

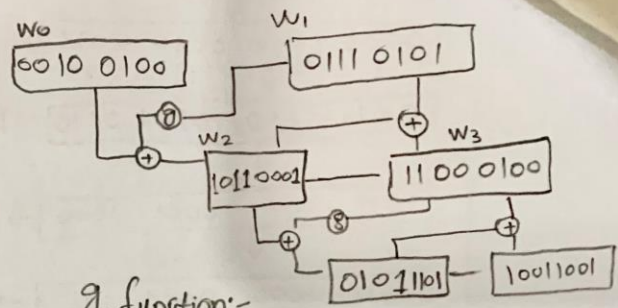
Key Generation:-

Given: $(2475)_{16}$

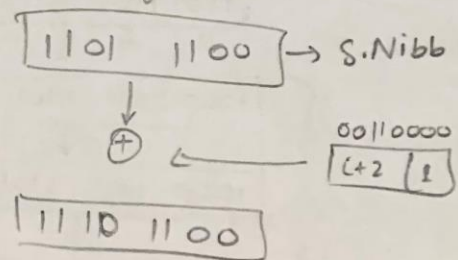
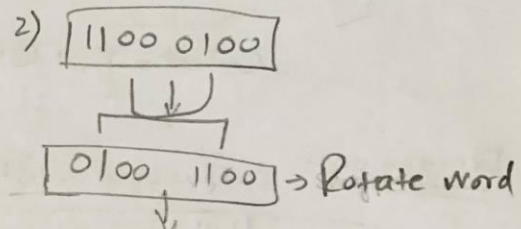
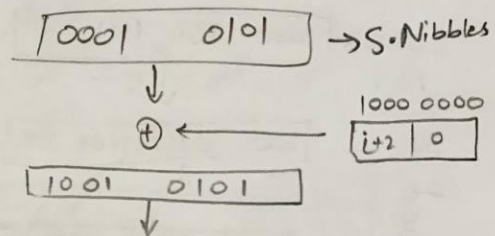
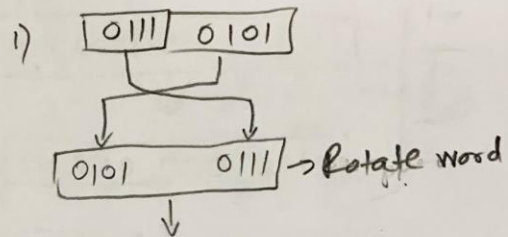
Key = 0010 0100 0111 0101

