Assignment-4

Name: AVISHEK ROY SPARSHO

SEC: 10

ID: 20301269

Avisek

Signature

Answer to q.n. 1

Delta modulation is an conversion technique used for transmission of voice information where quality is not of primary importance. It is an digital analog to digital and digital to analog signal conversion.

Delta modulation is different from PCM in many ways.

1) PCM stands for 'Pulse Code Modulation' and DM denotes Delta Modulation.

2) 4, 8 or 16 bits are used per sample in PCM. On the other hand only one bit is used for DM.

3) PCM needs highest transmitter bandwidth. In case of DM, it requires lowest transmitter bandwidth.

PCM is very complex technique, thats why delta modulation was developed because it is the simpliest technique. PCM finds the value of the signal amplitude for each sample. Where DM finds the change from the previous sample. Not that there are No code words here, bits are sent simultenesously

Answer to q.n. 2

When multiple signals are need to be transferred to a signal medium we need multiplexing.

For instance,

i) Analog and digital broadcasting

ii) Processing of video

iii) Telegraphy

Difference ~~of~~ between FDM & TDM are the following diagram.

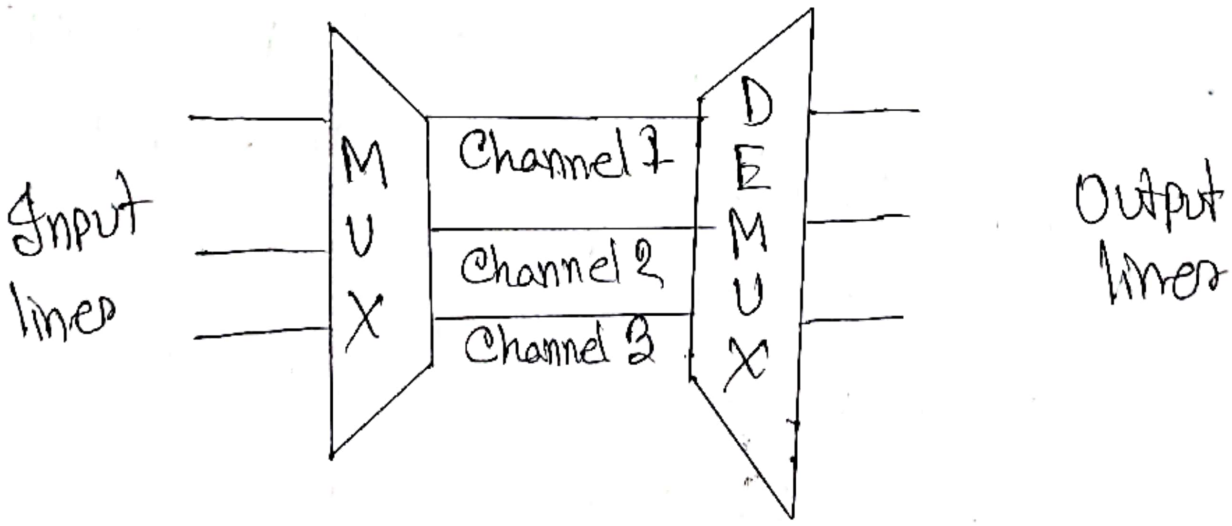


Fig: Frequency division multiplexing

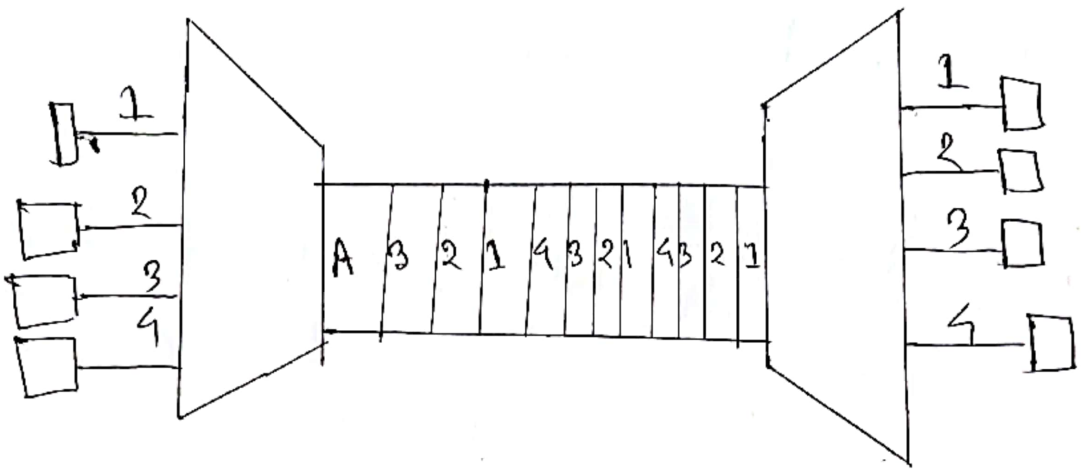


Fig.: Time-division multiplexing

Basis for comparison	TDM	FDM
Basic	Time scale is shared	Frequency is shared
Used with	Digital signals & analog signal	Analog signals
Neeessary requirements	Sync Pulse	Guard Band
Utilization	Efficiently used	Ineffective

