

① The minimized form of the logical Expression $\overline{ABC} + \overline{A}B\overline{C} + \overline{A}BC + A\overline{B}\overline{C}$ is,

Given, $\overline{ABC} + \overline{A}B\overline{C} + \overline{A}BC + A\overline{B}\overline{C}$

$$= \overline{A}\overline{C}(\overline{B}+B) + \overline{A}BC + A\overline{B}\overline{C}$$

$$= \overline{A}\overline{C} + \overline{A}BC + A\overline{B}\overline{C} \quad [\because B+\overline{B}=1]$$

$$= \overline{A}(\overline{C}+BC) + A\overline{B}\overline{C} \quad [\because (\overline{C}+BC) = (\overline{C}+B)\overline{C}+0]$$

$$= \overline{A}(\overline{C}+B)(\overline{C}+C) + A\overline{B}\overline{C}$$

$$= \overline{A}\overline{C} + \overline{A}B + A\overline{B}\overline{C} \quad [\because C+\overline{C}=1]$$

$$= \overline{A}\overline{C} + B(\overline{A}+A\overline{C})$$

$$= \overline{A}\overline{C} + B(\overline{A}+A)(\overline{A}+\overline{C}) \quad [\because \overline{A}+A\overline{C} = (\overline{A}+A)(\overline{A}+\overline{C})]$$

$$= \overline{A}\overline{C} + B(\overline{A}+\overline{C})$$

$$= \overline{A}\overline{C} + \overline{A}B + B\overline{C}$$

Ans.

② The Boolean Expression $y = \overline{A}BCD + \overline{A}BC\overline{D} + A\overline{B}CD + A\overline{B}\overline{C}D$ is minimized to,

$$y = \overline{A}BCD + \overline{A}BC\overline{D} + A\overline{B}CD + A\overline{B}\overline{C}D$$

$$= \overline{B}CD(\overline{A}+A) + \overline{A}BC\overline{D} + A\overline{B}\overline{C}D$$

$$= \overline{B}CD + \overline{A}BC\overline{D} + A\overline{B}\overline{C}D \quad [\because A+\overline{A}=1]$$

$$= \bar{C}(\bar{B}D + AB\bar{D}) + \bar{A}BC\bar{D}$$

$$= \bar{C}(\bar{B}D + A)(\bar{B}D + B\bar{D}) + \bar{A}BC\bar{D}$$

→ Distributive law.

$$= \bar{B}\bar{C}D + A\bar{C} + \bar{A}BC\bar{D}$$

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