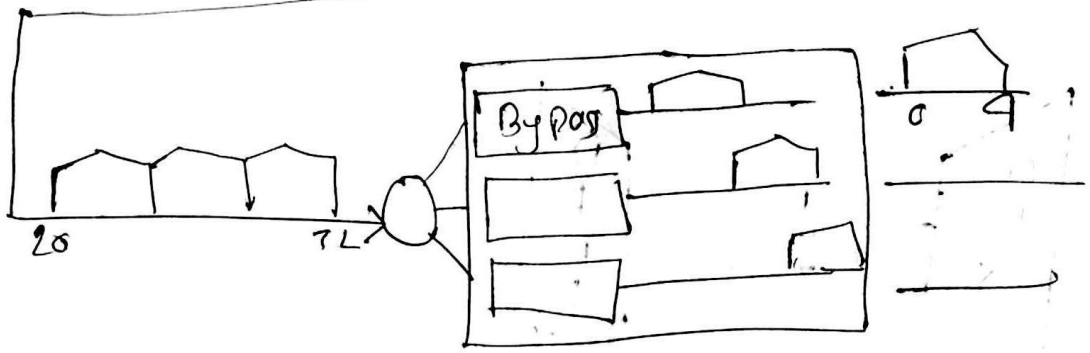


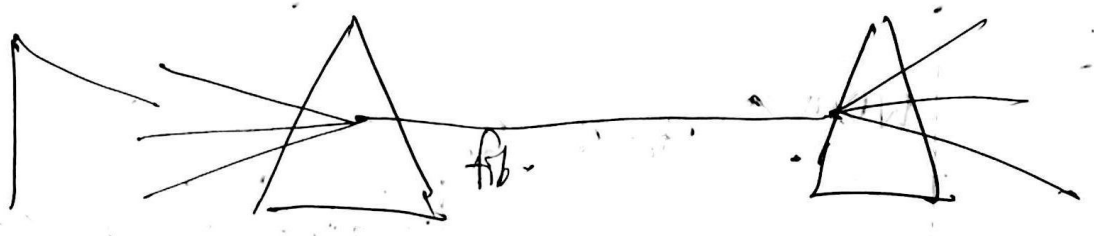


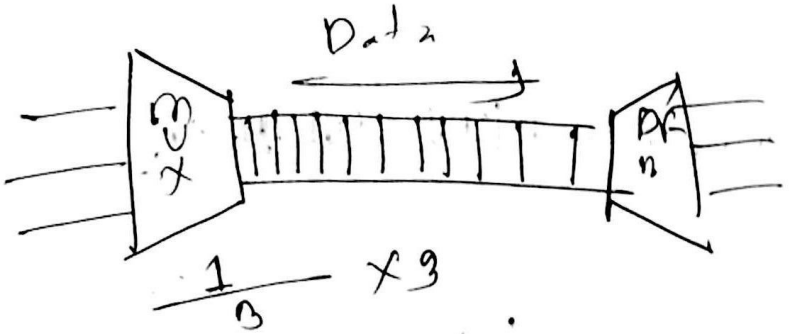
analog multiplexing technique to combine optical


Data flow
1
2
3
4
MUX
4 3 2 1 4 3 2 1 4 3 2 1
DEMUX
1
2
3
4


modulator
modulator
modulator
0
4
20
24
28
32
+


Bypass
20
0
4


fib



$\frac{1}{3}$ x 3

inp = 1 Kb

$= \frac{1}{4}$

$= \frac{10}{10^6}$ s

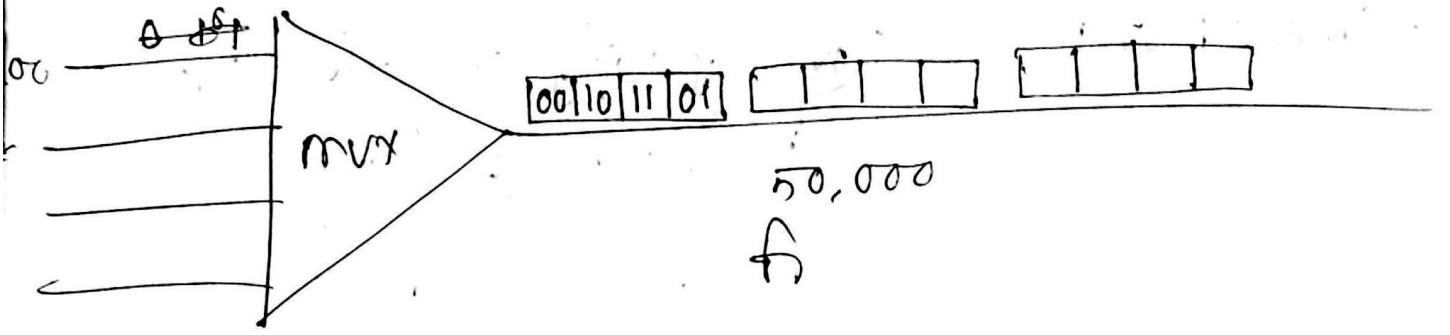
= 1 ms

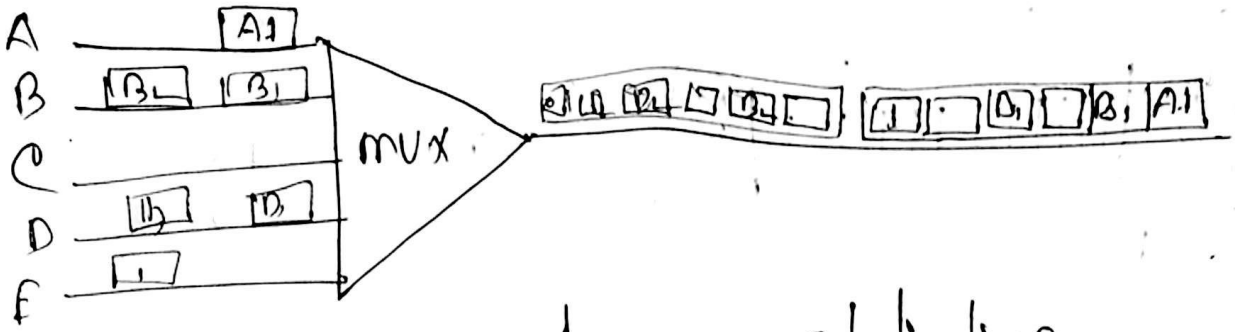
in d = data = 1

inp = $\frac{1}{1}$ mbps = 1 μs

$\frac{1}{4}$ μs 4x1 1000,000 fi

Interleaving: TDM can be visualized as two fast-rotating switches, one on the multiplexing side and other on the demultiplexing side.





Syncronus	statistics
(i) no need for addressing	(i) needs for
(ii) each input connection has an allotment in the output even if it is not sending data.	(ii) no relation between input and output because no preassigned slot
(iii) data rate of input n time faster.	(iii) frames not need to be syncronized.
	(iv) capacity of the link is normally less.