General Information Technology
Teacher's Instructional Manual
Grade 12

Department of Information Technology
Science and Technology Faculty
National Institute of Education
Sri Lanka

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Preface

Curriculum developers of the NIE were able to introduce Competency Based Learning and Teaching curricula for grades 6 and 10 in 2007 and were also able to extend it to 7, 8 and 11 progressively every year and even to GCE (A/L) classes in 2009. In the same manner syllabi and Teacher's Instructional Manuals for grades 12 and 13 for different subjects with competencies and competency levels that should be developed in students are presented descriptively. Information given on each subject will immensely help the teachers to prepare for the Learning – Teaching situations.

I would like to mention that curriculum developers have followed a different approach when preparing Teacher's Instructional Manuals for Advanced Level subjects when compared to the approaches they followed in preparing Junior Secondary and Senior Secondary curricula . (Grades 10,11)

In grades 6,7,8, 9, 10 and 11 teachers were oriented to a given format as to how they should handle the subject matter in the Learning – Teaching process, but in designing AL syllabi and Teacher's Instructional Manuals freedom is given to the teachers to work as they wish.

At this level we expect teachers to use a suitable learning method from the suggested learning methods given in the Teacher's Instructional Manuals to develop competencies and competency levels relevant to each lesson or lesson unit.

Whatever the learning approach the teacher uses it should be done effectively and satisfactorily to realize the expected competencies and competency levels.

I would like to note that the decision to give this freedom is taken, considering the importance of GCE (A/L) examinations and the sensitivity of other stakeholders who are in the education system to the Advanced Level examination. I hope that this Teacher's Instructional Manual would be of great help to teachers.

I hope the information, methods and instructions given in this Teacher's Instructional Manual will provide proper guidance to teachers to awaken the minds of our students.

Professor Lal Perera
Director General
National Institute of Education

Foreword

Action taken over long years of the past to retain the known and learn the predetermined has made us little able today even to construct what is. The first curriculum reform of the new millennium that comes to being with a drastic change in the learning-teaching process in secondary education attempts to overcome this inability while bringing about a set of worthy citizens who are capable of revising the known, exploring the undetermined and constructing what might be.

If you are a teacher teaching this subject or any other subject in grades 6 to 11, it will not be difficult for you to align yourself with the new learning-teaching approaches that are recommended in a considerable way for the GCE (A/L) as well. This reform calls the teacher to identify competency levels under each competency and plan activities to achieve them. The teachers entering the new role of transformation should understand that the procedures which emphasize the teacher in the learning-teaching process are of limited use for the present and that it is more meaningful to get children learn co-operatively sharing their experiences. This situation, however, requires the teachers to provide a new direction for their teaching by selecting new learning–teaching methods that emphasize the student over the teacher.

If you study the Teachers' Instructional Guides (TIGs) prepared by the National Institute of Education for Mathematics, Science, Health & Physical Education, Technology and Commerce Subjects of grades 6 to 11, you certainly will be able to acquire a good understanding on the student-centred, competency based and activity- oriented approaches we have recommended for learning and teaching. The activities presented in these Guides attempt to bring learning, teaching and evaluation to the same platform while helping teachers adopt co-operative learning techniques on the basis of the 5E Model.

Considering the need to establish an innovative teaching force we have selected just a few activities from the relevant activity continuum to be incorporated in the TIGs. Yet you have the freedom to plan your own activities to suit the subject and class requirements by studying the exemplar activities in the Guides and improving your understanding on the principles underlying the reform. The activities incorporated in this TIG, provide you with four types of information. At the beginning of each activity you come across the final outcome that the children are expected to achieve through the activity. This learning outcome named as 'Competency' is broad and long-term. The competency level stated next highlight one of the number of abilities that the children have to develop to realize the competency. All this reveals that the competency levels are more specific and of a shorter-term when compared to the relevant competencies.

The next section of the Guide presents a list of behaviours that the teacher is expected to observe at the end of each activity. To facilitate the task of both the teacher and the students an attempt has been made to limit the number of such behaviours to five. These behaviours referred to as learning outcomes are more specific than the competency level. They include three abilities derived from the subject and two derived from the learning teaching process. Out of the three subject-related abilities that are listed in an order of difficulty, the teacher has to direct the children to realize at least the first two, preferably by involving them in an exploration. The next section of the activity presents what the teacher has to do to engage the children for the exploration. Although the implementation of each and every activity starts with this step of engagement, the teachers should realize that activity planning should begin with the exploration, which is the second 'E' of the 5E Model.

Instructions for the group exploration form the next section of the exemplar activities. The teacher has to plan these instructions in such a way to allow different groups studying different facets of the same problem to reach the expected ends through a variety of learning-teaching methods. For this, the teacher can select either Inquiry-based Learning carried out through a series of questions or Experiential Learning where children attempt to learn by doing. It is also the responsibility of the GCE (A/L) teacher to get the children use the knowledge they acquire likewise to solve problems that are specific to the subject under concern or that run across a number of subjects of the curriculum.

It is meaningful to plan such problem-based learning on the basis of real-life situations. For this you can select dilemmas, hypothetical situations, analogies or primary sources. Some techniques that can be used for the exploration are reading, collecting and managing information, reflection, observation, discussion, formulation and testing of hypotheses, testing predictions, preparing questions and answers, simulation, problem solving and aesthetic activities such as drawing or composing. There is room here even for memorization although it is considered as a form of mechanical learning.

Rather than depending on the knowledge available to the teacher, the students explore in small groups to construct their own knowledge and meaning. They interact with others in the group to learn from peers and improve the quality of their exploration findings. All this works successfully only if the teacher is capable of providing the students with the reading material and other inputs they are in need of. The teacher also has to support student learning throughout the learning process by moving from one group to the other. The discovery method that is prominent in this type of learning, however, is a guided discovery rather than a free discovery. There is no doubt that students learning likewise with instructional scaffolding both by the teacher and the peers will acquire a whole lot of worthwhile experiences, which they will find useful in life.

Explanation follows the above stage of exploration. The small groups get ready to make innovative, team presentations on their findings. The teacher has to encourage the children to select novel methods for the presentations and share the responsibility for the presentation with other members of the group. In the next step of elaboration, the children get the opportunity to clarify the unclear, correct the incorrect, and fill any gaps that they have left. They also can go beyond the known to present new ideas. The activities end with a brief lecture made by the teacher. The teacher moving to the transmission role at this point has to cover all the important points that the syllabus has prescribed for the competency level. The last section of the Activity Plan guides the teacher in this compulsory final elaboration.

To overcome many problems in General Education, the National Institute of Education has taken steps to move teachers to their new role of transformation. This role starts with a transaction that gets extended to a student exploration, a series of student explanations and elaborations, and a final elaboration by the teacher. The learning that takes place here with student involvement has replaced the teacher dominated teaching of the past. The students use reading material and other quality inputs to involve in explorations. Joyful learning thus coming to the fore encourage students to attend school daily, develop a number of competencies that they find useful in future work and life, and prepare for nation building by developing the much needed thinking skills, social skills and personal skills. For the success of all this, an examination system that evaluates the ability of students to face real-life challenges should replace the existing system that focuses mainly on the knowledge that students have acquired by memorizing answers to model questions.

The twofold, meaningful evaluation that runs through the activities is the prominent feature of this learning-teaching process. Even in the first step of engagement, the teacher has the opportunity to evaluate the prior learning acquired by students. The expert teacher, however, has to use the evaluation to strengthen the exploration, explanation and elaboration stages of each activity. A number of steps have already been taken at the national level to improve evaluation practices in general education. The written tests have been minimised to safeguard the real nature of school-based assessments(SBA). A compulsory question is recommended for the term tests on SBA to gain recognition for the same. Authentic Evaluations have been introduced to ensure real outcomes of learning. To open the doors for a new Sri Lanka, it is the co-ordinated responsibility of all citizens of the country to thrive for the success of this new programme with sound instructional leadership and quality assurance by those responsible for management.

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Assistant Director General (Curriculum Development)
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Competency 1 : **Explores the computer and its potential to reap timely benefits**

Competency Level 1.1 : **Explores the evolution of the computer in terms of its major stages**

Duration : One period

Learning Outcomes
- Names the electronic components pertaining to the respective computer generations.
- Accepts the need to study the past and the present to be prepared for the future.
- Traces the evolution of the computer in terms of its major generations.

Points to clarify subject matter:
- Computers can be categorized into five generations based on the technology used to build the machine.
- The evolution of the computer rests basically on the development of its electronic components as follows.
  - First generation - Vacuum tube
  - Second generation - Transistor
  - Third generation - Integrated Circuit (IC)
  - Fourth generation– Very Large Scale Integrated Circuit (VLSI), Microprocessor
  - Fifth generation (Future)- VLSI, superconductors
- The size, power consumption and heat generation are a few computer aspects that have decreased over the generations.
- Processing speed and performance are features that have increased over the years.

Reading Material

The Five Generations of Computers

The history of computer development is often referred to in reference to the different generations of computing devices. Each generation of computer is characterized by a major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful and more efficient and reliable devices. Read about each generation and the developments that led to the current devices that we use today.

First Generation

The first generation of computers took place during the mid 1940s to the late 1950s. The first computers used vacuum tubes (Figure 1.1.1) for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on machine language to perform operations, and they could only solve one problem at a time. Input was based on punched cards and paper tape, and output was displayed on printouts. The UNIVAC and ENIAC computers are examples of first-generation computing devices.

Figure 1.1.1

UNIVAC Computer
Figure 1.1.2
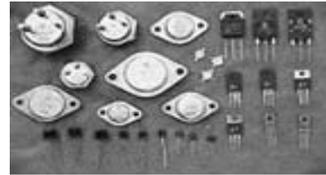
Transistors
Figure 1.1.3

The UNIVAC (Figure 1.1.2)was the first commercial computer delivered to a business client, the U.S. Census Bureau in 1951.

Second Generation

The second generation of computers took place during the late 1950s to mid 1960s. Transistors (Figure 1.1.3)replaced vacuum tubes and ushered in the second generation of computers. The transistor was invented in 1947 but did not see widespread use in computers until the late 50s. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a vast improvement over the vacuum tube.

Second-generation computers (Figure 1.1.4)still relied on punched cards(Figure 1.1.5) for input and printouts for output. Second-generation computers moved from cryptic binary machine language to symbolic, or assembly languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. These were also the first computers that stored their instructions in their memory, which moved from a magnetic drum to magnetic core technology.

Second Generation Computer
Figure 1.1.4

A Punch Card
Figure 1.1.5

The first computers of this generation were developed for the atomic energy industry.

Third Generation

The third generation of computers began during the mid 1960s and lasted until the mid 1970s. The development of the integrated circuit (IC) (Figure 1.1.6)was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers. Instead of punched cards and printouts, users interacted with third generation computers through keyboards and monitors and interfaced

First Integrated Circuit
Figure 1.1.6

with an operating system, which allowed the device to run many different applications at one time with a central program that monitored the memory. Computers for the first time became accessible to a mass audience because they were smaller and cheaper than their predecessors.