Key₀ = 1011 0001 1100 0100 \Rightarrow B1C4

Key₁ = 0101 1011 1001 1001 \Rightarrow 5D99



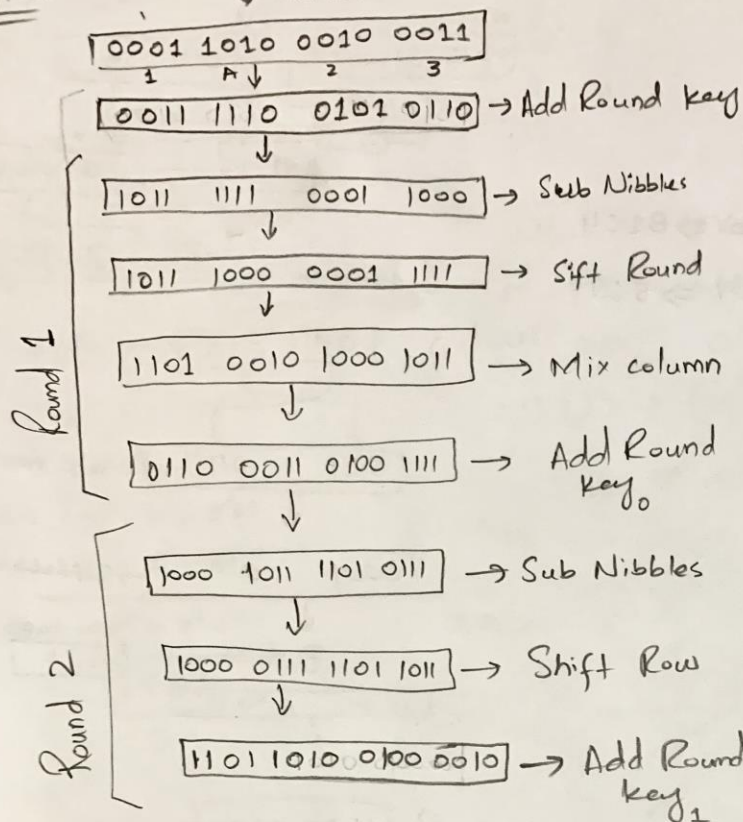
g. function:-



Encryption:-

Plain text = 1A23

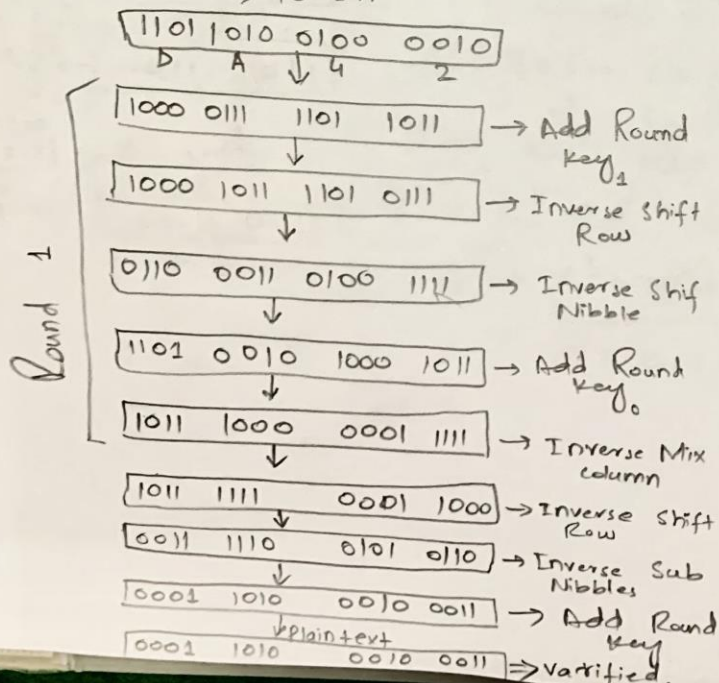
↓ → 16 bit



C-Text = 1101 1010 0100 0010 ⇒ DA 42

Decryption:-

C-Text ⇒ 16-bit



R.w

$$\begin{bmatrix} 1 & 4 \\ 4 & 1 \end{bmatrix} \begin{bmatrix} B & 1 \\ 8 & F \end{bmatrix} \Rightarrow \begin{bmatrix} D & 8 \\ 2 & B \end{bmatrix}$$

$$1 \times B + 4 \times 8$$

$\begin{array}{cccc} \text{P} & \text{P} & \text{P} & \text{P} \\ 0001 & 1011 & 0100 & 1000 \end{array}$

$$(1)(x^3+x+1) + (x^2)(x^3)$$

$$x^3+x+1+x^5$$

$$x^4+x+1 \overline{) x^5+x^3+x+1}$$

$$\underline{x^5+x^2+x}$$

$$x^3+x^2+1$$

$$\underline{1101}$$

D

$$4 \times B + 1 \times 8$$

$\begin{array}{cccc} \text{P} & \text{P} & \text{P} & \text{P} \\ 0100 & 1011 & 0001 & 1000 \end{array}$

$$(x^2)(x^3+x+1) + (1)(x^3)$$

$$x^5+x^2+x^2+x^3$$

$$x^4+x+1 \overline{) x^5+x^3+x}$$

$$\underline{x^5+x^2+x}$$

$$x$$

$$\underline{0010}$$

2

$$1 \times 1 + 4 \times F$$

$\begin{array}{cccc} \text{P} & \text{P} & \text{P} & \text{P} \\ 0001 & 0001 & 0100 & 1111 \end{array}$

$$(1)(1) + (x^2)(x^3+x^2+x+1)$$

$$1+x^5+x^4+x^3+x^2$$

$$x^4+x+1 \overline{) 1+x^5+x^4+x^3+x^2+1}$$

$$\underline{x^5+x^4+x^3+x}$$

$$x^2+x+1$$

$$\underline{x^2+x+1}$$

$$0$$

$$\underline{1000}$$

$$4 \times 1 + 1 \times F$$

$\begin{array}{cccc} \text{P} & \text{P} & \text{P} & \text{P} \\ 0100 & 0001 & 0001 & 1111 \end{array}$

$$(x^2)(1) + (1)(x^3+x^2+x+1)$$

$$x^2+x^3+x^2+x+1$$

$$\underline{1011}$$

$$\begin{bmatrix} 9 & 2 \\ 2 & 9 \end{bmatrix} \begin{bmatrix} D & 8 \\ 2 & B \end{bmatrix} \Rightarrow \begin{bmatrix} B & 1 \\ 8 & F \end{bmatrix}$$

$$9 \times D + 2 \times 2$$

$\swarrow \quad \swarrow \quad \swarrow \quad \swarrow$
 1001 1101 0010 0010

$$(x^3+1)(x^3+x^2+1) + (x)(x)$$

$$x^6 + x^5 + x^4 + x^3 + x^2 + 1 + x^2$$

$$\begin{array}{r}
 x^2 + x \\
 x^4 + x + 1 \\
 \underline{x^4 + x^3 + x^2} \\
 x^3 + x^3 + x^2 + 1 \\
 \underline{x^5 + x^2 + x} \\
 x^3 + x + 1 \\
 \hline
 1011 \\
 \hline
 B
 \end{array}$$

$$2 \times D + 9 \times 2$$

$\swarrow \quad \swarrow \quad \swarrow \quad \swarrow$
 0010 1101 1001 0010

$$(x)(x^3+x^2+1) + (x^3+1)(x)$$

$$x^4 + x^3 + x + x^4 + x$$

$\underline{1000}$

$$9 \times 8 + 2 \times B$$

$\swarrow \quad \swarrow \quad \swarrow \quad \swarrow$
 1001 1000 0010 1011

$$(x^3+1)(x^3) + (x)(x^3+x+1)$$

$$x^6 + x^3 + x^4 + x^2 + x$$

$$\begin{array}{r}
 x^2 + 1 \\
 x^4 + x + 1 \\
 \underline{x^6 + x^3 + x^2} \\
 x^4 + x \\
 \underline{x^4 + x + 1} \\
 0001
 \end{array}$$

$$2 \times 8 + 9 \times B$$

$\swarrow \quad \swarrow \quad \swarrow \quad \swarrow$
 0010 1000 1001 1011

$$(x)(x^3) + (x^3+1)(x^3+x+1)$$

$$x^4 + x^6 + x^4 + x^3 + x^2 + x + 1$$

$$\begin{array}{r}
 x^2 \\
 x^4 + x + 1 \\
 \underline{x^6 + x^3 + x^2} \\
 x^3 + x^2 + x + 1 \\
 \hline
 1111
 \end{array}$$