Q11.What is Secondary Memory? Explain their types.

Ans:- Secondary memory is computer memory that is non-volatile, persistent, and not immediately accessible by a computer or processor. It allows users to store data and information that can be retrieved, transmitted, and used by apps and services quickly and easily. Secondary storage is another name for secondary memory.

Types of Secondary Memory:- There are two types of secondary memory

- Fixed storage:- A fixed storage device in secondary memory is an internal media device used to store data in a computer system. Fixed storage is sometimes known as hard drives or fixed disc drives. In most cases, the computer system's data is saved in the fixed storage device that's incorporated into a given system. Fixed storage does not preclude their removal from the computer system; with the assistance of an expert or engineer, you may remove the fixed storage device for repairs, upgrades, or maintenance, among other things. Fixed storage have also types:-
    1. Hard disk drives (HDD)
    2. SSD (solid-state disk)
    3. Internal flash memory (rare)
- Removable storage:- Removable storage refers to an external media device that is mainly used to store data on a computer system in secondary memory. Disk drives or external drives are common names for removable storage. It's a removable storage device that can be inserted or withdrawn from the computer as needed. Removable Storage have also different types
    1. Optical discs (such as DVDs, CDs, Blu-ray discs, etc.)
    2. Floppy disks
    3. Memory cards
    4. Disk packs
    5. Magnetic tapes
    6. Paper storage (such as punched cards, punched tapes, etc.)

Examples of Secondary Memory:- **Floppy Disk, Compact Disc(CD), Hard Disk, SD Card etc.**

Q12.Difference Between Static and Dynamic ram?

SRAM	**DRAM**
It stores information as long as the power is supplied	It stores information as long as the power is supplied or a few milliseconds when power is switched off.
Transistors are used to store information in SRAM	Capacitors are used to store data in DRAM.

Capacitors are not used hence no refreshing is required.	To store information for a longer time, contents of the capacitor need to be refreshed periodically.
SRAM is faster compared to DRAM	DRAM provides slow access speeds.
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It has two subtypes which are:

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2. **Language Processor:** As we know that system software converts the human-readable language into a machine language and vice versa. So, the conversion is done by the language processor. It converts programs written in high-level programming languages like Java, C, C++, Python, etc(known as source code), into sets of instructions that are easily readable by machines(known as object code or machine code).

3. **Device Driver:** A device driver is a program or software that controls a device and helps that device to perform its functions. Every device like a printer, mouse, modem, etc. needs a driver to connect with the computer system eternally. So, when you connect a new device to your computer system, first you need to install the driver of that device so that your operating system knows how to control or manage that device.

Q21. Describe flyanns classification.

M.J. Flynn proposed a classification for the organization of a computer system by the number of instructions and data items that are manipulated simultaneously.

The sequence of instructions read from memory constitutes an **instruction stream**.

The operations performed on the data in the processor constitute a **data stream**.

Flynn's classification divides computers into four major groups that are:

1. Single instruction stream, single data stream (SISD)
2. Single instruction stream, multiple data stream (SIMD)
3. Multiple instruction stream, single data stream (MISD)
4. Multiple instruction stream, multiple data stream (MIMD)

Q22. What is a number system? Explain their types.

Ans:- The technique to represent and work with numbers is called the number system. The decimal number system is the most common number system. Other popular number systems include binary number systems, octal number system, hexadecimal number system, etc.

Types of Number Systems

There are various types of number systems in mathematics. The four most common number system types are

1. Decimal number system (Base- 10)
2. Binary number system (Base- 2)
3. Octal number system (Base-8)
4. Hexadecimal number system (Base- 16)

1.Decimal Number System (Base 10 Number System)

The decimal number system has a base of 10 because it uses ten digits from 0 to 9. In the decimal number system, the positions successive to the left of the decimal point represent units, tens, hundreds, thousands and so on. This system is expressed in decimal numbers. Every position shows a particular power of the base (10).

Ex- The decimal number 1457 consists of the digit 7 in the units position, 5 in the tens place, 4 in the hundreds position, and 1 in the thousands place whose value can be written as:

$(1\times10_3) + (4\times10_2) + (5\times10_1) + (7\times10_0)$

(1×1000) + (4×100) + (5×10) + (7×1)

1000 + 400 + 50 + 7

1457

2.Binary Number System (Base 2 Number System)

The base 2 number system is also known as the Binary number system wherein, only two binary digits exist, i.e., 0 and 1. Specifically, the usual base-2 is a radix of 2. The figures described under this system are known as binary numbers which are a combination of 0 and 1. For example, 110101 is a binary number.

We can convert any system into binary and vice versa.

3.Octal Number System (Base 8 Number System)

In the octal number system, the base is 8 and it uses numbers from 0 to 7 to represent numbers. Octal numbers are commonly used in computer applications. Converting an octal number to decimal is the same as decimal conversion and is explained below using an example.