Fourth Generation

Presently, computers are in their fourth generation and it began during late 1970s. The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip (Very Large Scale Integrated Circuits (VLSI)). What in the first generation filled an entire room could now fit in the palm of the hand. The Intel 4004 chip, (Figure 1.1.7)developed in 1971, located all the components of the computer - from the central processing unit (CPU) and memory to input/output controls - on a single chip. In 1981, IBM introduced its first computer for the home user, and in 1984 Apple introduced the Macintosh. Microprocessors also moved out of the area of desktop computers and into many areas of life as more and more everyday products began to use microprocessors. As these small computers became more powerful, they could be linked together to form networks, which eventually led to the development of the Internet. Fourth generation computers also saw the development of graphical user interfaces (GUI), the mouse and handheld devices.
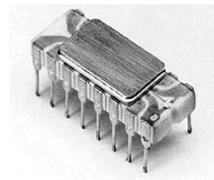
Intell 4004 Microprocessor

Figure 1.1.7

Fifth Generation

Fifth generation of computers belong to present and beyond.The use of parallel processing and superconductors is helping to make intelligence a reality. Parallel processing is the simultaneous use of more than one CPU to execute a program. Quantum computation and molecular and nanotechnology will radically change the face of computers in years to come. Computers with these technologies, certain calculations can be performed exponentially faster than conventional computers. The goal of fifth-generation computing is to develop devices that respond to natural language input and are capable of learning and self-organization.

Competency Level 1.2 **:** **Uses basic block diagrams to demonstrate the computer system**

Duration **:** Two periods

Learning Outcomes :

- Describes the basic block diagram of the computer system
- Accepts that each part of the block diagram performs a specific task.
- Draws block diagrams with flow path.

Points to clarify subject matter:

- The process of entering data and instructions into the computer system is called Input.
- Output is the result of processed data
- Input devices are used to input data to the computer.
- Output devices are used to output information.
- The programs and data must be in the main memory to be used by the Central Processing Unit (CPU).
- Secondary or auxiliary storage devices are used to store large volumes of information permanently.
- The CPU consists of two parts - Arithmatic & Logical Unit (ALU) and Control Unit (CU)
- The CPU performs the majority of calculations and controls the operation of a computer.
- The computer takes Input from the user, process them according to given instructions and outputs the result.
- Modern parallel computers are different from Von Neumann Architecture.

Reading Material

Considering the functions performed by the various components, a computer can be represented as a collection of logical components as in the following figure. The main hardware components of a modern computer system are the central processing unit (CPU), the main memory, the secondary storage and the input, output devices.
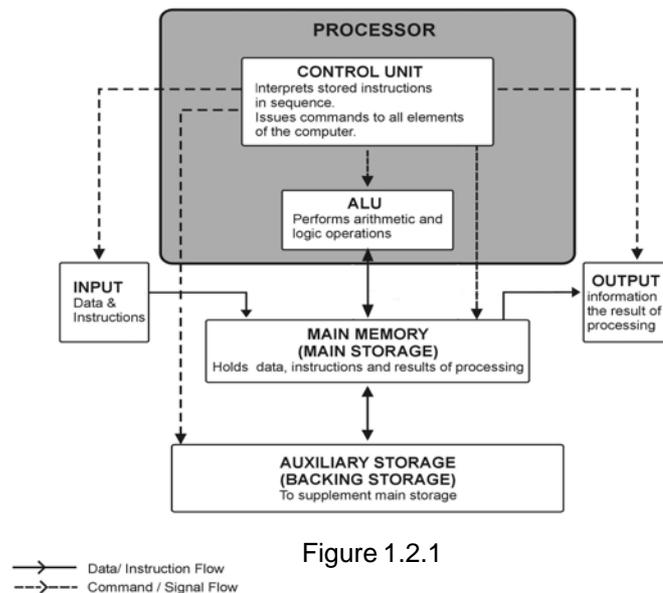
Figure 1.2.1

Computer Block Diagram (Figure 1.2.1) consist of the following parts:

- o Control unit
- o ALU
- o Main Memory
- o Auxiliary/Secondary Storage
- o Input and Output

Central Processing Unit (CPU)

The central processing unit performs the majority of calculations and controls the operation of a computer. CPUs are rated by the speed at which they can carry out instructions. The speed of a CPU is measured in Megahertz (MHz), and is also known as the clock speed. Different manufacturers make CPUs today. Some of these popular CPUs available are the Intel,(Figure 1.2.2) AMD, Cyrix and Motorola. The CPU consists of two parts: the control unit (CU) and the arithmetic and logic unit (ALU).

Figure 1.2.2

- • **Control Unit (CU)**

    The control unit controls and directs the operation of the entire computer system. Although it does not perform any actual processing on the data, the control unit acts as the central nervous system for the other components of the computer by generating clock pulses.

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

  The Arithmetic-Logic unit performs arithmetic operations such as addition, subtraction, multiplication and division on data. It also performs logical operations such as AND, OR which involve comparison of data.

Main Memory (Random Access Memory – RAM)

The main memory is the only large storage area that the CPU can access directly. The memory of a computer is measured in Megabytes today. The programs and data must be in the main memory to be used by the CPU. The main memory or RAM is the computer's short-term memory that temporarily holds data and instructions, which will be needed shortly by the CPU. Data and instructions can be stored and retrieved from anywhere in the RAM, and the time taken for such operations is approximately the same irrespective of the locations they are stored in the RAM. RAM is volatile, which means that it loses its data when the computerp power is turned off. RAM is supplied in modules; (Figure 1.2.3) small circuit boards which can be plugged into the motherboard in special sockets to upgrade the computer.

Figure 1.2.3

Auxiliary Storage

Secondary or auxiliary storage devices are used to store large volumes of information more permanently. There are many types of secondary storage devices and hard disk is one popular device for secondary storage.

Hard Disks

A hard disk drive is a device housed inside the computer on which data is stored for later retrieval. Computers have at least one hard disk. Hard disks are considered the most reliable method of storage. Hard disks use magnetic medium to hold data. Hard disk storage capacities are measured in gigabytes today. The speed of a hard drive is measured in terms of average access time: the speed at which the hard drive finds data. The average access time is measured in milliseconds (1/1000 of a second).

The other Secondary Storage devices are floppy disk, flash, tapes, CD /DVD etc.

The Input Function:

This is the process of entering data and instructions into the computer system. The computer takes raw data as an input and performs some processing giving out processed data based on the instruction given to the computer. Devices used to input data and instructions into the computer are called input devices. The keyboard and the mouse are used as the most common input devices.

The Output Function:

This is the process of producing results from data to get useful information. Similarly, the output produced by the computer after processing must also be kept inside the computer before being given out in human readable form.The output is also stored inside the computer for further processing. Devices used to output information are called output devices. The disply monitor and printer are used as the most common output devices.

Competency Level 1.3 : **Uses number systems to represent data in computer systems**

Duration : One period

Learning outcomes:

- Names the number system and describes them.
- Accepts the value of number systems in representing the same data in various ways.
- Denotes decimal numbers according to the given number system.
- Demonstrates ability to represent information in different forms

Points to clarify subject matter:

- There are four number systems
  - o Decimal Number System
  - o Binary Number System
  - o Octal Number System
  - o Hexadecimal Number System
- Decimal Number System
  - o Base is ten.
  - o Consists of ten digits.
  - o Its place values are powers of ten.
- Binary Number System
  - o Base is two.
  - o Consists of two digits.
  - o Its place values are powers of two.
- Octal Number System
  - o Base is eight
  - o Consists of eight digits.
  - o Its place values are powers of eight.
- Hexadecimal Number System
  - o Base is sixteen
  - o Consists of sixteen digits.
  - o Its place values are powers of sixteen.

The Computer uses the binary number system to represent

- anything.
- Other number systems are used in computing to represent long binary numbers to ensure that they are easily understood.

Reading Material:

Use the counting frame to denote the number 125.

$$10^3 \quad 10^2 \quad 10^1 \quad 10^0$$
$$1000 \quad 100 \quad 10 \quad 1$$

Place Value

Digits

Decimal Number 125

Digits			Place Value	
5	x	1	(10^0)	= 5
2	x	10	(10^1)	= 20
1	x	100	(10^2)	= 100
				125
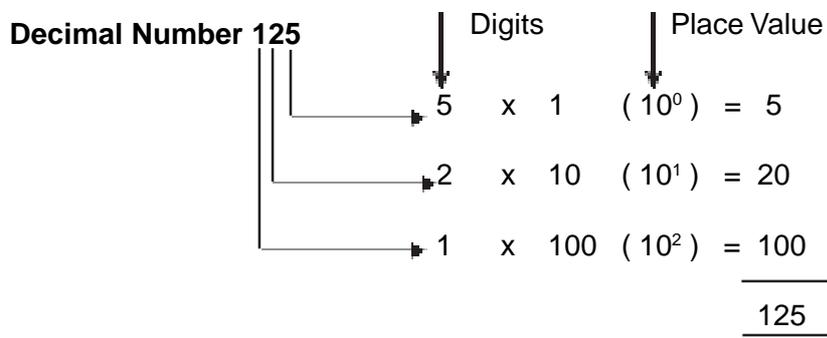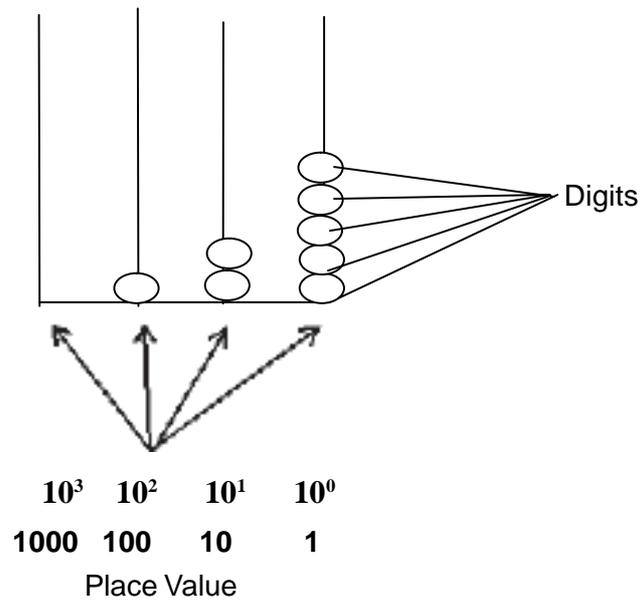
All decimal numbers can be represented as above.

Base Value of the decimal number system is 10.

Digits of the decimal number are 0,1,2,3,4,5,6,7,8,9

Place Values are 10^3, 10^2, 10^1, 10^0 or 1000, 100, 10, 1

8

Competency Level 1.4 :   Converts Decimal numbers to Binary and vice versa

Duration   **:**   One period

Learning Outcomes:

- Describes the methods used in converting binary numbers to decimal and vise versa.
- Accepts the need to convert numbers in the decimal number system to the binary number system, in computing.
- Converts decimal numbers to binary and vise versa.
- Presents ideas with confidence.
- Demonstrates ability to represent information in different forms.

