**COMPUTER STUDIES JSS 2**

**SECOND TERM**

**SCHEME OF WORK**

**WEEK TOPIC**

1. Classification of Computers
2. The Computer System
3. Hardware Components
4. Peopleware
5. Operating Systems
6. Functions of Operating Systems
7. Number Base
8. Conversion of Number Base
9. Units of storage in Computer

**WEEK 1**

CLASSIFICATION OF COMPUTERS

Computers can be classified into four:

1. By generation

2. By type

3. By size

4. By purpose

By Generation:

1. First Generation (1940 – 1956 ):

They were developed during the second world war to design flying bombs and missiles for the war. Examples are Colossus, ENIAC, EDVAC, EDSAC, UNIVAC, etc.

Features

• It uses vacuum tubes

• They are very big

• It generates lots of heat

• They are very slow in processing information

• It uses a magnetic drum for memory

• They occupy large space

• It uses punch cards for input and output

2. Second Generation (1956 – 1963 ):

These computers use transistors in place of vacuum tubes after the second world war e.g. IBM 7090.

Features

• It uses transistors

• It is smaller in size

• Faster in processing information

• It is cheaper to get

• It consumes less energy

• More reliable

• It uses punch cards for input and output

3. Third Generation (1964 – 1971 ):

They are I.Cs (Integrated Circuit) computers. Transistors are minimized and placed on silicon chips.

Features

• It uses integrated circuit

• Keyboard and monitors were used as input and output devices

• It uses an operating system eg: Microsoft OS, Mac OS etc.

• Enhanced processing speed

4. Fourth Generation (1972 – 1989):

This generation of computer uses a microprocessor, the era of CPU came to surface. Example: Micro Computer.

Features

• It uses microprocessors

• ADA programming language was developed

• It is a personal system

5. Fifth Generation (1991 – date):

These computers use artificial intelligence. They have voice recognition and are capable of doing more work e.g. Robot.

**By Type:**

1. Analog Computer:

They give their result is in continuous value rather than discrete value. They are built to respond to continuous signals such as electricity, temperature, pressure e.g. speedometer, wall clock, etc.

2. Digital Computer:

The word digital means discrete or whole number. Digital computers function by accepting and manipulating data in the form as discrete binary numbers e.g. digital thermometer, calculators, etc.

3. Hybrid Computer:

They combine the proper of both analog and digital computers. This means that they can accept and process data and produce output both in digital and analog formats.

**By Size:**

Computers can be classified by size, they are microcomputer, minicomputer, mainframe computer and supercomputers.

1. Micro Computers:

They are the smallest class of computers. It uses a single microprocessor mounted with memory chips as its central processing unit e.g. desktop, laptops, etc.

2. Minicomputers:

These are middle-level computers built to perform complex computations.

3. Mainframe Computers:

These are the largest class of computers. They have multiple chips so they can sustain a large amount of processing and allow many users at the same time.

4. Super Computers:

They are the largest and fastest types of mainframe computers. They perform highly complex and time-consuming computations and are used heavily by scientists, large business and the military for large research work such as weather forecasts, oil explorations, etc.

**By Purpose:**

1. General Purpose Computers:

They are designed to solve a wide range of problems. They perform many functions because various types of application programs are stored in them e.g. Microcomputers.

2. Special Purpose Computers:

They are designed to solve a specific problem e.g. ultrasound machines, x-ray machines, fuel dispenser, etc.

**WEEK 2**

THE COMPUTER SYSTEM

A computer is an electronic device that has the capability of accepting data through the input devices and processes it on the system unit and produces meaningful output called information with the aid of a stored program.

**Components of a Computer System**

There are three (3) major components which will determine the performance of the computer. They are:

* Hardware
* Software
* Peopleware

**Hardware Components**

A computer is made up of multiple physical components of computer hardware upon which operating system can be installed and other software to perform the operators desired function or tasks.

Therefore, it is the physical part of the computer which can be seen and touched. Simply, it is the tangible components of the computer.

The computer hardware is responsible for performing four (4) basic functions:

* Input
* Processing
* Output
* Storage

The hardware includes:

* CPU (which comprises of ALU, control unit, memory).
* Input devices or unit.
* Output devices.

