

## Multiplicative Cipher

### Key Selection:-

We should select only coprime numbers of 26 which should not be divisible by 2 or 13.

Message  $\rightarrow$  HELLO

### Encryption:-

$$C = (P \times k) \bmod 26$$

$P \rightarrow$  Numeric value of plain text

$k \rightarrow$  key.

$$H \rightarrow (7 \times 3) \bmod 26 \rightarrow 21 \bmod 26 \rightarrow 21 \rightarrow V$$

$$E \rightarrow (4 \times 3) \bmod 26 \rightarrow 12 \bmod 26 \rightarrow 12 \rightarrow M$$

$$L \rightarrow (11 \times 3) \bmod 26 \rightarrow 33 \bmod 26 \rightarrow 7 \rightarrow H$$

$$L \rightarrow (11 \times 3) \bmod 26 \rightarrow 33 \bmod 26 \rightarrow 7 \rightarrow H$$

$$O \rightarrow (14 \times 3) \bmod 26 \rightarrow 42 \bmod 26 \rightarrow 16 \rightarrow Q$$

VMHHQ  $\rightarrow$  Encrypted Message

# Ciphers

## Decryption:

$$P = (C * K^{-1}) \% 26$$

$C \rightarrow$  Numeric Value

$K^{-1} \rightarrow$  Multiplicative inverse of the key

VMHHQ

$$V \rightarrow 21 \rightarrow (21 * \frac{1}{3}) \bmod 26 \rightarrow (21 * 9) \% 26 \rightarrow 7 \rightarrow H$$

$$M \rightarrow 12 \rightarrow (12 * \frac{1}{3}) \bmod 26 \rightarrow (12 * 9) \% 26 \rightarrow 4 \rightarrow E$$

$$H \rightarrow 7 \rightarrow (7 * \frac{1}{3}) \bmod 26 \rightarrow (7 * 9) \% 26 \rightarrow 11 \rightarrow L$$

$$H \rightarrow 7 \rightarrow (7 * \frac{1}{3}) \bmod 26 \rightarrow (7 * 9) \% 26 \rightarrow 11 \rightarrow L$$

$$Q \rightarrow 16 \rightarrow (16 * \frac{1}{3}) \bmod 26 \rightarrow (16 * 9) \% 26 \rightarrow 14 \rightarrow O$$

HELLO  $\rightarrow$  Decrypted message.

# Ciphers

A  $\rightarrow$  0

B  $\rightarrow$  1

C  $\rightarrow$  2

D  $\rightarrow$  3

E  $\rightarrow$  4

F  $\rightarrow$  5

G  $\rightarrow$  6

H  $\rightarrow$  7

I  $\rightarrow$  8

J  $\rightarrow$  9

k  $\rightarrow$  10

L  $\rightarrow$  11

M  $\rightarrow$  12

N  $\rightarrow$  13

O  $\rightarrow$  14

p  $\rightarrow$  15

Q  $\rightarrow$  16

R  $\rightarrow$  17

S  $\rightarrow$  18

T  $\rightarrow$  19

U  $\rightarrow$  20

V  $\rightarrow$  21

W  $\rightarrow$  22

X  $\rightarrow$  23

y  $\rightarrow$  24

Z  $\rightarrow$  25