DAY 32

MCA CET 2025

COMPUTER

NUMBER SYSTEM

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Number System

Computers → Binary Number

(0,1) → No / Off / false, Yes / ON / True

The primary number system used by computers is the binary number system, which operates on a base-2 format. In this system, data is represented using only two digits: 0and 1. This binary representation aligns with the electronic nature of computers, where these digits correspond to the two states of electrical signals—off (0) and on (1)

Binary. (2) → 0,1

Decimals. (10) → 0 9

Octal → (8) ⇒ 0 - - - 7

Hexadecimal → (16) ⇒ 0 . . . . F

Decimal Number System

The decimal number system, also known as the base-10 system, is a positional numeral system that uses ten distinct digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9.

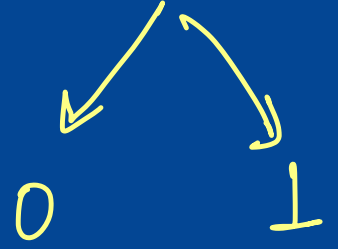
This system is the most widely used for everyday counting and calculations.

Binary Number System

Base = 2

Computers primary

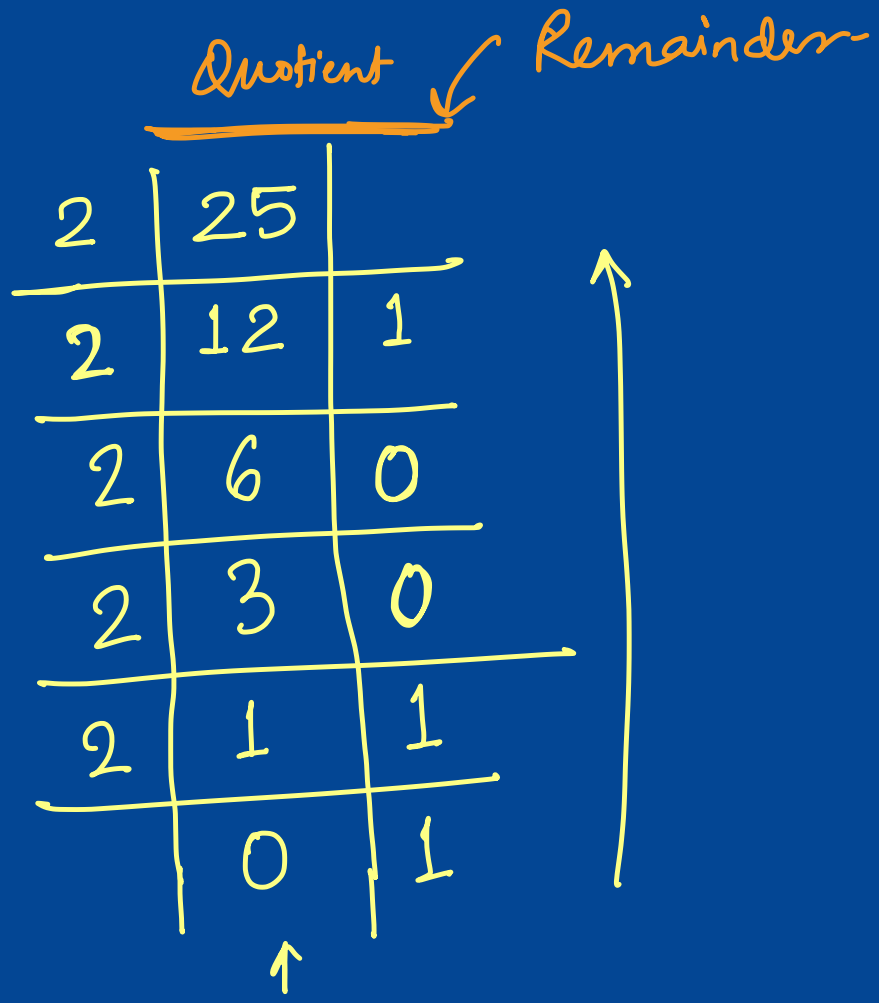
2 Numbers



Decimal to Binary

$(25)_{10} = (11001)_2$

Convert 25 to Binary



Binary to Decimal

$(1011011)_2 = (91)_{10}$

Convert 1011011 to Decimal

1	0	1	1	0	1	1
↓	↓	↓	↓	↓	↓	↓
2^6	2^5	2^4	2^3	2^2	2^1	2^0

$1\times64 + 0 + 1\times16 + 1\times8 + 0\times2^3 + 1\times2 + 1\times1$

$64+16+8+2+1 = (91)_{10}$

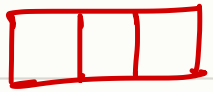
Octal Number System

Base = (8)

The octal number system is a base-8 numeral system that uses eight distinct digits: (0, 1, 2, 3, 4, 5, 6, and 7). Each digit's position in an octal number represents a power of eight, making it a positional numeral system similar to decimal (base-10) and binary (base-2).