Points to clarify subject matter

- A set of rules have to be followed in converting a number from one system to another.
- A standard procedure is available to present the digits of the converted number.

Reading Material

Number Conversion

Decimal to Binary

Division by two with remainder

1. let's convert the decimal number 156_{10} to binary. Write the decimal number as the dividend inside an upside-down "long division" grid. Write the base of the destination system (in our case, "2" for binary) as the divisor outside the curve of the division grid.

   2⟌156

2. Write the integer answer (quotient) under the long division grid, and write the reminader (0 or 1) to the right of the dividend.

   2⟌156   0

     78

3. Continue downwards, dividing each new quotient by two and writing the remainders to the right of each dividend. Stop when the quotient is 1.

2	156	0
2	78	0
2	39	1
2	19	1
2	9	1
2	4	0
2	2	0
	1	

4. Starting with the bottom 1, read the sequence of 1's and 0's upwards to the top. You should have 10011100. This is the binary equivalent of the decimal number 156. Or, written with base subscripts: $156_{10} = 10011100_2$

Binary to Decimal

1. let's convert the binary number 10011011_2 to decimal. List the powers of two from right to left. Start at 2^0, evaluating it as "1". Increment the exponent by one for each power. Stop when the amount of elements in the list is equal to the amount of digits in the binary number. The example number, 10011011, has eight digits, so the list, to eight elements, would look like this: 128, 64, 32, 16, 8, 4, 2, 1

2. Write the binary number below the list.

128	64	32	16	8	4	2	1
1	0	0	1	1	0	1	1

3. Move through each digit of the binary number. If the digit is a 1, write its corresponding power of two below the line, under the digit. If the digit is a 0, write a 0 below the line, under the digit.

128	64	32	16	8	4	2	1
1	0	0	1	1	0	1	1
128	0	0	16	8	0	2	1

Add the numbers written below the line. The sum should be 155.
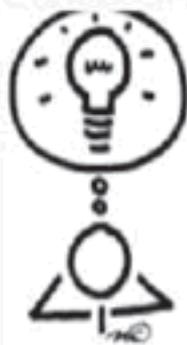
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency Level 1.5   :   Draws truth tables for logic gates

Duration   :   One period

Learning outcomes:

- Names and describes the basic logical operations
- Accepts the need to combine different operations appropriately in designing simple circuits to meet user needs
- Develops truth tables using different input combinations to arrive at the desired output
- Demonstrates ability to think logically

Learning – Teaching Process:

Engagement **:**
- Expose the two circuits shown below (Figure 1.5.1 and Figure 1.5.2) or demonstrate computer simulations for two circuits designed with VLab Electricity (Figure1.5.3) software to the class.
- Get students to discuss how the bulb lights up in relation to the on / off positions of the switches.
- Conduct a discussion to highlight the following.
    - The two diagrams represent the two types of circuits -parallel and series
    - In series circuits the bulb lights only if switches A and B are in "on" position
    - In parallel circuits the bulb lights when either switch A or B or both A and B are in the "on" position:
    - These two circuits illustrate the two logical operations in computers
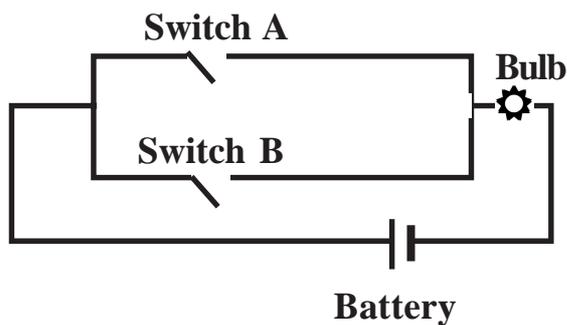
Figure 1.5.1
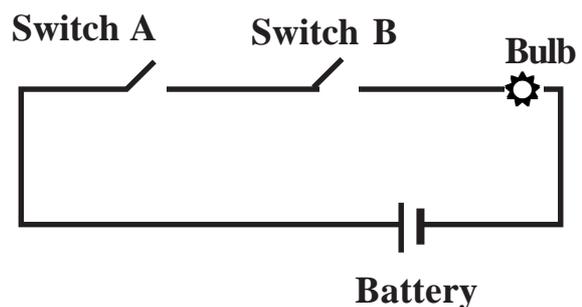
Figure 1.5.2
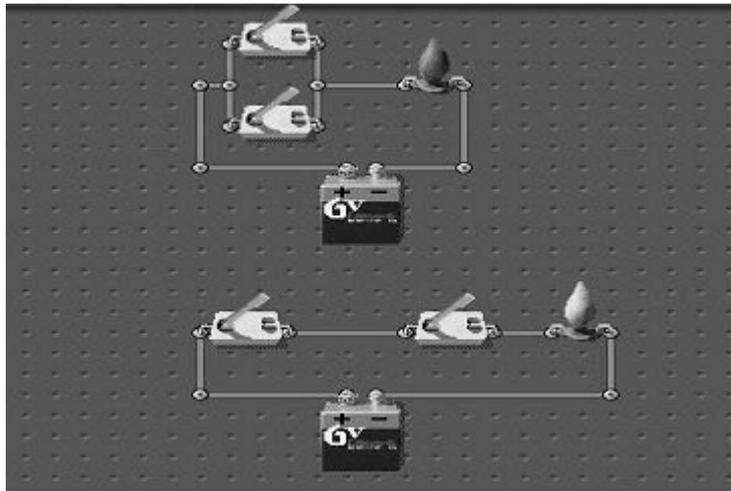
Figure 1.5.3

Instructions suggested for Learning:

Let's draw truth tables for basic logic operators

- Go through the reading material given and study the basic logic gates and their truth tables
- Write down the important points related to logic operations
- Identify the logic operations required to complete the one of the following truth tables (Figurers 1.5.4,1.5.5.,1.5.6.) assigned to your group.
- Design logic circuit equivalent to the truth table assigned to your group by using MM Logic software (freely availabal at www.softronix.com /download /mmlogic14.exe) to verify your answer.
- Be prepared to present your findings to whole class at the plenary session

A	B	C	A'	A'.B	B+C	(A'.B).(B+C)
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

Figure 1.5.4:Truth Table 1

A	B	C	B'	A+B'	B.C	(A+B').(B.C)
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

Figure 1.5.5:Truth Table 2

A	B	C	C'	A.C'	B.C	(A.C')+(B.C)
0	0	0				
0	0	1				
0	1	0				
0	1	1				
1	0	0				
1	0	1				
1	1	0				
1	1	1				

Figure 1.5.6:Truth Table 3

Points to clarify subject matter:

- Get the groups to present their findings.

- Request the presenters themselves to fill in any gaps they have left.

- Invite constructive comments from the other groups.

- Conclude the session by highlighting the following:
  - The AND operation gives an output 1 only if all the inputs are 1. The output will be 0 if any one of the inputs is 0.
  - The OR operation gives the output 1 if any input is one.
  - In an OR operation, If all the inputs are 0 then the output will be 0.
  - The NOT operation gives the inverse of the input, that is, if the input is 0, the output is 1 and *vice versa*.
  - A Truth table is a graphical representation, which shows how a logic circuit responds to various combinations of inputs using 1 for true and 0 for false.
  - In a truth table if there are two inputs there will be four combinations and if there are three inputs there will be eight combinations.
  - MMLogic software can be used to verify answers

Reading Material:

Truth Tables

A truth table shows how a logic circuit's output responds to various combinations of the inputs, using logic 1 for true and logic 0 for false. All permutations of the inputs are listed on the left, and the output of the circuit is listed on the right. The desired output can be achieved by a combination of logic gates.

Truth table for OR operation between two variables (Figure 1.5.7)

A	B	A+B
0	0	0
0	1	1
1	0	1
1	1	1

Figure 1.5.7

Truth table for AND operation between two variables (Figure 1.5.8)

A	B	A*B
0	0	0
0	1	0
1	0	0
1	1	1

Figure 1.5.8

The Gate

Logic gates are some form of electronic circuits. They have one or more inputs and a single output. All these inputs respond to binary values 0,1 and output the signal depending on the logical function the gate is designed for. There are 3 basic gates and they represent logical AND, OR and NOT functions.

OR Operation

When either input A OR B is 1, the output X is 1.
The expression X = A + B is read "X equals A OR B". (Figure 1.5.9)
The + sign stands for the OR operation, not for ordinary addition.
The OR operation produces a result of 1 when any of the input variable is 1.
The OR operation produces a result of 0 only when all the input variables are 0.

A	B	X = A+B
0	0	0
0	1	1
1	0	1
1	1	1

Figure 1.5.9

AND Operation

The expression X = A * B is read "X equals A AND B". **(**Figure 1.5.10) The multiplication sign stands for the AND operation, the same as for ordinary multiplication of 1s and 0s.
The AND operation produces the result 1 only for the single case where all the input variables are 1.

A	B	X = A*B
0	0	0
0	1	0
.	0	0
.	1	1

Figure 1.5.10

NOT Operation

The NOT operation is unlike the OR and AND operations in that it can be performed on a single input variable. For example, if the variable A is subjected to the NOT operation, the result x can be expressed as $x = A'$ where the prime (') represents the NOT operation.
This expression is read as
"x equals NOT A "or "x equals the inverse of A "or "x equals the complement of A".
Each of these is in common usage and all indicate that the logic value of $x = A'$ is opposite to the logic value of A.

The truth table of the NOT operation is shown as (Figure 1.5.11):

A	X = A'
0	1
1	0

Figure 1.5.11

1' = 0 because NOT 1 is 0
0' = 1 because NOT 0 is 1
The NOT operation is also referred to as the inversion or complementation, and these terms are used interchangeably.

Circuit symbols for Basic Logic Gates
The following symbols (Figure 1.5.12) are used to identify the Basic gates discussed above

NOT gate   AND gate   OR gate
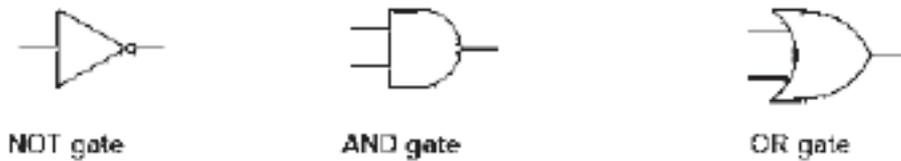
Figure 1.5.12

Logic Circuits (Figure 1.5.13) to be designed by using MM Logic software (Only for teachers' perusal).