Example: Convert 215_8 into decimal.

Solution:

$215_8 = 2 \times 8^2 + 1 \times 8^1 + 5 \times 8^0$

$= 2 \times 64 + 1 \times 8 + 5 \times 1$

$= 128 + 8 + 5$

$= 141_{10}$

4. Hexadecimal Number System (Base 16 Number System)

In the hexadecimal system, numbers are written or represented with base 16. In the hexadecimal system, the numbers are first represented just like in the decimal system, i.e. from 0 to 9. Then, the numbers are represented using the alphabet from A to F

Q23. What is 1’s and 2’s compliment?

1’s complement of a binary number is another binary number obtained by toggling all bits in it, i.e., transforming the 0 bit to 1 and the 1 bit to 0. In the 1’s complement format, the positive numbers remain unchanged. The negative numbers are obtained by taking the 1’s complement of positive counterparts.

for example, +9 will be represented as 00001001 in eight-bit notation and -9 will be represented as 11110110, which is the 1’s complement of 00001001.

Ex:- 1's complement of "0111" is "1000"

1's complement of "1100" is "0011"

2's complement of a binary number is 1, added to the 1's complement of the binary number. In the 2's complement representation of binary numbers, the MSB represents the sign with a '0' used for a plus sign and a '1' used for a minus sign. the remaining bits are used for representing magnitude. positive magnitudes are represented in the same way as in the case of sign-bit or 1's complement representation. Negative magnitudes are represented by the 2's complement of their positive counterparts.

Q24. Convert these no's to 2's: 110011, 10101, 1000000, 101110110

Q25. Convert these no's to binary, octal and hexadecimal nos: 16,52,68,27,55

Q26. Write notes on floating point, grey code, ASCII code, and EBCDIC code

Floating Point:- A floating point number, is a positive or negative whole number with a decimal point. Ex:- 5.5, 7.20, etc.

Grey code:- Gray Code is the minimum-change code category of coding in which, the two consecutive values changes by only a single bit. More specifically we can say, it is a binary number system where while moving from one step to the next, only a single bit shows variation.

This coding technique was invented by **Frank Gray**, thus it is named so.

ASCII Code:- ASCII Stands for American Standard Code for Information Interchange (pronounced 'as-key'). This is a standard set of characters understood by all computers, consisting mostly of letters and numbers plus a few basic symbols such as $ and %. Which employs the 128 possible 7-bit integers to encode the 52 uppercase and lowercase letters and 10 numeric digits of the Roman alphabet, plus punctuation characters and some other symbols. The fact that almost everyone agrees on ASCII

makes it relatively easy to exchange information between different programs, different operating systems, and even different computers.

EBCDIC CODE:- EBCDIC, in full extended binary-coded decimal interchange code, data-encoding system, developed by IBM and used mostly on its computers, that uses a unique eight-bit binary code for each number and alphabetic character as well as punctuation marks and accented letters and nonalphabetic characters.

Q27. What is boolean algebra? Explain their rules

Boolean algebra is the category of algebra in which the variable's values are the truth values, **true and false,** ordinarily denoted 1 and 0 respectively. It is used to analyze and simplify digital circuits or digital gates. It is also called **Binary Algebra** or **logical Algebra**.

Laws of Boolean Algebra

There are six types of Boolean algebra laws. They are:

- Commutative law
- Associative law
- Distributive law
- AND law
- OR law
- Inversion law

Those six laws are explained in detail here.

Commutative Law

Any binary operation which satisfies the following expression is referred to as a commutative operation. Commutative law states that changing the sequence of the variables does not have any effect on the output of a logic circuit.

- A. B = B. A

- A + B = B + A

Associative Law

It states that the order in which the logic operations are performed is irrelevant as their effect is the same.

- (A. B). C = A . (B . C)
- (A + B) + C = A + (B + C)

Distributive Law

Distributive law states the following conditions:

- A. (B + C) = (A. B) + (A. C)
- A + (B. C) = (A + B) . (A + C)

AND Law

These laws use the AND operation. Therefore they are called AND laws.

- A .0 = 0
- A . 1 = A
- A. A = A
- $A.\bar{A}=0$
-

OR Law

These laws use the OR operation. Therefore they are called OR laws.

- A + 0 = A
- A + 1 = 1
- A + A = A
- $A+\bar{A}=1$
-

Inversion Law

In Boolean algebra, the inversion law states that the double inversion of variable results in the original variable itself.

A- = A

Q28. Explain canonical expressions.

Ans:- Laws of Boolean Algebra

There are six types of Boolean algebra laws. They are:

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- **Associative law**
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- **A. A = A**
- **$A.A^{-}=0$**
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OR Law

These laws use the OR operation. Therefore they are called OR laws.