We need Multiplexing!

i) The transmission medium is used to send the signal from sender to receiver. The medium can only have one signal at a time

ii) If there are multiple signals to share one medium; then the medium must be divided in such a way that each signals is given some portion of the available bandwidth.

iii) When multiple signals share the common medium, there is a possibility of collision. That's why we apply multiplexing.

iv) Transmission services are very expensive

Answer to q.n.-3

Given,

Radio channel bandwidth = 9 kHz

Radio channel count = 23

Guardband bandwidth = 700 Hz = 0.7 kHz

Guard band count = (23-1) = 22

Required bandwidth = (23 x 9) + (22 x 0.7)

= 207 + 15.4

= 222.4 kHz

So,
the required bandwidth 222.4 kHz

Answer to q.n. 4

Given,

No of channel = 6

Channel bandwidth = 1.9 kHz

Guard band = 14 kHz

We know,

$$\text{Bandwidth} = [(\text{No. of channel}) \times \text{Channel bandwidth} + (\text{No of channel} - 1) \times \text{Guard band}]$$

$$= [6 \times 1.9 + (6-1) \times 14]$$

$$= 81.4 \text{ kHz}$$

(Ans)

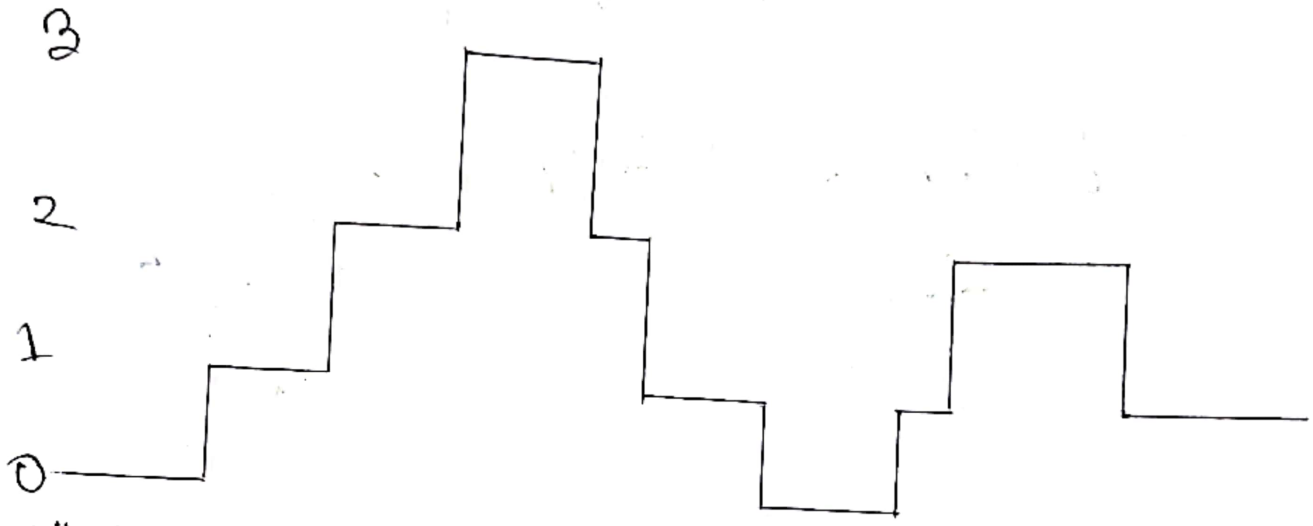
Answer to q.n.5

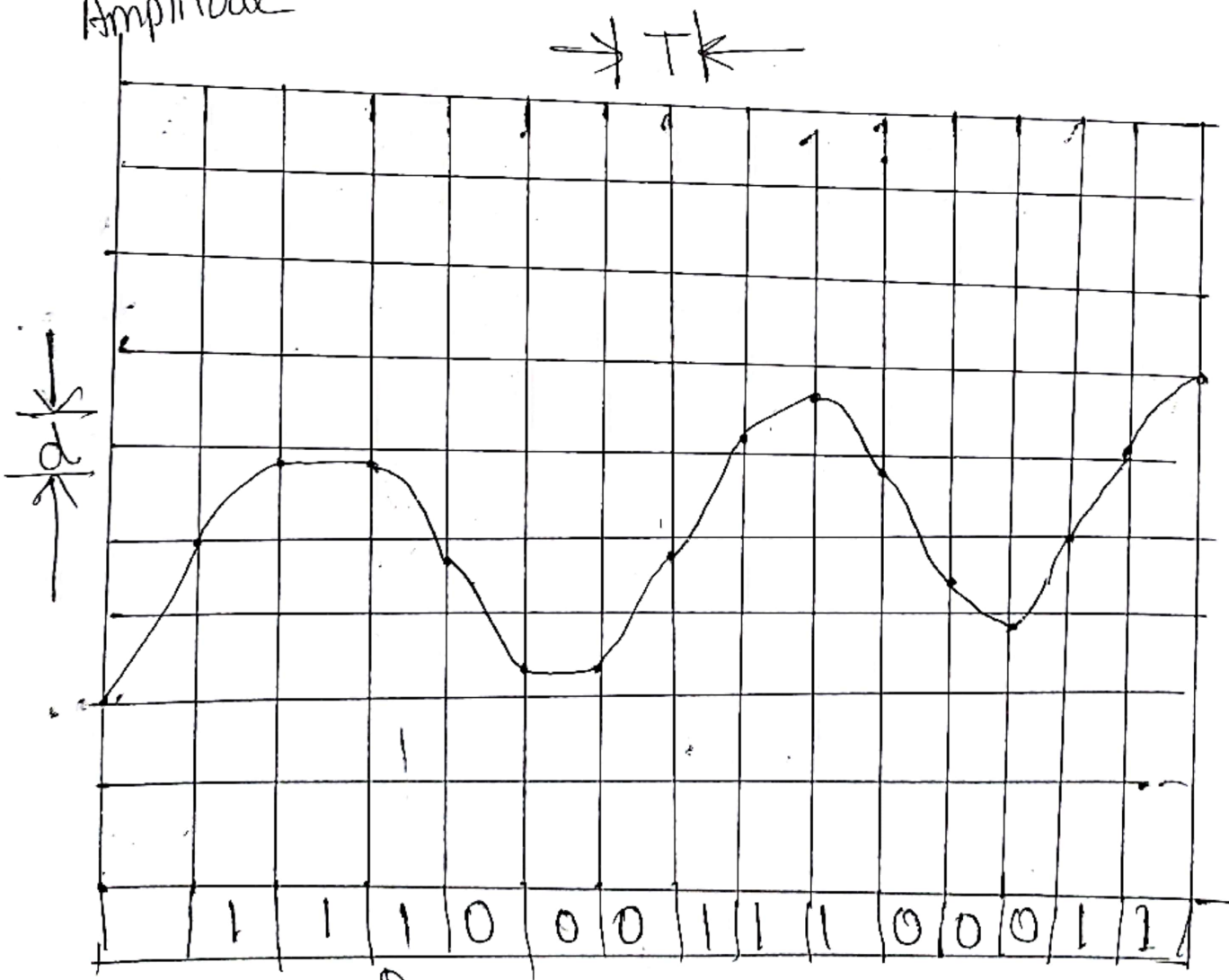
Statistical multiplexers have one very good advantage over synchronous TDMs. Although both synchronous TDM and statistical TDM can transmit data over a high speed link, statistical TDM doesn't require as high speed a line as synchronous TDM does and it allocates time slots dynamically on demand and does not delicate channel capacity to inactive low speed lines.

The time division multiplexing (TDM) needs synchronization between multiple -xer and demultiplexer. These bits are called framing bits, allows the

demultiplexer to synchronize with the incoming stream so that it can separate time slot accurately.

