International Journal of Research in Engineering, Science and Management
Volume-2, Issue-9, September-2019
www.ijresm.com | ISSN (Online): 2581-5792

Encryption and Decryption Technique by Using Decimal Systems

B. Siddiqe Basha[1], S. Revathi[2]
[1]*M.Phil. Scholar, Dept. of Mathematics, Ponnaiyah Ramajayam Inst. of Science and Tech., Thanjavur, India*
[2]*Assistant Professor, Dept. of Mathematics, Ponnaiyah Ramajayam Inst. of Science and Tech., Thanjavur, India*

***Abstract*: In this paper, we investigate the different types of number systems in cryptography and also studied some numerical example of encryption and decryption by using functions and modular properties.**

***Keywords*: crptography, encryption, decryption.**

1. Introduction

Cryptography is that the study of data activity and verification. The traditional topic of cryptography is encryption. Encryption scheme is used to keep messages or stored data secret. In this chapter, we introduce three fundamental basic numbers conversion systems namely binary, octa and hexa decimal conversions that we need to describe encryption schemes in different ciphers and their cryptanalysis [1]. This paper will discuss the binary, hexadecimal, and octal number systems in more detail and explain their uses.

2. Mathematic Formalism

A. Different types of number systems

Number systems square measure wont to describe the amount of one thing or represent sure information. Here, we can say that the word "calculator" attains ten letters. Our mathematical notation, the decimal system, uses ten symbols. Therefore, decimal is said to be Base Ten. To investigate the systems with bases, in particular how the system works.

B. Relation between decimal pattern and binary number

Counting in binary is analogous to investigation in the other mathematical notation. To Begin with a single digit, counting gives through each symbol, by increasing order. Before examining binary investigation, it is useful to briefly discuss the more familiar decimal counting system as a frame of reference. Decimal investigation uses the 10 symbols 0 through 9. Counting begins with the progressive substitution of the smallest amount significant figure (rightmost digit) that is usually known as the primary digit. When the offered symbols for this position square measures are exhausted, the minimum digit is reset to 0, then the next digit of maximum (one position to the left) is incremented (overflow).

Decimal pattern	0	1	2	3	4	5	6	7	8
Binary Number	0	1	10	11	100	101	110	111	1000

C. Relation between octal to decimal

Octal is another mathematical notation with less symbols to use than our typical mathematical notation. Octal is fancy for Base Eight that means eight symbols square measure wont to represent all the quantities. The digits are 0, 1, 2, 3, 4, 5, 6, and 7. Suppose we taken from the 7, we have a new placement to represent what we use 8 since an 8 doesn't exist in Octal. So, after 7 is 10.

Octal	0	1	2	3	4	5	6	7	10
Decimal	0	1	2	3	4	5	6	7	8

D. Some numerical example of encryption and decryption by using functions and modular properties

Suppose Subash wants to encrypt the plain text message “CRYPT ANALYSIS” using one-time pad. He first converts the letters into Binary bit string.

C	R	Y	P	T
00010	10001	11000	01111	10011
A	N	A	L	Y
00000	01101	00000	01011	11000
S	I	S		
10010	01000	10100		

The one – time pad requires a Key Consisting of a Randomly selected string of Bits that is the same length as the message suppose we use key

11000	10100	11001	01100	11001	00001
00011	00001	10100	00111	01101	01101

The encryption function E_f is $E_f: \Sigma \rightarrow \Sigma$ defined by

$$\Psi i \rightarrow (\Psi i + ei)$$

Plain Text	Key	Cipher Text
C = 00010	11000	00001 = B
R = 10001	10100	01011 = L
Y = 11000	11001	10111 = X
P = 0111	01100	00001 = B
T = 10011	11001	10010 = S
A = 00000	00001	00001 = B
N = 01101	00011	10000 = Q
A = 00000	00001	00001 = B
L = 01011	10100	00101 = F
Y = 11000	00111	00101 = F
S = 10010	01101	00101 = F
I = 01000	10111	00101 = F
S = 10010	01101	00101 = F

E. Problem

Suppose a person wants the plain text message" PROBABILITY" to encrypt using one-time pad. He first consults OCTA DECIMAL SYSTEM table to convert the letters to the octa system.

P	R	O	B	A	B	I	L	I	T	Y
17	27	16	1	0	1	11	13	10	23	31

The encryption function E is E : $f \rightarrow f$ by $\Psi_i \rightarrow (\Psi_i + e_i)$

Plain Text	**Key**	**Cipher Text**
17 = P	011	20 = Q
27 = R	010	3 = D
16 = O	000	16 = O
1 = B	011	4 = E
0 = A	101	4 = E
1 = B	110	7 = H
11 = I	100	12 = K
13 = L	011	16=O
10 = I	11	17=P
23 = T	111	4=E
31 = Y	001	6=G

3. Conclusion

The Applications of different types of Number Systems in Cryptography, we studied Correspondence between letters and different number systems and we studied some numerical example of encryption and decryption by using functions and modular properties.

References

[1] D. R. Stinson, "Cryptography. Theory and Practice," Chapman & Hall / CRC, 2006.