**Software Components**

The computer software also called a program is a collection of instructions that enable the hardware to function effectively. Without the software, no computer can function. It controls and directs the hardware on what to do.

There are basically two (2) major types of software namely:

* System Software
* Application Software

**Peopleware Components**

Peopleware is a term used to refer to one of the three core aspects of computer technology i.e. hardware, software and peopleware.

Peopleware can refer to anything that has to do with the role of people in the development or use of computer software and hardware components.

Peopleware can be divided into two distinct groups:

* Computer professionals
* Computer user

**WEEK 3**

**Hardware Components**

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The computer hardware is responsible for performing four (4) basic functions:

* Input
* Processing
* Output
* Storage

The hardware components include:

* CPU (which comprises of ALU, control unit, memory).
* Input devices or unit.
* Output devices.
* Input Devices:

These are devices that are used to communicate with the computer. They are devices through which data is sent into the computer system. For data to be processed by the CPU, it must pass through an input device. Input devices accept data in a form that the computer can use. It can also send data or instructions to the processing unit to be processed into useful information.

Examples of input devices include:

* Mouse
* keyboard
* Joystick
* Digital Camera
* Web Camera
* Light pen
* Scanner
* Barcode reader.

**Output Devices:**

These are devices that the computer uses to communicate with the users. They are used to display processed data to the users. The result of the processed data is sent to the outside world through the output devices.

Examples of output devices include:

* Monitor/ Video Display Unit (VDU)
* Speaker
* Printer
* Plotter
* Pointer
* Storage Devices:

The storage unit or main memory stores data and instructions that are about to be processed.

It has the ability to store data and instructions temporarily or permanently. There are two major types of storage namely:

* Primary storage
* Secondary storage
* Primary Storage

It is divided into the following:

* RAM (Random Access Memory)
* ROM (Read Only Memory)

**The ROM:**

The ROM is the Read-Only Memory. Once this memory is programmed, it cannot be re-written. The computer can only read its contents. They store information that cannot be altered.

The content of the boot accord which is the set of instructions that takes control of the computer when it is switched on is stored inside the ROM

**The RAM:**

The RAM is the “Random Access Memory”. The computer can read from it and store/write on it. It is volatile because its data/content is lost when the power goes off.

Most RAMs are used to store information/data that the CPU is processing.

**Secondary Storage / External Storage Devices**

It is the memory used for storing information, data/programs that the CPU is not referencing. They are mainly used for backup.

The secondary storage that is inside the computer is called the hard disk while others are external devices.

The secondary storage is also known as auxiliary storage or external storage or secondary memory.

Examples of secondary storage devices are:

* Magnetic tapes
* Magnetic disks
* Floppy diskettes
* Compact Disk Read Only Memory CD-ROM
* Flash drives
* External hard disk

**Arithmetic and Logic Unit (ALU):**

This has two main duties. It carries out all the required arithmetic operations like addition, subtraction, multiplication and division.

ALU also performs some logical operations like comparing two numbers to know which is bigger or smaller.

It has temporary storage locations called REGISTERS. The data are stored temporarily before calculation and after calculation, the data again come back to the memory.

Note that the control unit and ALU are known as CPU.

**WEEK 4**

PEOPLEWARE COMPONENTS

Peopleware is a term used to refer to one of the three core aspects of computer technology i.e. hardware, software and peopleware. It can refer to anything that has to do with the role of people in the development or use of computer software and hardware components.

Peopleware can be divided into two distinct groups:

* Computer professionals
* Computer user

Computer Professionals:

These are individuals who have in one way or the other required formal education or training in the use of computers.

Examples of computer professionals include:

* Computer Managers
* Computer Programmers / Software Developers.
* Computer Operators
* Computer Engineers
* System Analysts
* Software Engineers
* Database Administrators

Functions of a Computer Manager:

* Responsible for day to day running of the computer department.
* Ensures computer installations run efficiently in satisfying the computing needs of the organization.
* Coordinates the staff of the computer department.
* Plans for improvement to the organisation’s activities through new and improved systems.

Functions of a System Analyst:

* Design of computer-based systems, their implementation and review.
* Produces flow charts for the programmer to use.
* Analysis of existing systems with a view to computerizing them.

