

Ans. to the ques. no: 1

ID: AB-CDEFGH

22-46444-1

$$\begin{aligned}\text{User 1 needs} &= (B+C) \text{ Mbps} \\ &= (2+4) = 6 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{User 2 needs} &= (C+D) \text{ Mbps} \\ &= (4+6) = 10 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{User 3 needs} &= (D+E) \text{ Mbps} \\ &= (6+4) = 10 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{User 4 needs} &= (E+F) \text{ Mbps} \\ &= (4+4) = 8 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{User 5 needs} &= (F+G) \text{ Mbps} \\ &= (4+4) = 8 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{User 6 needs} &= (G+H) \text{ Mbps} \\ &= (4+1) = 5 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{User 7 needs} &= (H+E) \text{ Mbps} \\ &= (1+4) = 5 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{Guard band} &= (G+H+B+5) \text{ Mbps} \\ &= (4+1+2+5) = 12 \text{ Mbps}\end{aligned}$$

Now, assuming $1 \text{ Mbps} = 1 \text{ MHz}$ [for FDM]

Starting from 0 MHz,

User 1 = 0 - 6 MHz

User 2 = 18 - 28 MHz

User 3 = 40 - 50 MHz

User 4 = 62 - 70 MHz

User 5 = 82 - 90 MHz

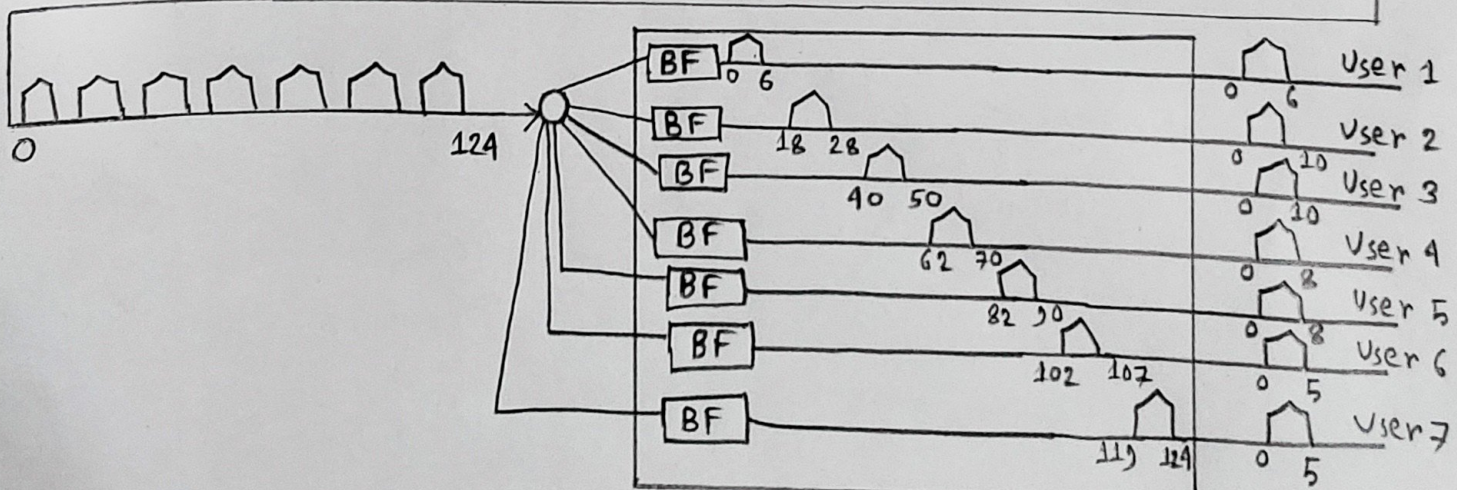
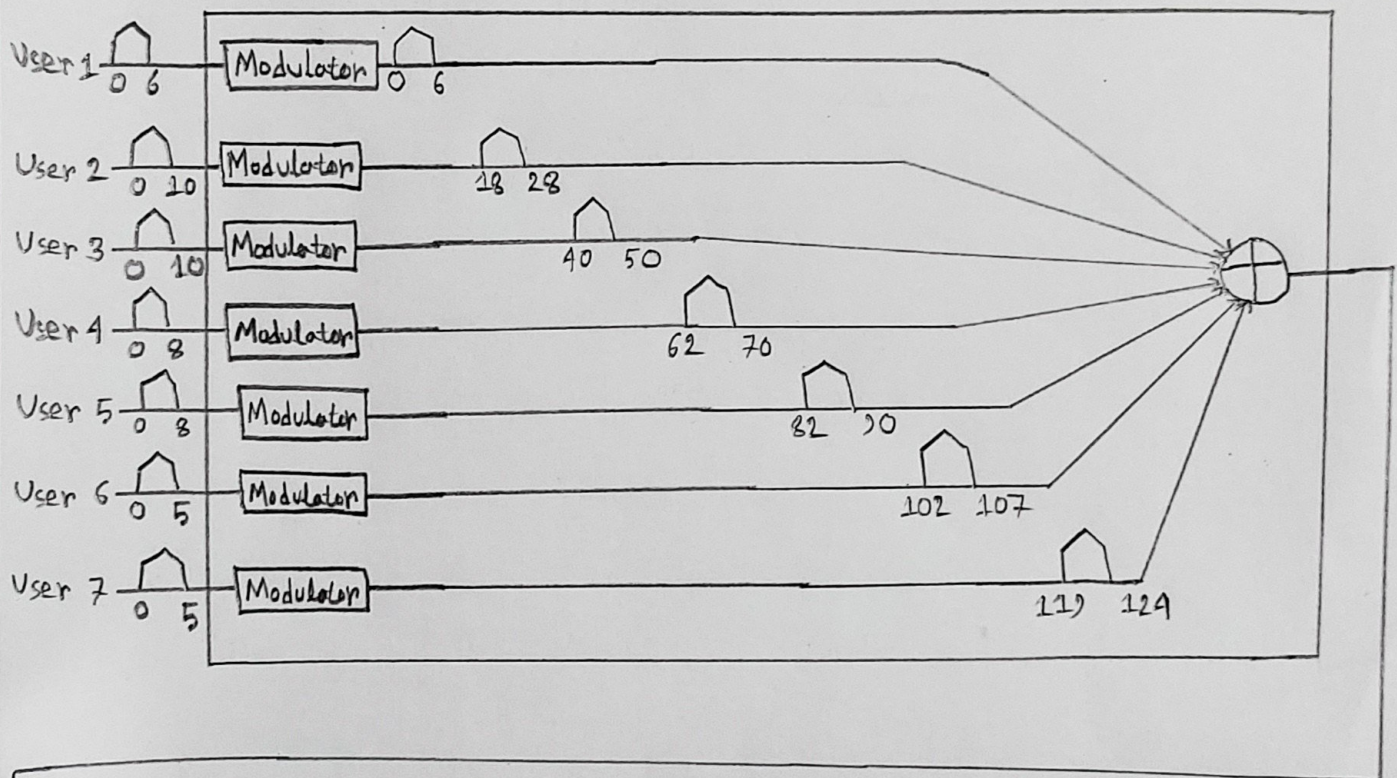
User 6 = 102 - 107 MHz

User 7 = 119 - 124 MHz

Assuming,

Bandpass filter = BF

∴ Minimum bandwidth = 124 MHz.



Ans. to the ques. no: 2

ID: AB - CDEFGH

2 2 - 4 6 4 4 4 - 1

$$\begin{aligned}\text{Source 1} &= (B+C) \text{ Mbps} \\ &= (2+4) = 6 \text{ Mbps}\end{aligned}$$

