

Ans-1 • The minimization will result in reduction of the number of gates (resulting from less number of terms) and the number of inputs per gate (resulting from less number of variables per term).

• The minimization will reduce cost, efficiency and power consumption.

•  $y(x+x') = y \cdot 1 = y$

•  $y+xx' = y+0 = y$

•  $(x'y+xy') = x \oplus y$

•  $(x'y'+xy) = (x \oplus y)'$

### \* Karnaugh Maps (K-maps)

• Karnaugh maps - A tool for representing Boolean functions of up to six variables.

• K-maps are tables of rows and columns with entries represent 1's or 0's of SOP and POS representations.

• An  $n$ -variable K-map has  $2^n$  cells with each cell corresponding to an  $n$ -variable truth table value.

- K-map cells are labeled with the corresponding truth-table row.
- K-map cells are arranged such that adjacent cells correspond to truth rows that differ in only one bit position (logical adjacency).
- If  $m_i$  is a minterm of  $f$ , then place a 1 in cell  $i$  of the K-map.
- If  $m_i$  is a max-term of  $f$ , then place a 0 in cell  $i$ .
- If  $d_i$  is a don't care of  $f$ , then place a d or x in cell  $i$ .