Functions of the Computer Engineer:

* Installation of a new computer or additional peripherals.
* Repairs or replaces defective components in the computer.
* Periodically clean the computer and the sensitive inner parts.

Qualities of a good Computer Professional

The qualities include the following:

* Must be ready to work with others as a team.
* Must be able to correct errors on the computer.
* Must not commit computer crime such as fraud.
* Must be ready to improve himself.
* Must be up to date on computer issues.
* Must not allow computers to get infected with a computer virus.

Computer Users:

These are the group of people who make use of the computer system in discharging their day to day activities or simply those who work with the computer system. These people may not have had any formal training in a computer but can exchange their services of some computer professionals. Examples of computer users include:

* Administrator
* Standard user
* Guest
* Child
* Hacker
* Teachers
* Gamers
* Artists
* Researchers
* Programmers
* Scientists

**WEEK 5**

Operating System

An operating system is software consisting of programs and data that runs on computers, manage computer hardware resources and provides common services for the execution of various application software.

It controls and coordinates all activities within the computer system. It plays the role of a manager in the computer. Without OS (operating system), you cannot communicate with the computer.

Examples of operating systems include:

* Microsoft Windows
* Linux
* Unix
* iOS
* Android
* Chrome OS
* Mac OS

The application programs make use of the operating system by making requests for services through a defined application program interface (API).

In addition, users can interact directly with the OS through a user interface such as a command language or a graphical user interface (GUI). The OS controls the basic input and output, allocates system resources, manage storage space, maintain security and delete equipment failure. It controls the flow of data.

An operating system performs these services for applications:

The OS determines which applications should run in what order and how much time should be allowed for each application before giving another application a turn during multitasking.

The OS manages the sharing of internal memory among multiple applications.

It handles input and output to and from attached hardware devices, such as hard disks, printers, and dial-up ports.

The OS sends messages to each application or interactive user (or to a system operator) about the status of operation and any errors that may have occurred.

It can offload the management of what are called batch jobs (for example, printing) so that the initiating application is freed from this work.

Functions of an Operating System

Boot process: When the computer is switched on, the boot program that is resided in ROM initialize the setup of the computer, the then load the rest of the OS from the banking storage (hardware) in the RAM.

The OS does the work of sharing and accounting of the computer resources.

It handles the input and output of data and information.

The OS handles the management of memory.

It handles the management of the hardware.

The OS handles multitasking and multiprogramming.

It handles protection and error trending.

The operating system acts as an interface between the user and the computer

It controls interaction and program control

**WEEK 6**

FUNCTIONS OF THE OPERATING SYSTEM

**Boot process**: When the computer is switched on, the boot program that is resided in ROM initialize the setup of the computer, the then load the rest of the operating system from the banking storage (hardware) in the RAM.

* The OS does the work of sharing and accounting of the computer resources.
* The operating system handles the input and output of data and information.
* The OS handles the management of memory.
* The operating system handles the management of the hardware.
* The operating system handles multitasking and multiprogramming.
* The operating system handles protection and error trending.
* The operating system acts as an interface between the user and the computer
* The operating system controls interaction and program control

**Resource Allocation:**

The Operating System ensures the proper use of all the resources available by deciding which resource to be used by whom for how much time. All the decisions are taken by the Operating System.

**Control over system performance :**

The OS monitors overall system health to help improve performance, records the response time between service requests and system response to having a complete view of the system health. This can help improve performance by providing important information needed to troubleshoot problems.

**Security:**

The operating system uses password protection to protect user data and similar other techniques. it also prevents unauthorized access to programs and user data.

**Coordination between other software and users:**

Operating systems also coordinate and assign interpreters, compilers, assemblers and other software to the various users of the computer systems.

**Device Management:**

An OS manages device communication via their respective drivers. It performs the following activities for device management.

* Keeps tracks of all devices connected to the system.
* Designates a program responsible for every device known as the Input/output controller.
* Decides which process gets access to a certain device and for how long.
* Allocates devices in an effective and efficient way.
* Deallocates devices when they are no longer required.

**WEEK 7**

NUMBER BASE

A number base is the number of digits or a combination of digits that a system of counting uses to represent numbers.