Figure 1.5.13

15
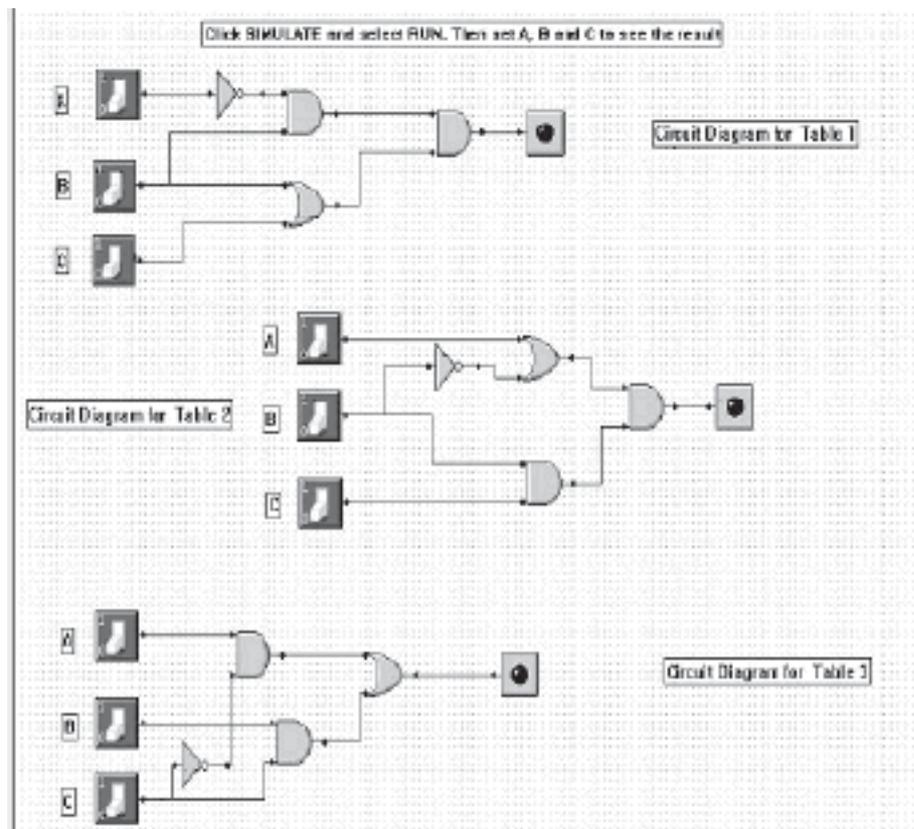
Competency 1.6 **:** **Classifies computers in terms of their characteristics**

Duration **:** Two periods

Learning Outcomes:

- Names different methods used to classify computer systems and describe them.
- Accepts the need to use a variety of methods to classify computers.
- Classifies computers on the basis of the number of methods.
- Expresses ones own ideas in different forms.

Points to clarify subject matter:

- Computers can be classified according to .
  - Computational method (Type)
  - Size and Capability
  - Purpose
- According to logic, computers can be classified as follows
  - Digital computers
  - Analog computers
  - Hybrid computers
- According to size and capability, computers can be classified as follows.
  - Super computers
  - Mainframe computers
  - Mini computers
  - Micro computers

    - Personal Computers

    - Laptop Computers
    - Palmtop Computers
- According to purpose, computers can be classified as follows.
  - General purpose computers

  - Special purpose computers

Reading Material

Classification of Computers

Computers can be classified as follows:
1. Computational method (Type)
2. Size and Capability.
3. Purpose

Classification based on Computational method
Based on the way a system performs computations, a computer can be classified as follows:
- Digital
- Analog
- Hybrid

Digital Computer

A digital computer can count and accept numbers and letters through various input devices. The input devices convert data into electronic pulses, and perform arithmetical operations on numbers in discrete form. In addition to performing arithmetical operations, they are also capable of:
1. Storing data for processing
2. Performing logical operations
3. Editing or deleting the input data

One of the main advantages of the use of digital computers is that any desired level of accuracy can be achieved by considering as many decimal places as are necessary and hence are most suitable for business applications. The main disadvantage is their high cost, even after regular reductions in price and the complexity in programming.

Example
To calculate the distance traveled by a car in a particular time interval, you might take the diameter of the tyre to calculate the periphery, take into consideration the number of revolutions of the wheel per minute, take the time in minutes and multiply them all to get the distance moved. This is called digital calculation. A computer using this principle of digital calculations will be called a digital computer.

Analog Computer
Analog computers (Figure 1.6.1)process data input in a continuous form. Data such as voltage, resistance or temperature are represented in the computer as a continuous, unbroken flow of information, as in engineering and scientific applications, where quantities to be processed exists as waveforms of continually rising and falling voltages, pressure and so on. As the measurements in analog computer are carried out by a few single purpose devices, the analog computer offers low cost and ease of programming. The main disadvantage of an analog computer is the accuracy factor. Hence it is not suitable for processing business data.

Figure 1.6.1

Example
If you see the principle of the milometer in a car it does not work on the same principle as explained in digital calculation. The rotation of the car wheels move some gears, the movement is transmitted to the meter through a flexible shaft. The meter itself contains some gears/ wheels marked with numbers and is calibrated to give the exact distance traveled in meter/kilometers. There is no calculation involved by numbers and the result is obtained by physical phenomenon. This method of calculation is called the Analog method. A computer using the analog method of calculation will be termed an analog computer.

Hybrid Computer

A computer can also be built using some parts employing digital computations and some parts based on Analog principles. Such computers are called Hybrid Computers.(Figure 1.6.2)

Example

In Process Control Computer Systems, the input comes from devices like pressure gauge, thermometers, meters etc. The pressure control system uses analog methods in the relevant areas. The inputs from analog devices are sent to a digital computation unit that runs the mathematical model for controlling the process. These types of computers are called Hybrid because they use analog methodology in some parts and digital methodology in some others.

Figure 1.6.2

Classification of computers according to purpose

General purpose computers

The computers, which can be theoretically used for any type of application, are called general-purpose computers.

Special purpose computers

The computers, which are made and used for specific jobs like air traffic control systems. Controlling fuel in automobiles are called special purpose computers

Classification based on Size and Capability

On the basis of size and capability, the digital computer can be classified as:

- Super Computer
- Mainframe computer
- Mini Computer
- Micro Computer

Super Computer

These are the largest,fastest and most expensive computers available but are typically not used for commercial data processing. Instead, they are used in specialized areas as in defense, aircraft design, computer generated movies, weather research etc. The first super computer was the ILLIAC IV made by Burroughs. Other manufacters of supercomputer are CRAY, CDC, FUGITSU, NEC etc. A supercomputer CRAY-1 is considered the most powerful computer. The super computers CRAY-2 and CRAY-3 were developed by Seymore Cray. Supercomputers can process 64 bits or more at a time. Their processing speed ranges from

Figure 1.6.3

10,000 million instructions per sec (MIPS) to 1.2 billion instructions per sec. They can support 10,000 terminals at a time. They have huge numbers of storage and other devises connected to them. These are the most expensive computers (Figure 1.6.3)

Mainframes

Mainframes(Figure 1.6.4) were less powerful and cheaper than Super computers. However, they are big general purpose computers capable of handling all kinds of scientific and business applications. Mainframes can process several million instructions per second. More than 1000 remote terminals can be

supported by a Mainframe. Mainframes have large on-line secondary storage capacity. A number of different types of peripheral devices like magnetic tape drivers, hard disk drive, visual display units, plotters, printers and

Figure 1.6.4

telecommunication terminals can be attached to Mainframe computers. Mainframes, such as ES/9000 family of computers of the International Business Machines Corp. (IBM) are used for such applications as payroll computations, accounting, business transactions, information retrieval and airline seat reservations.

Mini Computers

This type of computer performs data processing activities in the same way as the Mainframe but on a smaller scale. The cost of minis were lower. As the name implies, a minicomputer is small compared to a Mainframe and may be called a scaled down Mainframe as the processor and the number of peripherals are physically smaller. A mini computer can typically support 10 to 12 terminals. The most popular Minicomputers or minis are Nova, Dec, PDP_II and IBM series.

Micro Computers

This is the smallest category of computers, consisting of a microprocessor and associated storage and input/output devices. These are also called Personal Computer (PC) systems. Microcomputers were first available for widespread use in the 1970's, when it became possible to put the entire circuitry of computers (CPU) in to a small silicon chip. There are various types of microcomputers available in the market today.

E.g. Personal Computer, Laptop Computer, Palmtop Computer.

Personal Computers (PC)

A Personal Computer is so named because it is designed for personal use. IBM, the foremost computer-manufacturing firm in the world, introduced the first PC named as IBM-PC. Personal computers are classified on the basis of size and portability. Personal computers that can be placed on top of a desk but are not very portable are called desktop computers. Portable computers are those personal computers that are light enough to be easily transported. Portable personal computers that are small enough to be set up on the lap of a user are called laptop computers; notebook computers are approximately the size of a book. Portable personal computers that can be put in a pocket are called pocket or palm-sized computers.

Laptop Computer

A laptop computer,(Figure 1.6.5) or simply laptop (also notebook computer or notebook), is a small portable computer. Laptops usually run on a single main battery or from an external AC/DC adapter which can charge the battery while also supplying power to the computer itself. Many computers also have a 3volt cell to run the clock and other processes in the event of a power failure.

Figure 1.6.5

Palmtop Computer

This is a small computerthat literally fits in your palm. Compared to full-size computers, palmtops are severely limited, but they are practical for certain functions such as phone books and calendars. Palmtops (Figure 1.6.6) that use a pen rather than a keyboard for input are often called hand-held computers or Personal Digital Assistants (PDAs).

Because of their small size, most palmtop computers do not include disk drives. They use. silicon memory cards.

Figure 1.6.6

Competency Level 1.7   :   Selects software to meet user needs

Duration   :   Two periods

Learning outcomes:

- Names software by type.
- Accepts the importance of operating and application software as tools for running the computer and meeting the needs of the user, respectively.
- Develops a classification scheme to indicate software types in a systematic manner.
- Uses graphics to simplify complex ideas.

Points to clarify subject matter

Conduct a Discussion to highlight the following:

- Software can be put into two major categories.

    o System Software

    o Application software

- System software can be grouped into

    o Operating System

    o Utility programs

- The most important software for a computer is the Operating System Software

- Without the operating system, a computer cannot function.

- There are two types of operating systems
    o Command line Operating System
    o Graphical User Interface (GUI) operating system

- Utility programs help manage and maintain computer resources

- Application software can be put into two major categories

    o Tailor Made Software - developed according to a specific requirement of a person or

       business

    o Off the Shelf (Packaged) software - software products that are ready-made and

       available for sale

Reading Material

Computer Software
Computer software is a colletion of programs required to perform a specific task. A task can include the retrieval, storage, or display of information, or the transformation of data from one form to another.

Software is of two types – System software and Application software

System software

is a generic term referring to any computer software which manages and controls the hardware so that application software can perform a task. It is an essential part of the computer system. An operating system is an obvious example.

If system software is stored on non-volatile (that remains their memory when power is turned off) storage such as integrated circuits, it is usually termed firmware.

Operating system and Utility programs are the two major categories of system software.

Operating System software

Operating system software can be classified into two major categories

Command-Line operating system

This operating system allows the user to type in commands to make the computer carry out task.

E.g. DOS, Unix

A Graphical User Interface operating system (GUI)

An operating system based on graphics (WIMP, Windows, Icons, Menus and Pointing devices) instead of text; uses a mouse as well as a keyboard as input devices. This is a user-friendly interface.

E.g. Windows XP, Vista, Mac OS, Fedora, Ubuntu

The operating system is the most important program that runs on a computer. Every computer must have an operating system to run other programs. It is the first program loaded into memory when the computer is turned on and brings life to the computer hardware. Without it, you cannot use your word processing software, spreadsheet software, or any other applications. The users can interact directly with the operating system through a user interface such as a command language or a graphical user interface (GUI).

