CSE 320

Assignment 03

Name : Faiaz Abrar Zaman Pronoy

ID : 22301061

section : 18

Ans. to. the. Q. No – 1

Student ID: 22301061

$\therefore$ Last two digits: 61

$\therefore$ Bandwidth of a channel = 61 kHz

we have to multiplex 20 voice channel, so we need (20-1) = 19 guardband of 500 Hz using FDM.

$\therefore$ Guardband bandwidth = 19 × 500 Hz

= 9500 Hz

= 9.5 kHz

$\therefore$ Total required bandwidth,

= 20 × 61 + 9.5 kHz

= 1229.5 kHz

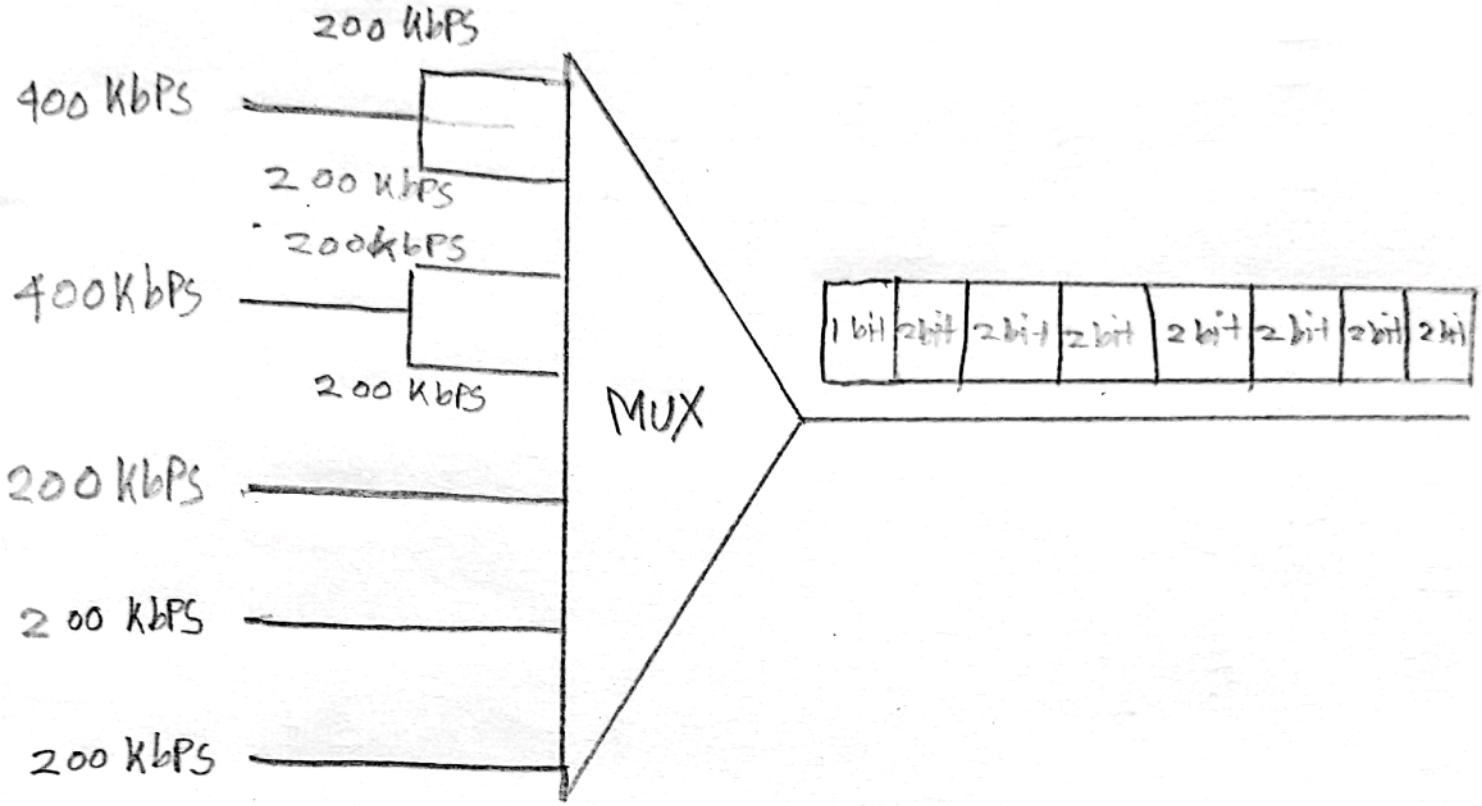
Ans. to. the. Q.No – 2

Synchronous TDM	Statistical TDM
1. Slots are allocated statically and periodically. Every input lines has a fixed time slot in every output frame regardless of whether it has data to send or not.	1. Slots are allocated dynamically and on demand. Input lines are given slots in output frames only if they have data to send.
2. Slots contain ~~both~~ only data ~~and~~ ~~address~~ of the destination and the number of slots in each frame are equal to the no of input lines.	2. Slot contain both data and address of the destination and the number of slots of each frame are less than or equal the no of input line.
3. synchronization bits are used at the beginning of each frame.	3. No synchronization bits are used, but it uses addressing bit.
4. Implementation is simpler as it doesn't require buffering, addressing.	4. implementation is more complex, as it requires buffering and addressing