Octal numbers can be derived from binary numbers by grouping binary digits into sets of three. Each group of three bits corresponds to a single octal digit.

Octal Digit	Binary Equivalent
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

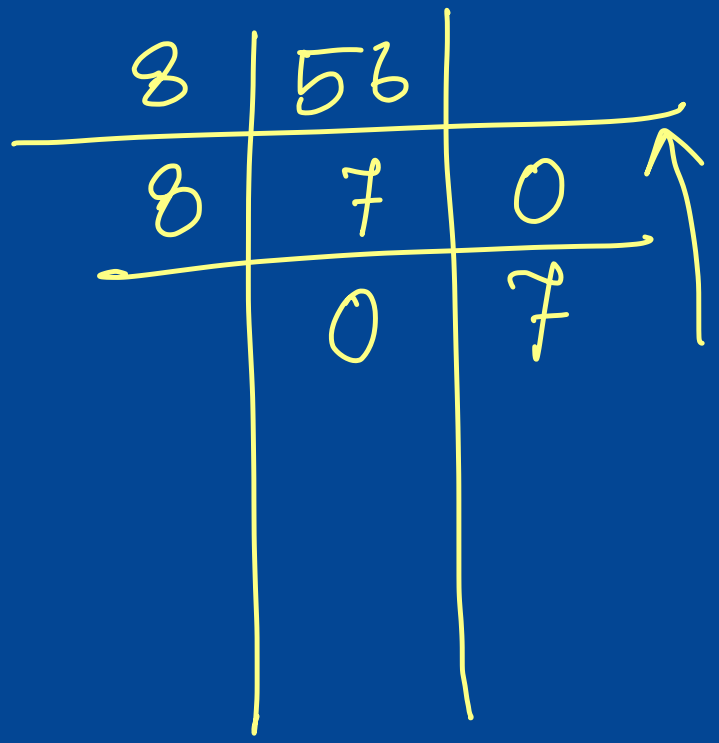


3 bits of binary is octal

Decimal to Octal

$(56)_{10} \longrightarrow (70)_8$

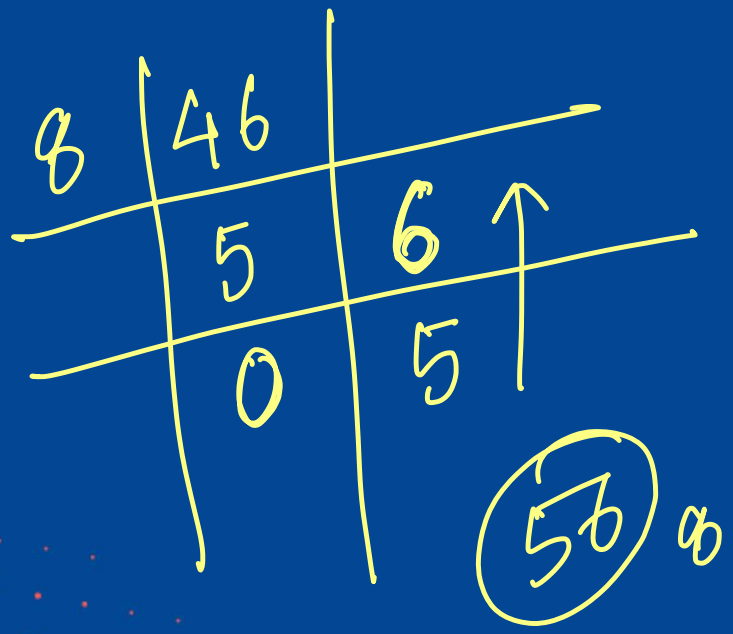
Convert 56 to Octal



Octal to Decimal

$(56)_8 \rightarrow (46)_{10}$

Convert $(56)_8$ to Decimal



5 → 8^1

6 → 8^0

$5 \times 8 + 6 \times 1 = 40 + 6 = 46$

Base = 16

Hexadecimal Number System

0 . . . . . F

The hexadecimal number system, also known as base-16, is a positional numeral system that uses sixteen distinct symbols to represent values. These symbols include the digits 0-9 (representing values zero to nine) and the letters A-F (representing values ten to fifteen).