Examples of Operating Systems

   Unix, Linux, Fedora, WindowsVista,

   Windows XP, Mac OS, Windows2000, Window95/98& DOS.

Operating systems perform basic tasks, (Figure 1.7.1)such as

- recognizing input from the keyboard
- sending output to the display screen
- keeping track of files and directories on the disk
- controlling peripheral devices such as disk drives and printers.

Figure 1.7.1

- It sends messages to each application or interactive user about the status of operation and any errors that may have occurred.
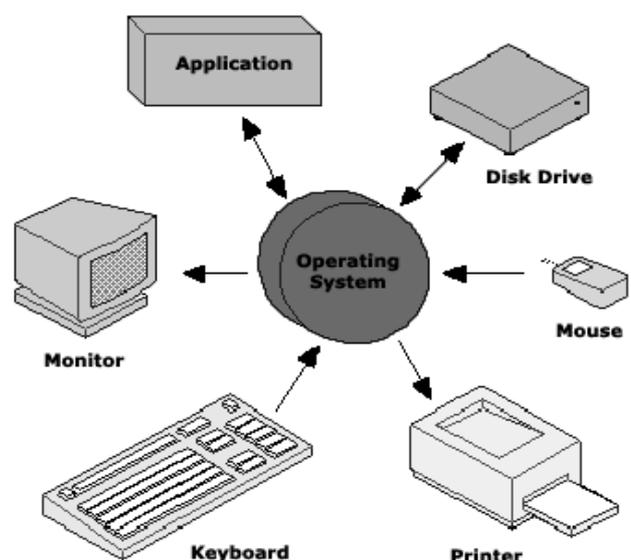
What are Utility Programs?

Utility programs help manage, maintain and control computer resources. These programs are available to help you with the day-to-day chores associated with personal computing and to keep your system running at peak performance.

Some examples of utility programs include:

- Backup software
- Scandisk
- Disk defragmenter
- Assemblers
- Compilers
- Virus Scanners

Backup software

Backup software assists you in making copies your files and even the entire computer hard drive. It is important for you to back up your files regularly. If you own a computer, you should backup your valuable data on your hard drive regularly.

Scandisk

Scandisk is a utility program provided with Windows computers. This program examines your disks to see if there are any potential problems on the disk, such as bad disk areas. Since disks are magnetic media, all disks, including your hard drive can be corrupted.

Disk Defragmenter

This type of software assists you in keep reorganizing your disk drives. After files are saved, deleted and resaved again, the disk can become uneven or fragmented. —available space is in small blocks located throughout the disk. Disk defragmenters gather those free spots and put them together to enable you to continue to save your data in the most efficient manner.

A Device driver

A Device driver, often called a driver for short, is a computer program that enables another program, typically, an operating system (e.g., Windows /Linux) to interact with a hardware device. A driver is essentially an instruction manual that provides the operating system with the information on how to control and communicate with a particular piece of hardware

Because of the diversity of modern hardware and operating systems, there are many ways in which drivers can be used. Drivers are used for interfacing with:

- Printers
- Video adapters
- Network cards
- Sound cards
- Modems
- Scanners

Virus Scanning Programs (Anti Virus Software)

A utility or software that searches a hard disk (storage media) for malicious codes (viruses) and removes any that are found. Most antivirus programs include an auto-update feature that enables the program to download profiles of new viruses so that it can check for the new viruses as soon as they are discovered.

Programming Tools or Programming Languages

A programming language is a program or application that software developers use to create, debug, or maintain other programs and applications.

E.g   **Pascal, Visual Basic, Java, C#**

Compiler

A *compiler* is a program that translates a source program written in a high-level programming language (such as C, Java, or VB) into machine code,all at once.

Assembler

A utility program called an assembler, is used to translate assembly language statements into the target computer's machine code.

Application software

Application software can be put into two major categories

1. **Tailor Made (In house software)**
   These are the software that have been developed according to the specific requirement of a person or a business
   E.g. Accounting System , library management system

2. **Off the Shelf (Packaged) software**
   These are the software products that are ready-made and available for sale, lease, or license, to the general public.

Application software allows a user to accomplish one or more specific tasks. Typical applications include office automation suites, business software, educational software, databases and computer games. Most application software have a graphical user interface (GUI). There are many application software types available in the market today. Here are a few examples.

Word Processing software

Word processing software or a word processor is used to create documents using a computer. A word processor enables you to create a document, store it electronically on a disk, display it on a screen, modify it by entering commands and characters from the keyboard, and print it on a printer.
E.g. OpenOffice.org Writer, MS-Word

Database management system

A collection of programs that enables you to store, modify, and extract information from a database.
E.g. MS Access, OpenOffice.org Base, Oracle, MySql,

Presentation software

A presentation program is a computer software package used to display information, normally in the form of a slide show. It typically includes three major functions: an editor that allows text to be inserted and formatted, a method for inserting and manipulating graphic images and a slide-show system to display the content.
E.g. MS-PowerPoint, OpenOffice.org Impress

Spreadsheet software

A spreadsheet, also known as a worksheet, contains rows and columns and is used to record and compare numerical or financial data.
Spreadsheet applications (sometimes referred to simply as *spreadsheets*) are computer programs that let you create and manipulate spreadsheets electronically. In a spreadsheet application, each value sits in a cell.
E.g. OpenOffice.org Calc, MS- Excel

Graphics design software

Graphic design software is a subclass of application software used for graphic design, multimedia development, specialized image development, general image editing or simply to access graphic files.
E.g. Adobe Photoshop, 3D Studio Max, Poser,GIMP, Inkspace

Desktop Publishing software (DTP software)

DTP software has become a tool for designers in the design and creation of professional-looking newsletters, magazines and brochures, complete with pictures, diagrams and color.

E.g. PageMaker, Corel Draw, Scribus

Medical software
Many medical devices that monitor or control patients are predominantly controlled by software.

Educational software
Educational software is computer software whose primary purpose is teaching or self-learning. It ranges from programs for pre-school children, which have a large entertainment component, to straightforward typing tutors and programs that teach foreign languages.
E.g. How the body works, Learn to speak English, GCSE (series) CDs, Encarta, Britannica,VLab Electricity, MMLogic

Computer-aided design (CAD) software

This type of software assist engineers, architects and other design professionals in their design work
E.g. AutoCad, CadStd

Competency Level 1.8 :   Selects Information Systems to meet user needs

Duration   :   One period

Learning Outcomes:
- Names and describes the methods of classifying information systems.
- Accepts the relevance of different information processing systems.
- Classifies information systems on the basis of relevant methods.
- Picks relevant information from the sources.

Points to clarify subject matter:
- Information systems can be classified in three ways as follows
  - Whether Manual or Automated
  - In terms of Functionality
  - Management Levels
- In manual information systems all data processing is done manually. and the following are vital items
  - Filing cabinets
  - Procedures
  - Papers
- The automated Information *system* is a single set of hardware, software, databases, telecommunications, people and procedures that are configured to collect, manipulate, store, and process data into information.
- According to functionality the information systems can be classified in to different tipes.The fllowing are some of the examples
  - Transaction Processing Systems (TPS)
  - Management Information Systems (MIS)

- o Decision Support Systems (DSS)
- o Executive Support Systems (ESS)
- o Expert Systems (ES)
- TPSs capture and process data on business transactions
- MIS facilitates managers and support effective decision-making by providing feedback. on daily operations
- DSS relates to the support of problem-specific decision-making
- (ESS) specifically serve top-level managers and executives in their strategic decision making process.
- ES captures the knowledge and reasoning of human experts and utilizes the same in decision-making..
- Management Levels
  - o Strategic
  - o Tactical
  - o Operational
- Strategic level is the top-level management in an organization viz, the chairman, board of directors etc., on corporate goals strategic decisions are taken here.
- The middle or tactical management level manipulates resources to meet the goals, and defines the detailed tasks to be implemented at operational level.
- The operational level carries out the detailed tasks defined by the middle management.

Reading material

Manual and Computer-based Information Systems

Manual information system:

In a manual information system, all data processing is done manually. Filing cabinets, (Figure 1.8.1) manual procedures and papers are vital components of a manual information system.

This is an example of a manual information system A student who is applying for a "Character Certificate" fills a form with relevant information. The form is submitted to the office along with the student record book. The Principal's office verifies the information in the form by checking the student's file in the filing cabinet. Then the character certificate is prepared and sent to the principal for his/her signature. Finally, the "Character Certificate" is given to the student.
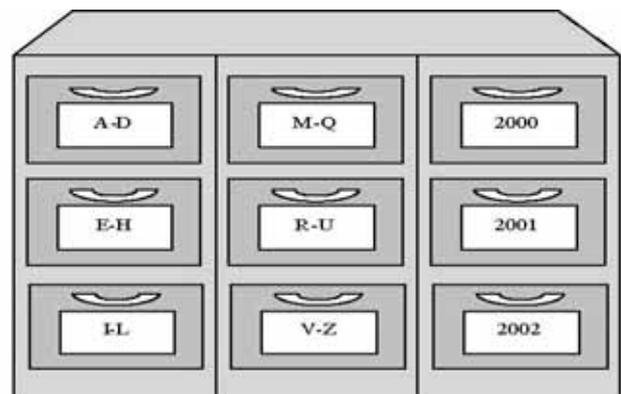

Figure 1.8.1

Computer-based information system:

A *computer-based information system* is a single set of hardware, software, databases, telecommunications, people and procedures that are organised to collect, manipulate, store, and process data into information. Let us look at each component in detail:

Hardware consists of computer equipment.

Software means computer programs

- **System software** that governs the basic computer operations such a start-up etc. For example, the Operating System

- **Application software** allows specific tasks to be accomplished. For example, Word Processing software enables us to create documents – letters, books, etc.

A database is an organized collection of data and information which plays an important part of a computer-based information system.

Telecommunications is the electronic transmission of signals and enable electronic communication. For example, the *Internet* is the world's largest computer network, which connects computers around the world.

People. This includes users, people who manage, run, program, and maintain the system. Users are persons, who use information systems to get results.

Procedures Procedures may include methods such as "how to perform a task by executing a particular program?" or policies such as "who can have access to the database and what data?"

A bank (Figure 1.8.2) has a head-office and many branches all over the country connected through computer network (telecommunications). The head office contains a *database* containing information on accounts, customers and transaction. Customers can access their account information from his/her branch. Customers, bank tellers, bank managers, bank's executives etc. are some who use the bank's CBIS. There are personnel who run, program, manage, and maintain the bank's CBIS which consists of the bank's IT department (such as database administrator, network administrators etc.). There are lots of *procedures*

Figure 1.8.2

in the bank (for example, a customer can access only his/her account information, a bank manager can approve a housing loan etc.).
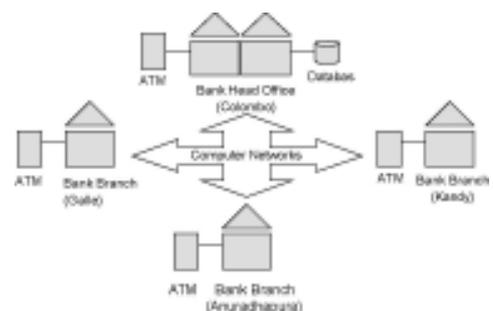
Types of Information Systems

There are different types of information systems providing information to people at different levels in the organization. First, we will discuss organizational structure and then describe the different types of information systems.