FIGURE NO .....

synchronization bit: Synchronization bits are required in TDM to ensure that the multiplexer and demultiplexer are alligned with each other and can separate the time slots correctly. otherwise the demultiplexer may receive bits from wrong channel or miss some bits altogether. This can cause errors and distortion in the received signals.

Ans. to. the. Q.No-3



(a) 7 input channels.

(b) Input bit duration,

$$200 \text{ Kb} \rightarrow 1 \text{ s}$$

$$\therefore 200 \times 10^3 \text{ bits} \rightarrow 1 \text{ s}$$

$$\therefore 1 \text{ bit} \rightarrow \frac{1}{2 \times 10^5} \text{ s}$$

$$\therefore \text{Input bit duration} = \frac{1}{2 \times 10^5} \text{ s}$$

(c) Frame size $= 7 \times 2 + 1$

$= 15$ bits

(d) Input slot duration,

1 bit $\rightarrow \frac{1}{2 \times 10^5}$ s (From 'b')

$\rightarrow 2$ bit $\rightarrow \frac{2}{2 \times 10^5}$ s

$\rightarrow \frac{1}{10^5}$ s

$\therefore$ Frame rate per second,

$\frac{1}{10^5}$ s $\rightarrow$ 1 frame

$\therefore$ 1 s $\rightarrow$ 10^5 frame

$\therefore$ F.P.S $= 10^5$

(e) We know, Input slot duration = Frame duration.

$\therefore$ Frame duration $= \frac{1}{10^5}$ s (From d)

(f) Frame size = 15 bits (From e)

Frame rate = 10^5 (From d)

$\therefore$ Data rate = Frame rate × Frame size

$= 10^5 \times 15$ bps

$= 15 \times 10^5$ bps

(g) Input slot duration $T = \frac{1}{10^5}$ s (From d)

