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CSE320

Home Assignment 02

spring 23

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sec : 4

GOOD LUCK

Q3. Required bandwidth = 15 x 6 kHz + 14 x 500 Hz

= 15 x 6 x 10^3 Hz + 14 x 500 Hz

= 97000 Hz = 97 kHz

5)

(a) size of output frame = $6 \times 2 \times 8 = 96$ bits

(b) frame rate = $\frac{60 \times 8}{16} = 30$ Mfps

$= 30 \times 10^6$ fps

(c) frame duration = $\frac{1}{30 \times 10^6} = 3.33 \times 10^{-8}$ s

(d) Output data rate = $6 \times 60 \times 8$ Mbps

$= 2880$ Mbps

(e) Input bit duration = $\frac{1}{60 \times 8 \times 10^6}$ s

$= 2.083 \times 10^{-9}$ s

(f) output bit duration = $\frac{1}{2880 \times 10^6} =$

$= 3.472 \times 10^{-10}$ s

(g) Output slot duration = $\frac{T_o}{n} = \frac{3.33 \times 10^{-8}}{6} = 5.55 \times 10^{-9}$ s

6.

(a) size of frame = 6 x (4 + 1 character)

= 6 x (4+8) bits

= 6 x 12 = 72 bits

(b) since character interleaving,

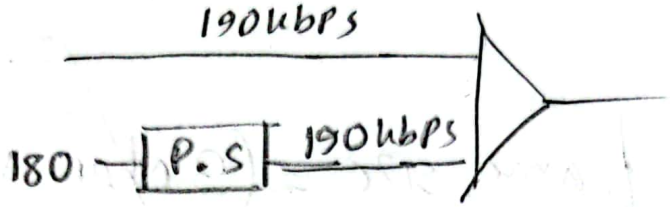
input rate = 500 char/s

output frame rate = 500 frame/s

(c) Duration of frame = $\frac{1}{500}$ = 2×10^{-3} s

(d) output data rate = 72 x 500 = 36 kbps

7.



(a) frame size = 2 bits

(b) frame rate = 190 kbps

(c) Frame duration = $\frac{1}{190 \times 10^3}$ s = 5.263×10^{-6} s

(d) Data rate = $(2 \times 190) = 380$ kbps

8)

1) output frame size = $3 \times 11 \times 8$ bits
= 264 bits

2) $55 \times 8 \times 10^6$ bits sent $\rightarrow$ 1 sec

$\therefore$ 1 " " $\rightarrow \frac{1}{55 \times 8 \times 10^6}$ sec

$= 2 \cdot 27 \times 10^{-9}$ sec

$\therefore$ input bit duration = $2 \cdot 27 \times 10^{-9}$ sec

3) frame duration, T_0 = input bit dur * MUX unit

$= 2 \cdot 27 \times 10^{-9} \times 3 \times 8$ s

$= 5 \cdot 448 \times 10^{-8}$ s

Now, output slot duration = $\frac{T_0}{n}$

$= \frac{5 \cdot 448 \times 10^{-8}}{11}$

$= 4 \cdot 95 \times 10^{-9}$ s

4) Output data rate = $11 \times 55 \times 8 \times 10^6$

$= 4840000000$ bps

$\therefore$ Output bit duration = $\frac{1}{\text{output data rate}}$

$= 2.0661 \times 10^{-10}$ s

5) Output frame rate = $\frac{1}{5.448 \times 10^{-8}}$ $\left[\frac{1}{\text{frame duration}}\right]$

$= 18355359.77$ fps

6) output data rate = 4840000000 bps

Part 2

Ans to qr 1

In FDM, signals are modulated to diffrent ranges of cannier freqruencies which then are seperated by guard bands to prevent signals from overlapping.