Organisational Structure

Traditionally, organizations have a hierarchical structure: the strategic level, the tactical level and the operational level. (Figure 1.8.3)
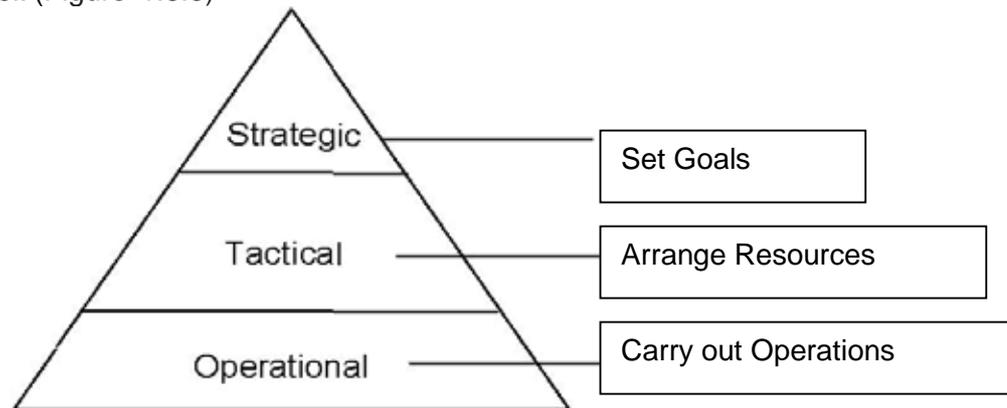
Figure 1.8.3

The strategic level includes the top-level management in an organization such as the chairman, board of directors etc. They make corporate goals and strategic decisions for an organization. The top-level management typically makes *strategic decisions*. The board of directors, chairman and other top-level management may decide to expand their activities and profits. These unstructured strategic decisions are rarely based on routine procedures, are complex in nature and involve the subjective judgment of the decision makers.

The middle or tactical management level must acquire and arrange the resources to meet the goals, and define the detailed tasks to be carried out at the operational level. These resources may include people, machinery, buildings, etc. needed to accomplish the goals. The information that middle managers need include review, summarization, and analysis of data to help plan and control operations and implement policy that have been formulated by upper management.

The personnel at the operational level carry out the detailed tasks defined by the middle management. Most decisions at this level require easily defined information that relates to the current status and activities within the basic business functions. This information is generally given to lower management in detailed reports. The decisions taken at this level are called structured decisions,.

Information System Types

Different levels of management require different types of information for their decision-making process. There are different types of information systems available towards different user needs. We can broadly classify some of the basic types of information systems as follows:

- Transaction Processing Systems (TPS)
- Management Information Systems (MIS)
- Decision Support Systems (DSS)
- Executive Information Systems (EIS)
- Expert Systems (ES)

The following figure (Figure 1.8.4) illustrates the focus areas of the different information systems.
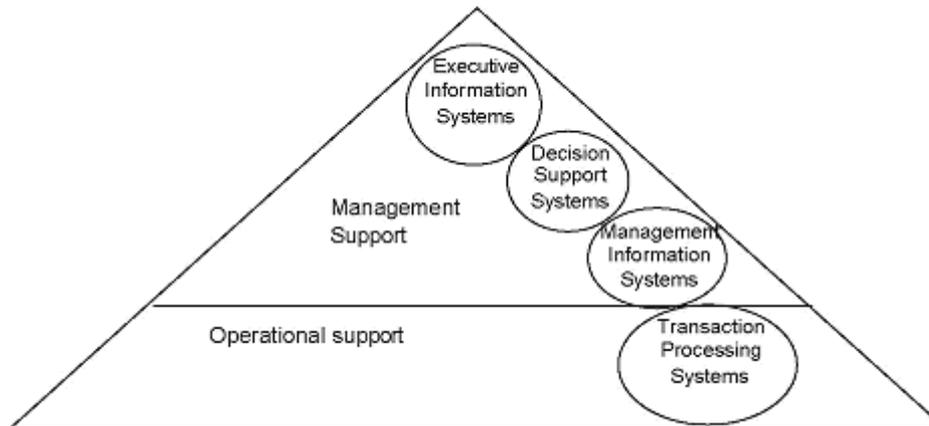
Figure 1.8.4

It is important to note that a single organization may have many different types of information systems. Let us consider each information system type in detail.

Transaction processing systems: (TPS) The Transaction Processing System*s* are a popular type of information system. Transaction processing systems capture and process data about business transactions. A TPS is focused at the operational level of a business. In our example of the bank, the banking system that maintains information about customers, accounts and financial transactions (such as withdrawals, deposits etc.) is a TPS. Many people at the operational level of the bank use the TPS. The lower-level management mainly uses the reports generated by TPS.

Management information systems (MIS): Provides managers with information and support for effective decision-making and provides feedback on daily operations.. Management information systems typically provide standard reports derived from information in transaction processing systems. These reports assist managers at the middle –level in their decision making process.

Decision support systems (DSS)**:** A DSS supports all aspects of problem-specific decision-making. It goes beyond the traditional MIS. It supports complex, unstructured and semi-structured decision-making. For instance, the management decides to expand business. A DSS may support find the best city or town to open new branches a DSS can help by suggesting alternatives and assist in the final decision-making. A DSS analyses the information already captured by TPSs and MISs in order to support unstructured and semi-structured decision-making at various levels. A DSS may also include data obtained from external sources as well.

Executive Information systems (EIS)**:** is a DSS specifically made for top-level managers and executives to support their strategic decision making process. EISs provide executives with internal information as well as information from external sources (such as research databases, news services etc.). EISs provide executives to view information in a user-friendly, customized manner that assist them in their decision-making process.

Expert systems: This belongs to the area known as Artificial Intelligence in computer science field. The focus of an expert system is to capture the knowledge and reasoning of a human expert in a particular field and utilizes this in decision-making in the respective field. Expert systems have been successfully utilized in different areas such as assisting medical diagnosis or credit evaluations etc.

Competency 2   :   Uses Information communication efficiently and

effectively in day-to-day life

Competency Level 2.1   :   Selects appropriate media for data communication

Duration   :   One period

Learning Outcomes:

- Describes the need for data communication.
- Explains how data is transmitted.
- Lists out the Communication media types and examples of each.
- Accepts the importance of networks to transmit information rapidly.

Points to clarify subject matter:

- There are two types of data transmission media

  o Guided media transmit data through specific physical pathways

      1.Copper wire passes electronic signals to transmit data.
        E.g. Twisted pair
              Coaxial cable

      2. Fiber optics transmit light waves

  o Unguided media uses some electromagnetic waves to transmit data. Electromagnetic

      waves don't need specific media.
          E.g.
    - Radio waves
    - Infrared waves
    - Microwaves
- Comparison of Communication media
- Advantages and disadvantages of communication media

Reading Material:

Data communication

Communication is conveying information from one place to another place. The path through which the communication takes place is called a communication channel or medium. Communication that is done with data is called data communication. In other words, communication of binary encoded data from one place to another is known as data communication.

E.g. When a key on the keyboard of the computer is pressed the device produces an electrical signal that represents the key's character to the computer. The transmission passes through a cable from the device to the computer and the signal for each individual character is a series of electrical pulses called a **pulse train**. 1 and 0 represents these respectively.

Transmission of electronic signals (analogue, digital)

Signal means an event, message or data structure transmitted between computational processes.

Analogue Signals

Analogue signals(Figure 2.1.1) are what we encounter every day of our life. Speech is an analogue signal using telephone line. In analogue signals, signal intensity varies smoothly over time. The public dial-up service supports analogue signals

Digital Signals

Digital signals (Figure 2.1.2) are the language of modern day computers. Digital signals comprise only two states. These are expressed as ON or OFF, 1 or 0 respectively.

- Light Switches: Either ON or OFF

- Doors: Either OPEN or CLOSED

In digital signals, signal intensity is constant for some period of time and then changes to another constant value. This transition takes place in a very short time. E.g. Binary coded speech (speech through the computer).
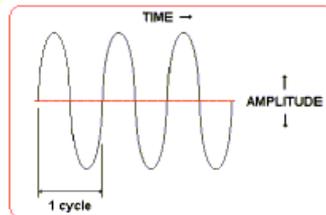
Figure 2.1.1
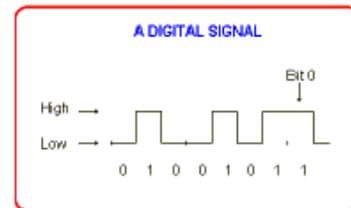
Figure 2.1.2

Data Transmission

Data transmission is the process of conveying data between two points by way of a communication medium. Data transmission requires a medium.

Transmission Media

Transmission media is what actually carries signals from one point to another. This may include copper wiring in the case of twisted pair cable or coaxial cable, or electronic waves in the case of microwave or satellite transmission.

There exist several types of transmission media
- Guided media / bounded media (wires/cables – copper, fiber optics)
- Unguided media / unbounded media (wireless – microwave/radio, satellite, mobile)

Bounded media confine the data to specific physical pathways. A medium such as copper wiring is referred to as bounded media because it holds electronic signals. Fiber optic cable is said to be bounded media as well because it holds light waves. Common examples of bounded media are wire and optical fiber cables. Cable TV uses bounded media.

Unbounded media transmit the data-carrying signal through space, independent of a cable. Other media that do not physically constrain signals are considered to be unbounded media. Broadcast radio and television are examples of unbounded media.

Guided media / bounded media

Twisted Pair

Twisted Pair (TP) means two wires twisted around one another. Two insulated copper wires in a regular spiral pattern as a single communication link. Twisted pair cabling is the current popular favorite for new LAN (Local Area Network) installations.