0	1	2	3	4	5	6	7	8	9
A	B	C	D	E	F				
↓	↓	↓	↓	↓	↓				
10	11	12	13	14	15				

Octal ⇒ 3 bits
Hexadec. ⇒ 4 bits.

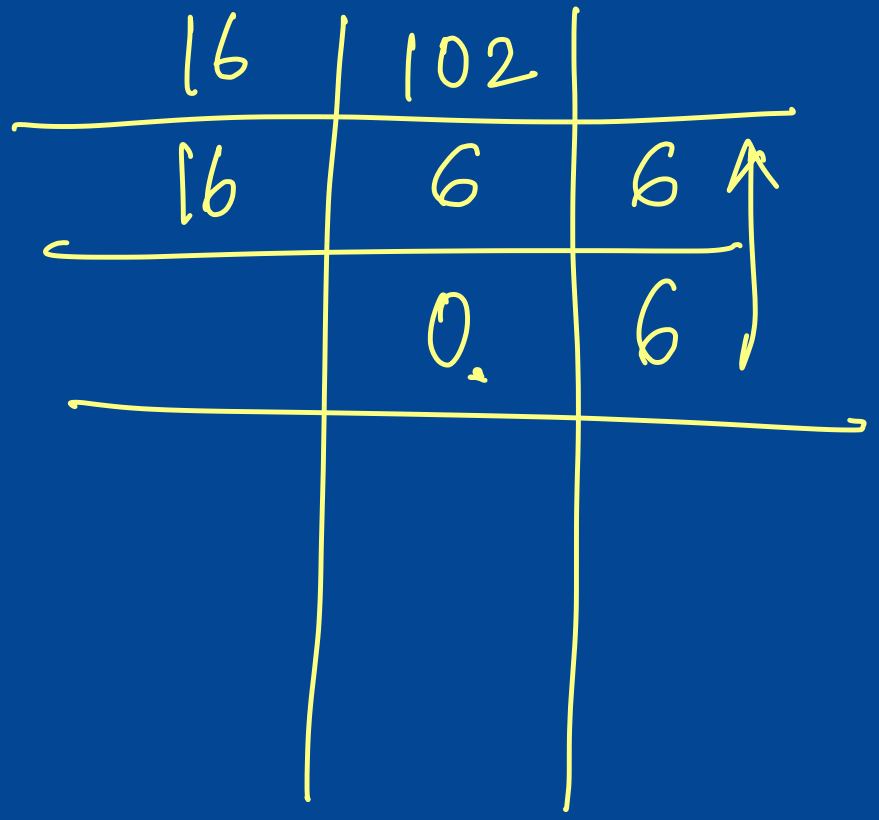
Each hexadecimal digit corresponds to a 4-bit binary equivalent. The conversion can be done using a table:

Hex Digit	Binary Equivalent
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A (10)	1010
B (11)	1011
C (12)	1100
D (13)	1101
E (14)	1110
F (15)	1111

Decimal to Hexadecimal

Convert 102 to Hexadecimal

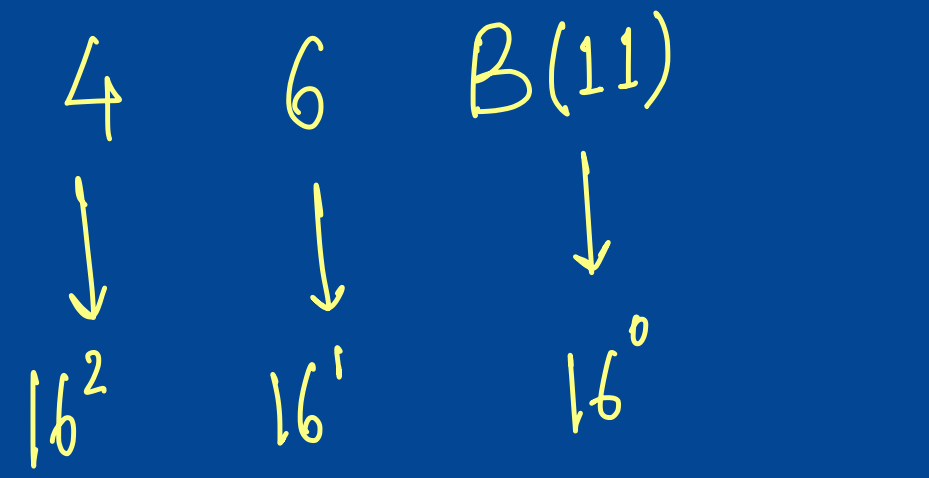
$(102)_{10} = (66)_{16}$



Hexadecimal to Decimal

$(46B)_{16} = (1131)_{10}$

Convert 46B to Decimal



$256 \times 4 + 6 \times 16 + 11 \times 1$

$1024 + 96 + 11 = 1131$

In which form is data stored in a computer?