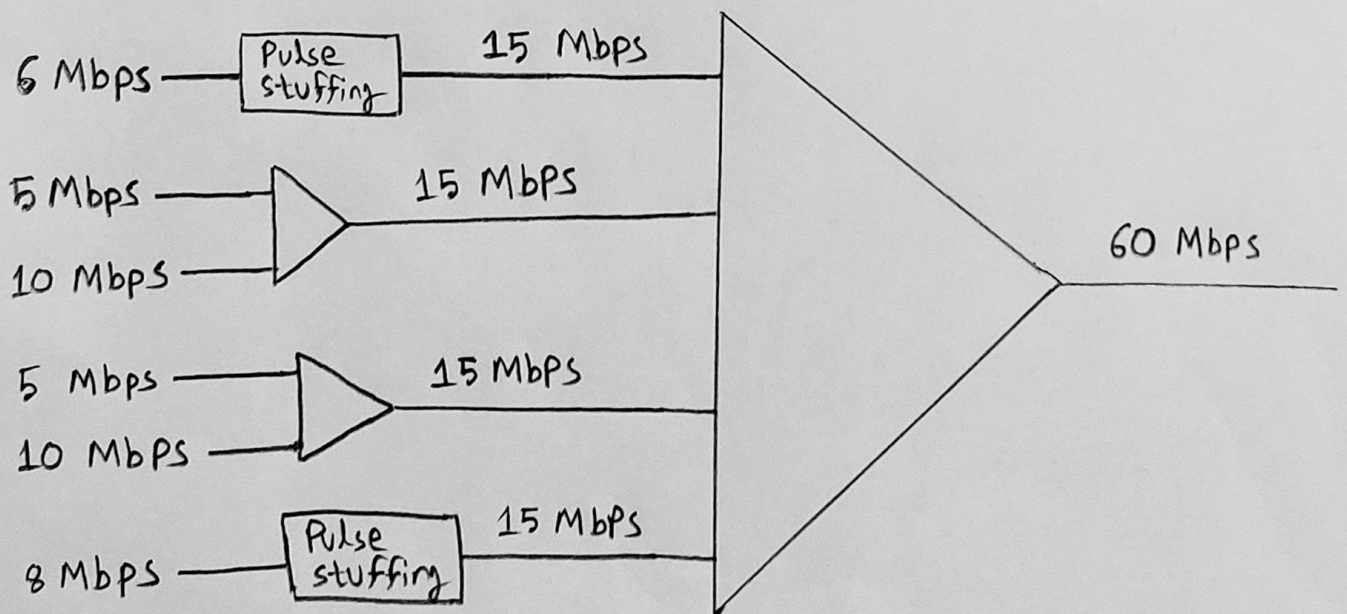
$$\begin{aligned}\text{Source 2} &= (H+E) \text{ Mbps} \\ &= (1+4) = 5 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{Source 3} &= (D+E) \text{ Mbps} \\ &= (6+4) = 10 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{Source 4} &= (G+H) \text{ Mbps} \\ &= (4+1) = 5 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{Source 5} &= (C+D) \text{ Mbps} \\ &= (4+6) = 10 \text{ Mbps}\end{aligned}$$

$$\begin{aligned}\text{Source 6} &= (E+F) \text{ Mbps} \\ &= (4+4) = 8 \text{ Mbps}\end{aligned}$$



a) The multilevel multiplexing and pulse stuffing data rate management technique are used here for multiplexing.

b) The data rate of each source is 15 Mbps.

c) For, each character = 8 bit

$$\begin{aligned} 15 \text{ Mbps bit transmit in } 1 \text{ s} \\ \therefore 1 \text{ " " " " } \frac{1}{15 \text{ Mbps}} \\ \therefore 8 \text{ bit " " " " } \frac{1 \times 8}{15 \text{ Mbps}} = \frac{8}{15 \times 10^6} \text{ s} \\ = 5.33 \times 10^{-7} \text{ s} \quad (\text{Ans.}) \end{aligned}$$

d) The frame rate is always the same as any input rate. So, the frame rate is = $\frac{15000000}{8}$ frames per second.
= 1875000 frames per second. (Ans.)

e) The duration of a frame is the same as the duration of an input unit. So,

$$\text{duration of each frame is} = 5.33 \times 10^{-7} \text{ s} \quad (\text{Ans.})$$

f) The number of bits in each frame is = (4×8) bits
= 32 bits (Ans.)

g) The data rate of the link is = (4×15) Mbps
= 60 Mbps. (Ans.)