There are two types of Twisted pair according to transmission characteristics

- Shielded Twisted Pair (STP) (Figure 2.1.3)
- Unshielded Twisted Pair (UTP) (Figure 2.1.4) - UTP looks much like the wire used to wire voice telephones
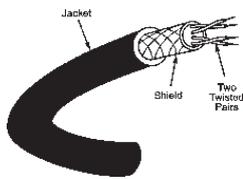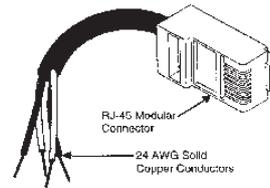
Figure 2.1.3

Figure 2.1.4

Coaxial Cable

As you can see in this diagram, (Figure 2.1.5) this cable is called coaxial (or *coax* for short) because two conductors share a common axis. coaxial cable is a two wire conductor. It has a single core, with an outer conductor that acts as a shield. The signal is transmitted on the inner core. The inner core and the outer core are separated by an insulator.
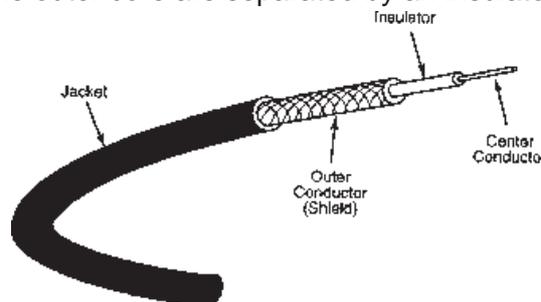
Figure 2.1.5

Fiber Optics

Fiber optic cables (Figure 2.1.6) utilize light waves to transmit data through a thin glass or plastic fiber. Which consists of hundreds of thin glass or plastic wires that transmit pulsation beams of light.
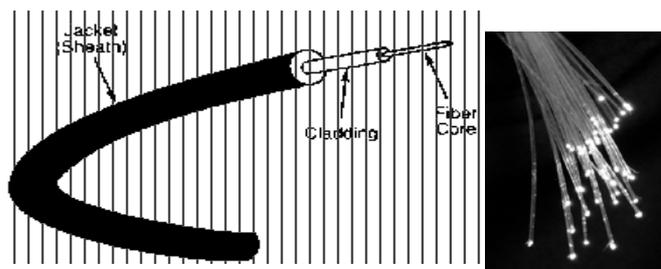
Figure 2.1.6

Cabling Summary

Is shown in following tables (Figure 2.1.7 & Figure 2.1.8)

Twisted Pair Cable	
Advantages	Disadvantages
1. Inexpensive	1.Sensitive to RFI and EMI RFI – Radio frequency interference EMI – Electromagnetic interference
2. Often available in existing phone system	2. Not as durable as coaxial
3. Well tested and easy to get	3. Doesn't support at high a speed as other media

Figure 2.1.7

Coaxial Cable	
Advantages	Disadvantages
1. Fairly resistant to RFI and EMI	1. Can be effected by strong interference
2. Supports faster data rates than TP	2. More costly than TP
3. More durable than TP	3. Bulkier and more rigid than TP

Fiber Optic Cable	
1. Highly secure	1. Extremely costly in product and service
2. Not affected by RFI and EMI	2. Complicated tools and methods for installation
3. Very durable	3. Complex to layout and design

Figure 2.1.8

Unguided media / Wireless Media / Radiated media

The dream of being able to communicate data in networks without having to deal with the constraints of physical cabling is very much realized today. Wide area networks obviously make use of wireless technology to transmit data around our globe. Two major local wireless technologies are radio transmission and infrared transmission.

Radio transmission

Radio transmitters (Figure 2.1.9) are omni directional and can easily penetrate walls, floors, ceiling and the like. Radio-based LANs do have to contend with the interference that occurs daily in the workplace. Radio, though limited by its speed, may be the wireless transmission method of choice for many desktops because of its low cost and capabilities.
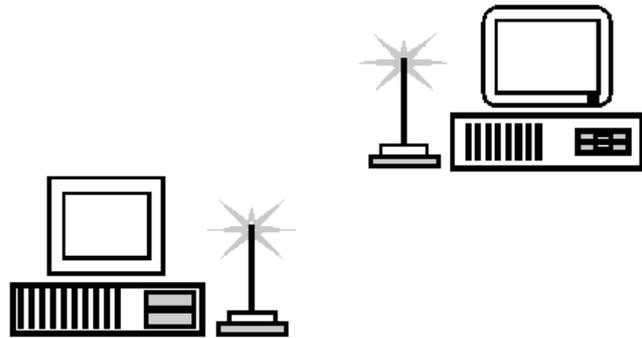
Figure 2.1.9

Infrared transmission

Infrared technology uses the invisible portion of the light spectrum with wavelengths just a little less than those of red light. These frequencies are very high offering nice data transfer rates. Modern infrared LANs can achieve throughput at 16 Mbps with potential for better. We are used to seeing infrared technology utilized for our television or Video Cassette Recorder (VCR) remotes. Infrared transmissions offer potential for high-speed data transfer but are limited by inability to penetrate walls and floors. Infrared waves are widely used for short range communication. (Figure 2.1.10)
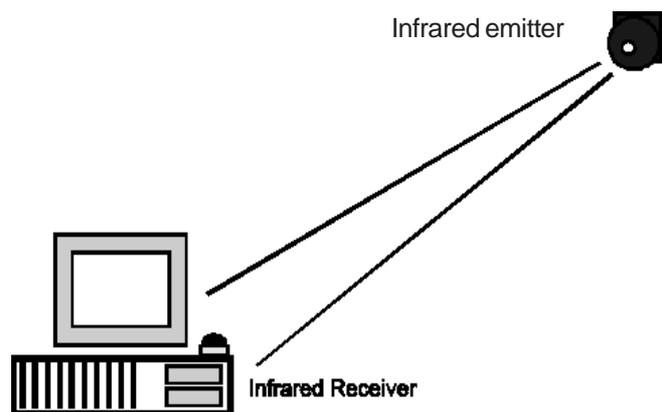
Figure 2.1.10

Microwave transmission

Microwave is a high-frequency beam with a short wave length. Microwave can be transmitted over a direct line-of-sight path between any two points. This transmission (Figure 2.1.11) medium is typically used for long-distance data/voice transmission. Microwave transmission is either terrestrial or satellite. Terrestrial microwaves pose bio-hazardous to both humans and animals.
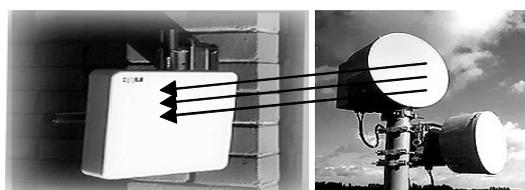
Figure 2.1.11

Satellite transmission

In satellite transmission, (Figure 2.1.12) signals are transmitted to a satellite 500 to 22,000 miles in space. One disadvantage of satellite transmission is the delay that occurs in transmission, which is known as propagation delay.
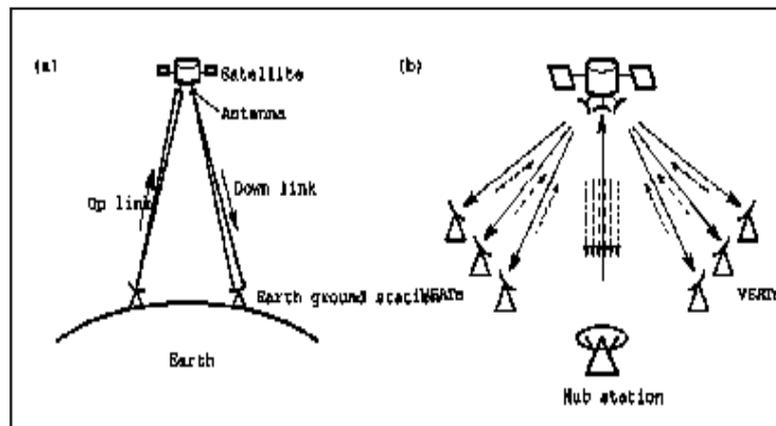
Figure 2.1.12
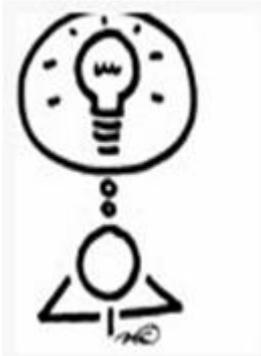
Dear Teacher!
Please feel free to design your own activities, Perhaps within the parameters specified.

We shall be delighted if you could Communicate your innovations to us.

Competency Level 2.2 : **Selects suitable network types as required**

Duration : One period

Learning Outcomes:

- Names types of computer network & networking devices.

- Accepts the importance of networks to transmit information rapidly.

- Draws a network diagram according to given specification.

Learning – Teaching Process:

Engagement:

- Pose the following questions to the whole class and conduct a brainstorming discussion.

    1. What are two types of data transmission media?

    (Give examples for each)
    2. Which media used to transmit electronic signals?
    3. Which medium used to transmit light waves?
    4. Which media used to transmit electromagnetic waves?
    5. How data is transmitted between two computers?

- Conduct a discussion to highlight the following:
    o Transmitting data is a major requirement for communication
    o Connecting two or more computers is needed for data communication
    o An interconnected set of computers is called a network.

Instructions suggested for learning:

Let's investigate computer networks.

- Consider the following topics related to computer networks
    o Types of computer networks
    o Devices used in a computer network.
    o Importance of networks.
- Go through the reading material to note the important points regarding the topic.

- Discuss the area assigned to you and understand it thoroughly.

- Be prepared to present your findings at the plenary session.

Points to clarify subject matter:
- Get each group to present its findings.
- Encourage the other groups to submit constructive comments.
- Fill any gaps indicated.
- Conduct a discussion to highlight the following:

- A network is a system that transmits any combination of voice, video and/or data between users.

- A computer network is an interconnection of various computer system located at different places.

- The computer networks can be classified as follows on the basis of geographical area.
  - Local Area Network (LAN)
  - Wide Area Network (WAN)
  - Metropolitan Area Network (MAN)

- The following network devices can be used in a network.
  - Modems
  - Hubs
  - Switches
  - Network Interface Cards
  - Routers
  - Wireless devices (e.g.base station)

- The importance of computer networks.
  - Data and information sharing
  - Resource sharing
  - Software sharing
  - Reliable data storages

Reading Material

Computer Network

A computer network is a collection of independent computers that communicate with one another over a shared network medium. A computer network can transmit any combination of voice, video and/or data between users. The network includes the network operating system in the client and server machines, the cables connecting them and all supporting hardware in between such as routers and switches. In wireless network systems, antennas and towers are also part of the network.

Types of Networks

LAN, WAN and Other Area Networks

One way to categorize the different types of computer network designs is by their scope or scale. For historical reasons, the networking industry refers to nearly every type of design as some kind of *area network*. Common examples of area network types are:

- LAN – Local Area Network

- WLAN – Wireless Local Area Network

- WAN – Wide Area Network

- MAN – Metropolitan Area Network

LAN and WAN were the original categories of area networks, while the others have gradually emerged over many years of technology evolution

Local Area Network (LAN)

A LAN (Figure 2.2.1) connects network devices over a relatively short distance. A networked office building, school, or home usually contains a single LAN, though sometimes one building will contain a few small LANs (perhaps one per room), and occasionally a LAN will span a group of nearby buildings.
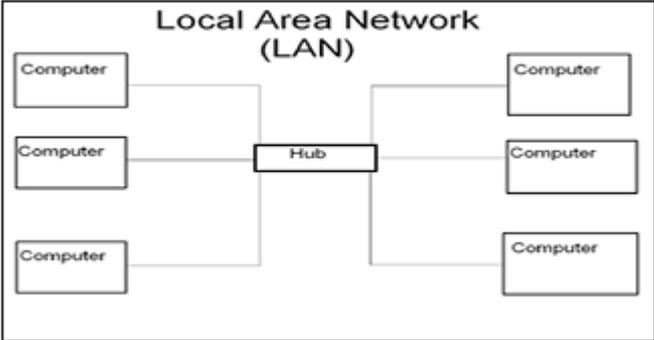
In addition to operating in a limited space, LANs are also typically owned, controlled, and managed by a single person or organization. They also tend to use certain connectivity technologies, primarily Ethernet and Token

Figure 2.2.1

Ring. . A network uses clients and servers that have network-enabled operating systems such as Windows, Mac and UNIX. A LAN allows a large number of users to share corporate resources such as storage devices, printers, software, data files.