A base can be any whole number greater than 0. The most used number system is the Decimal system, commonly known as base 10. The base of any number may be written beside the number, for example, 208 is read as 20 base 8.

#### number-systems mathematics classnotesng

#### The Decimal Numbers System:

These are numbers in everyday use. They are also called Denary numbers or numbers in base 10, which has the most important role in the development of science and technology. It has 10 symbols, these are: 0,1, 2, 3, 4, 5, 6, 7, 8, 9.

The position of every digit has a weight which is a power of 10. Each position in the decimal system is 10 times more significant than the previous position i.e. the numeric value of a decimal number is determined by multiplying each digit of the number by the value of the position in which the digit appears and then adding the products.

For example:

22= 2×101 + 2×100

= 2×10 + 2×0 = 20 + 2

= 2210 or 22.

#### The Binary Number System:

The binary number system is a system that makes use of only the digits i.e. 0 and 1. The two digits are called binary digits or simply bits. It is referred to as a base 2 system. A computer can only understand the “on” and “off” state of a switch which is represented by 1 and 0 respectively. The binary number system uses positional notation but, in this case, each digit is multiplied by the appropriate power of two based on its position.

For example: convert 2232 to base 10

2232= 2×22 + 2×21 + 3×20

= 2×4 + 2×2 + 3×1

= 8 + 4+3 = 1510

#### Octal Number System:

The octal system is the base eight system. This system uses digits 0 to 7 i.e. 8 digits, to represent a number and the numbers are as a base of 8.

For example: convert 22 from octal to decimal.

228= 2×81 + 2×80

= 2×8 + 2×0 = 16 + 2

= 1810 or 18.

#### Hexadecimal Number System:

This is a system that uses 16 digits i.e. 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F; thus it is also known as the base 16 number system. Each digit position represents the power of 16. As the base is greater than 10, the number system is represented by letters (A-F) as seen above.

**WEEK 8**

# Conversion of Number Base

#### NUMBER BASE Conversion: from Decimal to other Base System

* Step 1 – divide the decimal number to be converted by the value of the new base.
* Step 2 – get the remainder from step 1 as the rightmost digit (least significant digit) of the base number.
* Step 3 – divide the quotient of the previous divide by the new base.
* Step 4 – record the remainder from step 3 as the next digit (to the left) of the new base number.

Repeat steps 3 and 4, getting remainders from right to left until the quotient becomes zero in step 3.

The last remainder obtained will be the most significant digit (MSD) of the new base number.

##### Decimal to Binary:

Example: Convert 1510 to binary.

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Operation | Result | Remainder |
| Step 1 | 15/2 | 7 | 1 |
| Step 2 | 7/2 | 3 | 1 |
| Step 3 | 3/2 | 1 | 1 |
| Step 4 | 1/2 | 0 | 1 |

As mentioned in steps 2 and 4, the remainders must be arranged in reverse order i.e. from bottom to top.

1510= 11112

##### Decimal to Octal:

Example: convert 38510 to octal.

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Operation | Result | Remainder |
| Step 1 | 385/8 | 48 | 1 |
| Step 2 | 48/8 | 6 | 0 |
| Step 3 | 6/8 | 0 | 6 |

As mentioned in steps 2 and 4, the remainders must be arranged in reverse order i.e. from bottom to top.

38510 = 6018

#### NUMBER BASE Conversion: from other Base System to Decimal

* Step 1 – determine the positional value of each digit. This depends on the position of the digit and the base of the number system.
* Step 2 – multiply the obtained values in step 1 by the digits in the corresponding position.
* Step 3 – sum the products calculated in step 2. This total is the equivalent value in decimal.

##### Binary to Decimal

For example: convert 2232 to base 10

2232= 2×22 + 2×21 + 3×20

= 2×4 + 2×2 + 3×1 = 8 + 4+3

= 1510

##### Octal to Decimal

For example: convert 22 from octal to decimal.

228= 2×81 + 2×80= 2×8 + 2×0 = 16 + 2 = 1810 or 18.