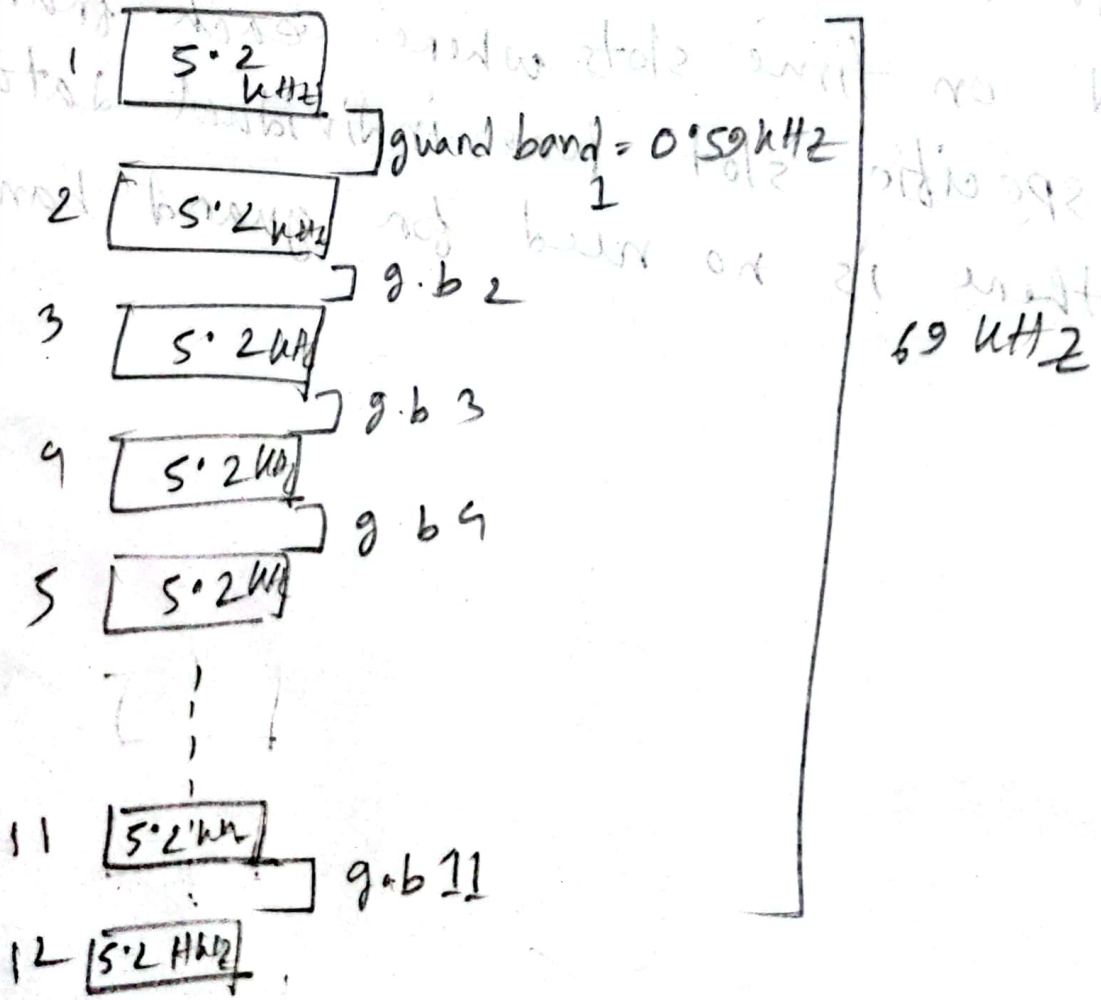
In TDM, signals are not overlapped on freqruencies rather they are multiplexed based on time slots where each frame has specific slot tone individual data so there is no need for guard bands.

Total bandwidth of channel, N = 69 kHz

Used " for signal = 12 × 5·2 =
62·4 kHz

∴ Total guard bands = (69 − 62·4) kHz
= 6·5 kHz

→ Each guard band = $\frac{6 \cdot 5}{11}$ = 0·59 kHz
= 590·90 Hz



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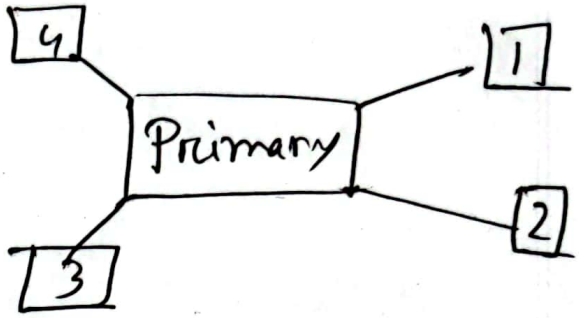
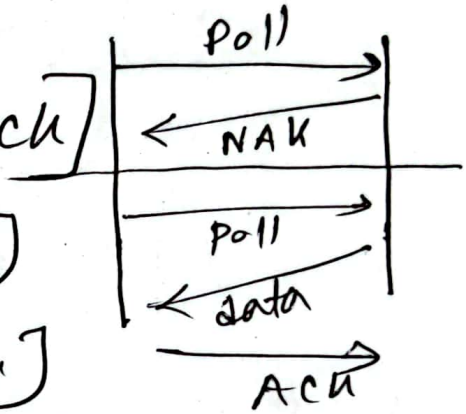


When data received by primary device :



station 1 : Poll + 5[frame+ACK]

S 2 : Poll + 5 [frame + ACK]

S3 : Poll + 5 (frame + ACK]

S4 : Poll + 5 (frame + ACK)

When declined to send by secondary devices :

S1 : Poll + NAK

S2 : Poll + NAK

S3 : Poll + NAK

S4 : Poll + NAK

Total = 8 Poll + 4NAK + 20 frame + 20 ACK

$= 8 \times 32 + 4 \times 32 + 20 \times 10^3 + 20 \times 32$

= 21024 bits total

Ans to Q 4

4. Show the staircase in the following graph and generate the digital data from the given analog signal using the Delta Modulation (DM) technique.