(a) Binary

(b) Magnetic

(c) Picture

(d) Alphabets

Which of the following is an example of the binary number system?

(a) 100101

(b) 89056

(c) ABCDE

(d) 009

1 binary digit

For a computer, BIT stands

(a) Binary Digit

(b) Built-in Integer

(c) Binary Task

(d) Binary Integer Transfer

What is the base of the octal number system ?

(a) 8

(b) 16

(c) 2

(d) 0

base = 8

Which of the following is an example of a hexadecimal number system ?

(a) $(4D2)_{16}$

(b) 110011 — Binary

(c) 1234

(d) $(458)_8$

base = 16

8 digits

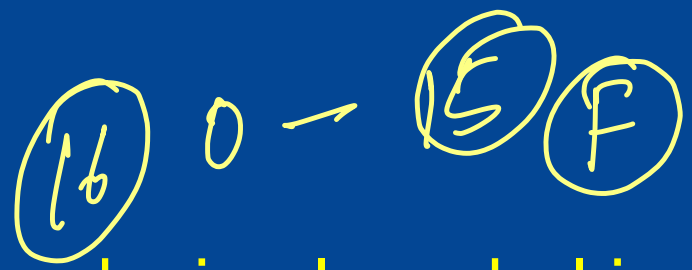
Octal number system has digits has

(a) 1-9

(b) 0-5

(c) 1-8

(d) 0-7



Which hexadecimal symbol is used for the decimal number 15?