**WEEK 9**

# Units of Storage in computer

A byte is the most common unit of storage in a computer which is equal to 8 bits. Computer memory is made up of millions of bytes. All data and information fed into a computer, as well as the program that comes preloaded, is stored in the form of bytes.

Each byte resides temporarily on the computer memory and this specific location is called an address.

The size of a computer’s memory differs. The size of a computer’s memory is stated by the manufacturer in terms of bytes.

* 1,024 bytes make a kilobyte (KB)
* 1 megabyte (MB) is equal to 1,024 kilobytes
* 1 gigabyte (GB) is equal to 1,024 megabytes

In order to make calculations and definition of memory size easier, 1.024 bytes are often rounded off to 1000 bytes. Thus, the user will often state that 1 KB is equal to 1000 bytes.

#### BITS:

Bits comes from the word binary digit. It is the first and smallest unit of memory. A bit makes use of 0 and 1. With bits, data are stored internally as zeros and ones and it is highly machine-dependent.

Group of bits makes up storage units in the computer called character, bytes, or word, which are used as a group. A **bit** is the basic unit of information in computing and data transmission.

#### BYTE:

A byte is a character containing 8 bits e.g. 10101111 and it is the smallest group of bits used by a computer. A byte is the basic unit of storage in the computer memory. One byte is one character. A character can be a number, letter, or symbol.

A byte is a unit of digital information in computing and data transmission that most commonly consists of eight bits. The actual standard of eight bits is a convenient power of two (2⁸) i.e. 256 values thus permitting the values 0 to 255 for one byte.

##### KILOBYTE (KB):

One kilobyte is 1024 bytes. A **kilobyte** (KB) is a decimal multiple of the unit byte for digital information or computer storage.

The prefix kilo (symbol K) is defined in the International System of Units (SI) as a multiplier of 10³, therefore, 1 kilobyte = 10³ bytes = 1000 bytes.

At the same time, conventionally, this metric prefix is used to designate binary multiplier 2¹⁰ = 1024, so 1 Kilobyte = 210 =1024 bytes.

##### MEGABYTE (MB):

One megabyte is 1,048,576 bytes. A **megabyte** (MB) is a decimal multiple of the unit byte for digital information or computer storage.

The prefix mega (symbol M) is defined in the International System of Units (SI) as a multiplier of 10⁶, therefore, 1 megabyte = 10⁶ bytes = 1,000,000 bytes.

At the same time, this metric prefix is used to designate binary multiplier 2²⁰, so 1 MB = 1024 KB.

##### GIGABYTE:

One gigabyte is 1,073,741,824 bytes. A **gigabyte** (GB) is a decimal multiple of the unit byte for digital information or computer storage.

The prefix Giga (symbol G) is defined in the International System of Units (SI) as a multiplier of 10⁹, therefore, 1 gigabyte = 10⁹ bytes = 1,000,000,000 bytes.

At the same time, usually, this metric prefix is used to designate binary multiplier 2³⁰, so 1 GB = 1024 MB.

##### TERABYTE:

One terabyte is 1,099,511,627,776 characters. A **terabyte** (TB) is a decimal multiple of the unit byte for digital information or computer storage.

The prefix Tera (symbol T) is defined in the International System of Units (SI) as a multiplier of 10¹², therefore, 1 terabyte = 10¹² bytes.

At the same time, this metric prefix is used to designate binary multiplier 2⁴⁰, so 1 TB = 1024 GB.

#### NIBBLE:

This is a unit of storage that is equivalent to 4 bits i.e. half a byte.

There are sixteen (2⁴=16) possible values of a nibble, therefore it corresponds to a single hexadecimal digit.

#### WORD:

It is a set of characters with the same relationship which is treated as a whole entity. In computers, characters are organised in units of storage known as either the word or the byte.

A word is a group of 4 consecutive bytes i.e. 16 bits. A word is divided into two – Double word and Quad word. A doubleword is made up of two words which is equal to 4 bytes i.e. 32 bits, while the quadword is made up of 4 words which is equal to 8 bytes i.e. 64 bits.

A computer word is a group of a fixed number of bytes which varies from computer to computer but is fixed for each computer. The length of a computer word is called word length, which is in the range of 1 byte to 64 bytes. It implies the number of its which can be handled like a single operation.