

Questions:

1. What do you understand by data, information and code?
2. Briefly discuss four popular number system.
3. Define bit & byte.
4. What do you understand by BCD, ASCII, EBCDIC and Unicode?
5. Binary arithmetic (class note)

- What do you understand by data, information and code?

Data

- Facts, statistics used for reference or analysis.
- Numbers, characters, symbols, images etc., which can be processed by a computer.
- Data must be interpreted, by a human or machine, to derive meaning
- "Data is a representation of information" *
- Latin 'datum' meaning "that which is given"

Information

- Knowledge derived from study, experience (by the senses), or instruction.
- Communication of intelligence.
- "Information is any kind of knowledge that is exchangeable amongst people, about things, facts, concepts, etc., in some context."
- "Information is interpreted data"

Code

Codes are used to reduce the volume of data. There are some codes. These are **ASCII Code**, Extended Binary Coded Decimal Interchange Code, **Unicode**, **BCD code** etc.

- Briefly discuss four popular number systems.

Popular number systems in connection with digital computers are: Decimal, Binary, Octal, and Hexadecimal. Basic characteristics of these number systems are given below:

Decimal: It is most commonly used number in real life.

Digits: 0,1,2,3,4,5,6,7,8,&9 (total 10 digits)

Base: 10 (Since total number of digits is 10)

Binary: Digital computers use binary numbers for internal operation.

Digits: 0 & 1 (total 2 digits)

Base: 2 (Since total number of digits is 2)

Octal: This is not a commonly used number system.

Digits: 0,1,2,3,4,5,6 & 7 (total 8 digits)

Base: 8 (Since total number of digits is 8)

Hexadecimal: It is a popular system for computer scientist, engineers and information technologists.

Digits: 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E & F.

Base: 16 (Since total number of digits is 16)

- Define bit & byte.

Bit : In binary system 0 or 1 is called a bit, which is short for binary digits.

Byte : A group of eight bits is called a byte. The capacity of a computer's memory is expressed in number of bytes.

- Number of bytes (characters) storage medium can hold
 - Kilobyte KB – 1 thousand
 - Megabyte MB – 1 million
 - Gigabyte GB – 1 billion
 - Terabyte TB – 1 trillion

[Lecture 4: Introduction to Computer] BBA First semester

Size:

- 1024 bytes = 1 KB
1024 KB = 1MB
1024 MB = 1GB

- **What do you understand by BCD, ASCII , EBCDIC and Unicode?**

ASCII Code : ASCII codes represent text in computers, communications equipment, and other devices that work with text. ASCII, pronounced "ask-ee" is the acronym for **American Standard Code for Information Interchange**.

This code is developed as a 7-bit standardization of various special codes.

It is used mainly by personal computer systems.

BCD code : The code , which require 4 bits for each decimal digit, is called BCD(binary coded decimal) code. BCD code is a weighted code.

Example: Decimal digit- 0
 BCD code - 0000

Extended Binary Coded Decimal Interchange Code (EBCDIC) is an 8-bit character encoding used mainly on IBM mainframe and IBM midrange computer operating systems.

Unicode is an industry standard allowing computers to represent & manipulate text expressed in any of the world's writing systems. It covers almost all scripts like Arabic, Bengali, Greek, Hebrew, Latin, Gujrati, etc. It is used in operating systems, email, web, font etc.

Unicode is a 16-bit system which is developed by Unicode Inc. with support from Apple, IBM and Microsoft.

- **Binary arithmetic**

Arithmetic in binary is much like arithmetic in other numeral systems. Addition, subtraction, multiplication, and division can be performed on binary numerals.

Addition

The circuit diagram for a binary half adder, which adds two bits together, producing sum and carry bits.

The simplest arithmetic operation in binary is addition. Adding two single-digit binary numbers is relatively simple, using a form of carrying:

$$\begin{aligned} 0 + 0 &\rightarrow 0 \\ 0 + 1 &\rightarrow 1 \\ 1 + 0 &\rightarrow 1 \\ 1 + 1 &\rightarrow 0, \text{ carry } 1 \text{ (since } 1 + 1 = 0 + 1 \times \text{binary } 10) \end{aligned}$$

Addition table

	0	1
0	0	1
1	1	10

Subtraction

Further information: two's complement

Subtraction works in much the same way:

$$\begin{aligned} 0 - 0 &\rightarrow 0 \\ 0 - 1 &\rightarrow 1, \text{ borrow } 1 \\ 1 - 0 &\rightarrow 1 \\ 1 - 1 &\rightarrow 0 \end{aligned}$$

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