Answer to q.n. 6





binary data for signal → 111000111 00011

~~Ans~~

Answer to the q.n.:07

(1)

Given that,

Voice channel count = 6

At a time bit multiplexed = 2 character

= 2 × 8

= 16 bits

∴ Size of output frame = 6 × 16

= 96 bits

∴ The size of an output frame is 96 bits

(4)

Channel bandwidth = 60 Mbps

$= 60 \times 10^6$ bits

Here, 2character = 16 bit

Now,

60×10^6 bit take 1 second

$\therefore$ 16 bit take $= \frac{1 \times 16}{60 \times 10^6}$ second

$= 2.667 \times 10^{-7}$ second

2.667×10^{-7} second need to create 1 frame.

$\therefore$ 1 second need to create $= \frac{1}{2.667 \times 10^{-7}}$

$= 3749531.309$ frames

(iii)

Output frame ~~dwor~~ duration $= \frac{1}{\text{frame rate}}$

$= \frac{1}{3749521.309}$

$= 2.667 \times 10^{-7}$ second

∴ The ~~dwo~~ duration of an output frame $= 2.667 \times 10^{-7}$ second.

(iv)

No. of bits = 96

Output data rate = Frame duration × no. of bits

$= 2.667 \times 10^{-7} \times 96$

$= 2.560 \times 10^{-5}$ bps.

(Ans)

(V)

Bandwidth = 60 Mbps

= 60×10^6 bps

60×10^6 bits take 1 second

1 bits take $\frac{1}{60 \times 10^6}$ s

= 1.667×10^{-8} second

(Ans)

(VI)

Output bit duration = $\frac{\text{Input bit duration}}{\text{no. of channel}}$

= $\frac{1.667 \times 10^{-8}}{6}$

= 2.778×10^{-9} second

(Ans)

2 characters in each output slot.

$= 2 \times 8 = 16$ bit in each output slot.

60×10^6 bits takes 1 second

16 bits takes $\frac{1 \times 16}{60 \times 10^6}$ second

$= 2.667 \times 10^{-7}$ second

Now, voice channel = 6

Input slot ~~not~~ duration = 2.667×10^{-7} second

$\therefore$ Output slot duration = $\frac{2.667 \times 10^{-7}}{6}$ second

$= 4.445 \times 10^{-8}$ second