(a) A

(b) C

(c) F

(d) E

Binary equivalent to decimal number 150 is

(a) 10010110

(c) 10010101

(b) 10000111

(d) 10101001

10000010

2	150	
2	75	0
2	32	1
2	16	0
2	8	0
2	4	0
2	2	0
2	1	0
	0	1

Octal equivalent to decimal number 222 is

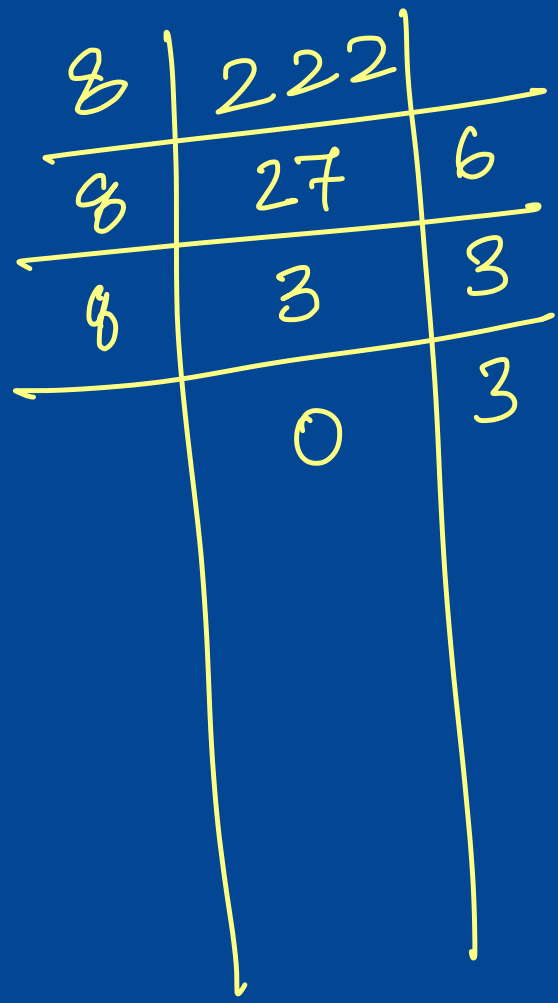
(a) 173

(b) 336

(c) 167

(d) 123

336



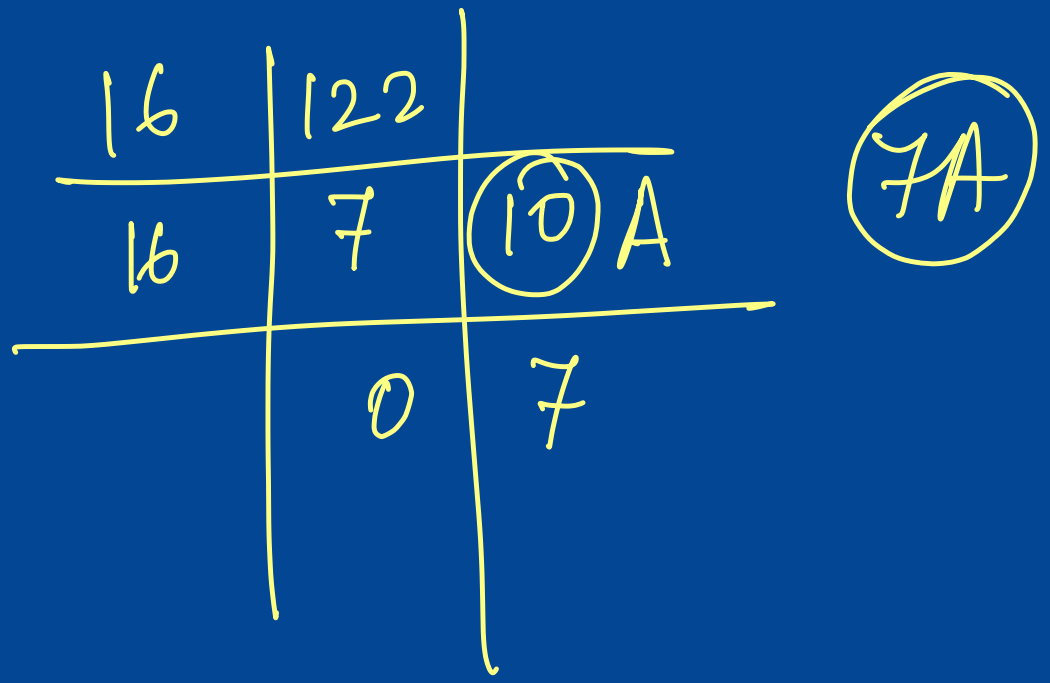
Hexadecimal equivalent of decimal number 122 is

(a) 7A

(b) 8A

(c) 9A

(d) 10A



Number System

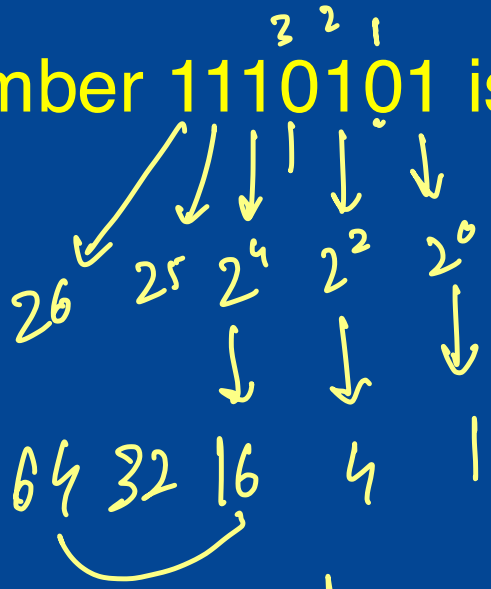
Octal number equivalent to binary number 1110101 is.

(a) 456

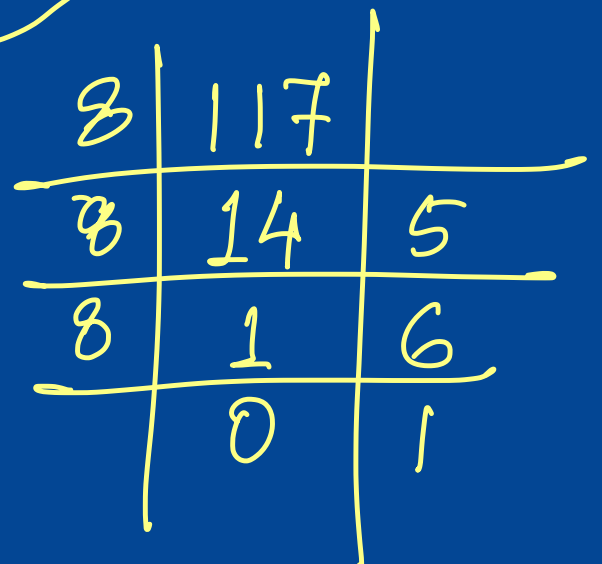
(b) 165

(c) 164

(d) 167



165



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