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- **A + 1 = 1**
- **A + A = A**
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Inversion Law

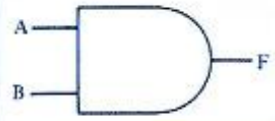
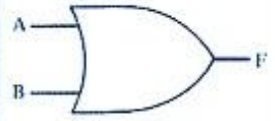
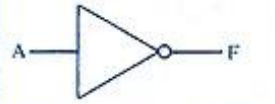
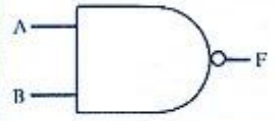
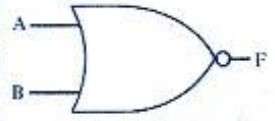
In Boolean algebra, the inversion law states that double inversion of variable results in the original variable itself.

Q28. Explain canonical expressions.

Canonical Form – In Boolean algebra, the Boolean function can be expressed as Canonical Disjunctive Normal Form known as minterm and some are expressed as Canonical Conjunctive Normal Form known as maxterm.

Q29. Define logic gates with their truth table.

Logic gates are the basic building blocks of any digital system. It is an electronic circuit having one or more than one inputs and only one output. The relationship between the input and the output is based on a certain logic. Based on this, logic gates are named as AND gate, OR gate, NOT gate, etc.

Name	Graphic Symbol	Algebraic Function	Truth Table
AND		F = A · B or F = AB	A B | F 0 0 | 0 0 1 | 0 1 0 | 0 1 1 | 1
OR		F = A + B	A B | F 0 0 | 0 0 1 | 1 1 0 | 1 1 1 | 1
NOT		F = $\overline{A}$ or F = A′	A | F 0 | 1 1 | 0
NAND		F = $(\overline{AB})$	A B | F 0 0 | 1 0 1 | 1 1 0 | 1 1 1 | 0
NOR		F = $(\overline{A + B})$	A B | F 0 0 | 1 0 1 | 0 1 0 | 0 1 1 | 0

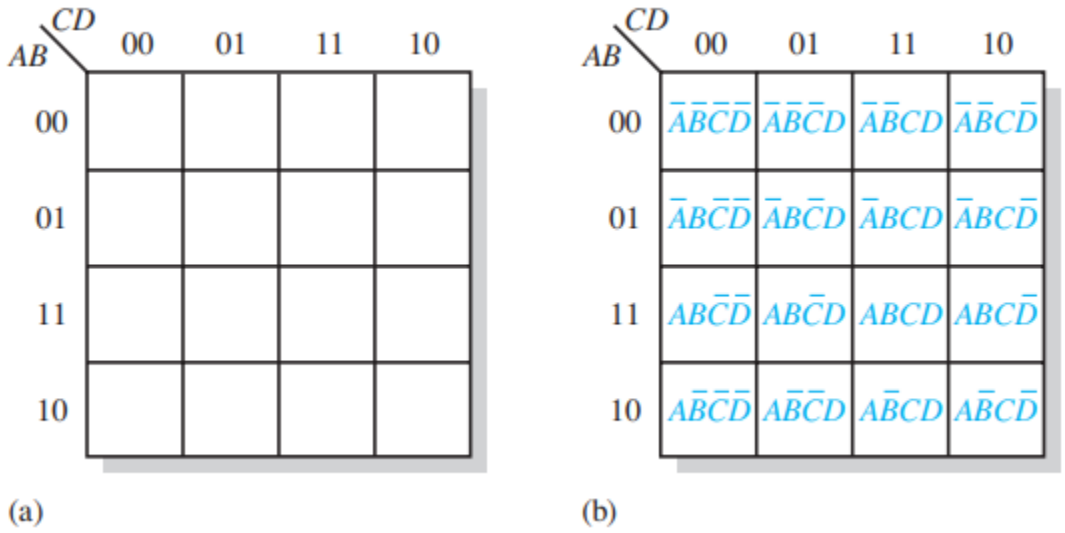
Q30.What is k map explain with 4 variables?

- A Karnaugh map is similar to a truth table because it presents all of the possible values of input variables and the resulting output for each value.
- Instead of being organized into columns and rows like a truth table, the Karnaugh map is an array of cells in which each cell represents a binary value of the input variables.

- The cells are arranged in a way so that simplification of a given expression is simply a matter of properly grouping the cells.
- Karnaugh maps can be used for expressions with two, three, four, and five variables, but we will discuss only 3-variable and 4-variable situations to illustrate the principles.
- The number of cells in a Karnaugh map, as well as the number of rows in a truth table, is equal to the total number of possible input variable combinations.

The 4-Variable Karnaugh Map:

- The 4-variable Karnaugh map is an array of sixteen cells, as shown in Figure(a).
- Binary values of A and B are along the left side and the values of C and D are across the top.
- The value of a given cell is the binary values of A and B at the left in the same row combined with the binary values of C and D at the top in the same column.



(a) (b)

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