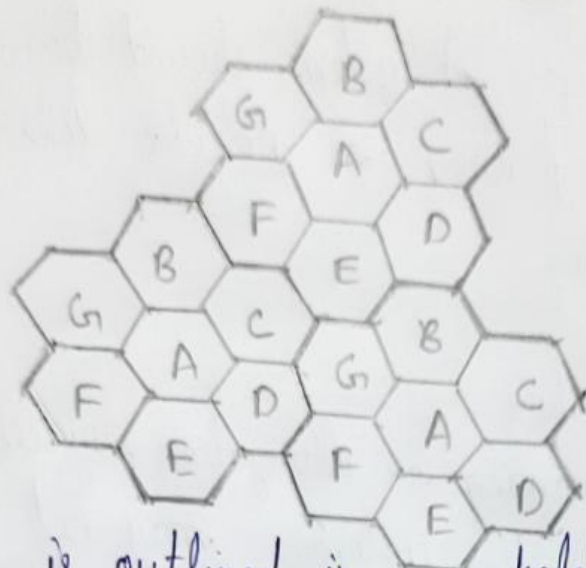


(b) Explain about Frequency Reuse concept with neat sketch.

Ans:- Frequency reusing is the concept of using the same frequency channel by users in different geographic locations (different cells). The frequency reuse concept increases the spectrum efficiency but if the system is not properly designed, then Interference may occur.

Figure in the next page illustrates the concept of cellular frequency reuse, where cells labeled with the same letter use the same group of channels. Cells with the same letter use the same set of frequencies.



cell cluster is outlined in bold and replicated over the coverage area. In this example, the cluster size, N , is equal to seven, and the frequency reuse factor is $1/7$ since each cell contains one-seventh of the total number of available channels.

Consider a cellular system, which has a total of S duplex channels available for use. If each cell is allocated a group of k channels ($k < S$), and if the S channels are divided among N cells into unique and disjoint channel groups which each have the same number of channels, the total number of available radio channels can be expressed as, $S = kN$. The N cells which collectively use the complete set of available frequencies is called a cluster. If a

cluster is replicated M times within the system, the total number of duplex channels, C , can be used as a measure of capacity and is given by $C = M \times N = MS$

→ The capacity of a cellular system is directly proportional to the number of times a cluster is replicated in a fixed service area. The factor N is called cluster size and is typically equal to 4, 7 or 12. The number of cells per cluster, N , can have values that satisfy, $N = i^2 + ij + j^2$, where i, j are non-negative integers.

→ The smallest possible value of N is desirable in order to maximize capacity over a given coverage area. The frequency reuse factor of a cellular system is given by $1/N$, since each cell within a cluster is only assigned $1/N$ of the total available channels in the system.