$\therefore$ output " " $= \frac{T}{\text{num of channels}}$

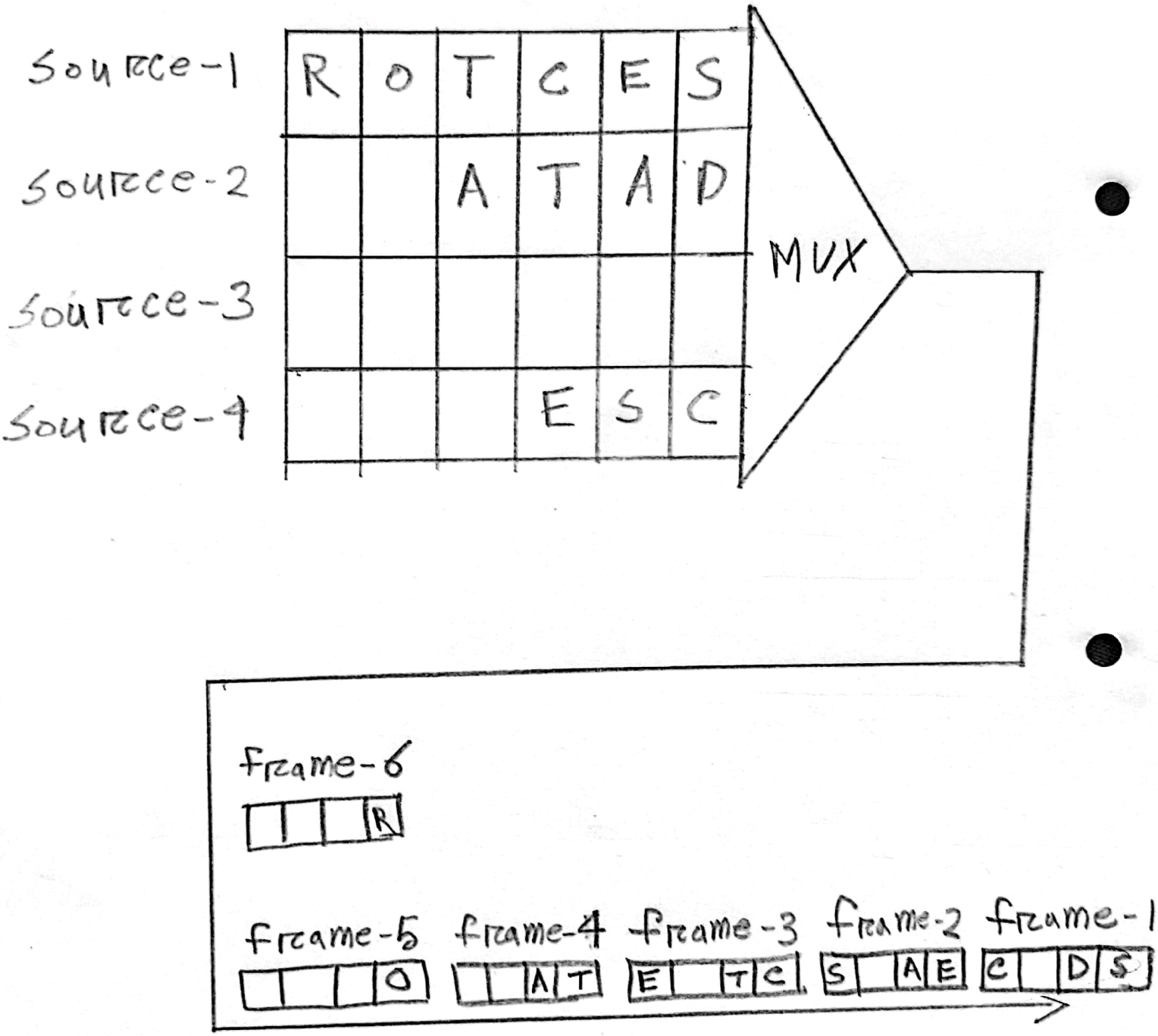
$= \frac{1}{10^5 \times 7}$ sec

(h) Input bit duration $\Phi = \frac{1}{2 \times 10^5}$ sec

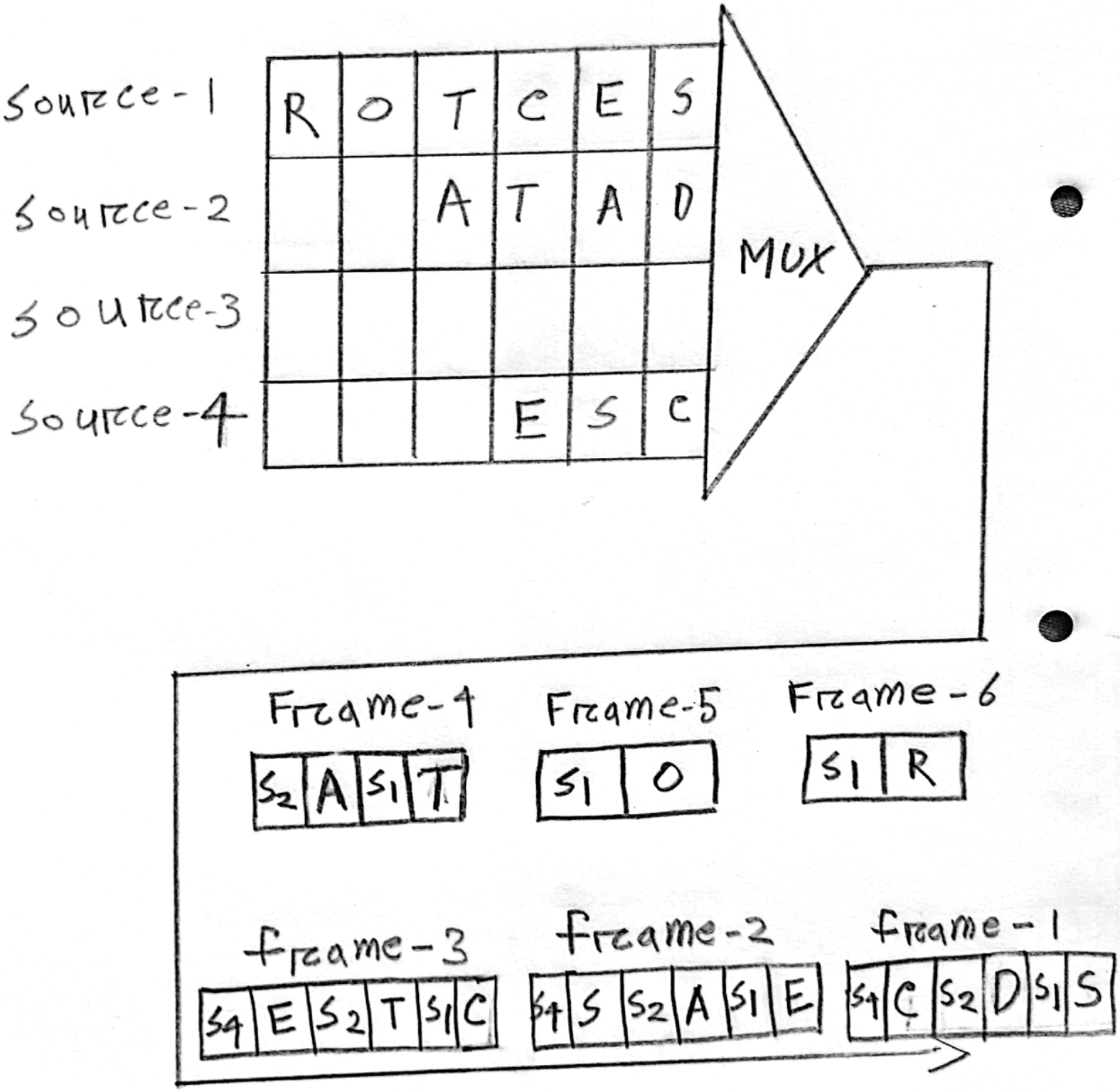
output " " $= \frac{1}{7 \times 2 \times 10^5}$ sec

Ans. to the. Q. No - 4

synchronization TDM



Statistical TDM



As we can see, the synchronous TDM multiplexer uses four slot per frame, regardless of whether the sources have data to send or not. This results in some empty slots and wasted bandwidth. On the otherhand, statistical TDM multiplexer uses only the required slot of a frame and only for the sources that have data to send. This results in no empty slots and better bandwidth utilization.