Wide Area Network (WAN)

As the term implies, a WAN spans a large physical distance.(Figure 2.2.2) The Internet is the largest WAN, spanning the Earth. A WAN is a geographically-dispersed collection of LANs. A network device called a router connects LANs to a WAN. In IP networking, the router maintains both a LAN address and a WAN address.
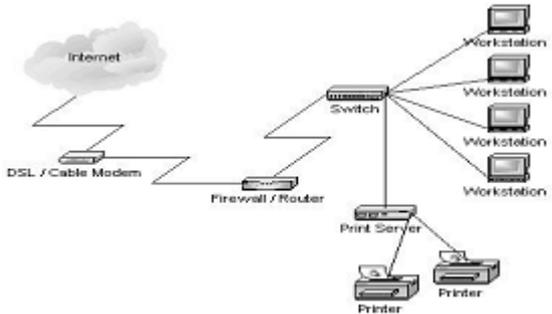
A WAN differs from a LAN in several important ways. Most WANs (like the Internet) are not owned by any one organization but rather exist under collective or distributed ownership and management.

Figure 2.2.2

Metropolitan Area Network (MAN)

A network spanning a physical area larger than a LAN but smaller than a WAN, such as a city. A MAN is typically owned an operated by a single entity such as a government body or large corporation

LAN, WAN and Home Networking

Residences typically employ one LAN and connect to the Internet WAN via an Internet Service Provider (ISP) using a broadband modem. The ISP provides a WAN IP address to the modem, and all of the computers on the home network use LAN (so-called *private*) IP addresses. All computers on the home LAN can communicate directly with each other but must go through a central gateway, typically a broadband router, to reach the ISP.

Components of a network

Modem (MODulator d**EM**odulator**)**

A modem is an analog-to-digital and digital-to-analog converter. A device that allows a computer or terminal to transmit data over a standard telephone line. It converts digital pulses from the computer to audio tones that an analog telephone line is set up to handle and vice versa. It also dials the line, answers the call and controls transmission speed. Traditional modems used in dial-up networking convert data between the analog form used on telephone lines and the digital form used on computers. Standard dial-up network modems transmit data at a maximum rate of 56,000 bits per second (56 Kbps).

Figure 2.2.3

Broadband modems that are part of cable and DSL Internet service use more advanced signaling techniques to achieve dramatically higher network speeds than traditional modems. Broadband modems are sometimes called "digital modems" and those used for traditional dial-up networking, "analog modems." Cellular modems that establish Internet connectivity through a digital cell phone also exist. Modems are available as external devices or internal modem cards. (Figure 2.2.3)

Hub

A hub (Figure 2.2.4) is a small rectangular box, often made of plastic that receives its power from an ordinary wall outlet. A hub joins multiple computers (or other network devices) together to form a single network segment. On this network segment, all computers can communicate directly with each other. Ethernet hubs are by far the most common type, but hubs for other types of networks such as Universal Serial Bus(USB) also exist.
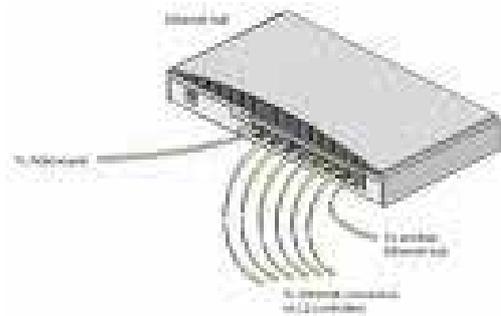
A hub includes a series of ports that each accepts a network cable. Small hubs network four computers. They contain four or sometimes five ports, the fifth port being

Figure 2.2.4

reserved for "uplink" connections to another hub or similar device. Larger hubs contain eight, 12, 16, and even 24 ports.

Competency 3 : **Uses the internet efficiently and effectively to access and communicate information**

Competency Level 3.1 : **Uses the Internet to access relevant information**

Duration : Two periods

Learning Outcomes:

- Names components required to access the Internet.

- Accepts that the Internet can be used to search for information.

- Uses web browsers & search engines to search for information.

- Searches for information using the Internet.

- Downloads information using the Internet.

Learning – Teaching Process:

Engagement:

- Get two volunteers to present the following dialogue.

Dialogue

Amal : Hello, Nimal, where you going?

Nimal : I'm going to the school to look for my results. Aren't you?

Amal : Haven't you got your results yet? I knew my results the evening before yesterday.

Nimal : How come? The school receives the results by post, this morning. Doesn't it?

Amal : Nimal… Didn't you listen to the evening news the day before yesterday? And it was announced that the results would be carried on the web site at mid-night, ` the same day.

Nimal : Then how about yours?

Amal : I've got 10 A s.

Nimal : Congratulations. Didn't you phone your dad and tell him about your performance?.

Amal : Madness, why should I spend so much to make a phone call? No sooner than I knew my results, I sent an Email to my dad. But, before he went through my email, he had come to know my results.

Nimal : How did that happen?

Amal : As a habit, dad used to read the 'Daily News' on the Internet. He has seen that
the results would be carried on the web site of the Examination Department. He
has got my Index number. from mum over the phone when he spoke to mum
that day.

Nimal : Lucky I met you Amal. I didn't know all these things. I was waiting until it came
to school by post.

Amal : Let's go to our place. I could go through the web site and watch yours' too. Not
only that, I can down load it and get a print out. Then I can show it to the rest at
home.

- Conduct a discussion to highlight the following:
  - The Internet is the largest network in the world.
  - The Internet helps you to locate information.
  - The Internet can be used for various tasks.
  - To access Internet in your home the following will be needed.
    - A computer
    - A telephone line and a modem/CDMA phone / equivalent wireless devices
    - Internet Service Provider (ISP)
    - Web Browser
- Or mobile phone with Internet facility

Instructions   suggested for Learning:

Let's go through the Internet.
- Search information on the Internet related to the following four topics.
  - Future computers
  - Free and Open Source Software
  - Tele-Medicine
  - Employment opportunities
- Go through the reading material to acquaint yourself with the Internet related topics.
- Identify the services of the Internet.
- List the services associated with the Internet.
- Describe the services listed.
- Get hand on experience on surfing the Internet by using a popular web browser
- Conduct the discussion to identify how you can explain the services in relation to web
  addresses and search engines.
- Be prepared to make an innovative whole class presentation at the plenary session

Points to clarify subject matter :

- Get each group to present its findings.

- Request the presenters themselves to fill in any gaps they have left.

- Encourage the other groups to submit constructive comments.

- Fill-in any gaps indicated.

- Conduct a discussion to highlight the following:
    - No person, government or entity owns or controls the Internet.
    - Internet renders various services such as
        - E-mail
        - World wide Web (WWW)
        - File Transfer Facility
    - A web browser is a software application, which is used to surf the web.
    - Popular web browsers are Internet Explorer and Mozilla Firefox.
    - Each web site has a unique web address.
    - Search engines help users to find web pages on a given subject.
    - Can search for information using search engines.

Reading Material

What is Internet?

The Internet is a massive network of computer networks, a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet. Information that travels over the Internet does so via a variety of languages known as protocols. The Internet consists of millions of smaller domestic, academic, business, and government networks, which together carry various information and services, such as electronic mail, online chat, file transfer, and the interlinked Web pages and other documents of the World Wide Web

World Wide Web:

The World Wide Web (WWW), or simply Web, is a way of accessing information over the medium of the Internet. It is an information-sharing model that is built on top of the Internet. The Web uses the Hyper Text Transfer Protocol (HTTP), only one of the languages spoken over the Internet, to transmit data. The WWW also utilizes browsers, such as Internet Exploreror or Mozilla Firefox, to access web documents called web pages that are linked to each other via hyperlinks. Web documents also contain graphics, sounds, text and video.

Web sites and Web Pages:

- A site (location) on the World Wide Web.
- Each web site contains a home page, which is the first document users see when they enter the site.
- A web site is a collection of web pages, which are documents coded in HTML that are linked to each other and very often to pages on other web sites.

Web Browser:

A web browser is a software application that enables a user to display and interact with text, images and other information typically located on a web page at web site on the world or a Local Area Network (LAN). Some of the web browsers are Microsoft Internet Explorer, Netscape Navigator, and Mozilla firefox.

Web Address (Uniform Resource Locator):

The address that defines the route to a file on an Internet server. You can retrieve a page by typing its URL in the address bar.

e.g.: http:// www.nie.lk/page/syllabus.html

    Protocol   Domain Name   Page

Search Engines

Search engines are used to search information. Yahoo, Google, MSN are some of the search engines to be used to find information.

E-mail :

E-mail (Electronic mail) is one of the services provided by the Internet. E-mail is a store and forward method of composing, sending, storing and receiving messages over electronic communication systems.

E-mail facility can be obtained in the following ways:

- o By installing e-mail software such as Eudora, Pine, etc on your computer
- o By using a popular search engine like Google, Yahoo or MSN which comes with in-built e-mail facility

File transfer

File transfer is another important service provided by the Internet. This service allows you to transfer files between two computers on the Internet or on the same network. The two most important facilities provided by the file transfer are the abilities to:

1. Copy a file from another computer to your computer
2. Send a file from your computer to another computer
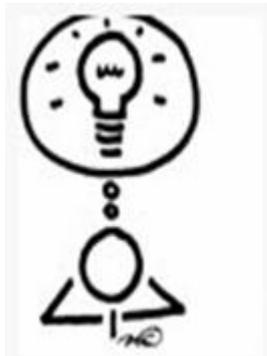
Dear Teacher!
Please feel free to design you
Perhaps within the paramete

We shall be delighted if you
Communicate your innovatio

Competency Level 3 .2   :   Uses electronic media for effective communication

Duration   :   Two periods

Learning outcomes:
- Names the components required to send and receive an e-mail
- Accepts that we can communicate via Internet using an e-mail.
- Creates an e-mail account.
- Sends messages using e-mail.
- Uses Internet chatting in day-to-day life.

Points to clarify subject matter:
- To send and receiving an e-mail the following requirements must be satisfied;
  - A computer with an Internet connection
  - An e-mail account
  - An e-mail software
- Some e-mail software are:
  - Eudora
  - Microsoft Outlook Express
  - Pegasus
- An e-mail address comprises two parts.
  - Your Identity.
  - The identity of your ISP.
  - These two are separated by the symbol "@"
- E-mail service providers facilitates dispatch of the same message to multiple users at the same time .
- Extra copies of the original mail could be sent as carbon copies   (CC).

Reading Material
What's Electronic mail?

- Electronic mail or email is a term, used to describe the tool which allows one computer user to send a message to one or more other computer users over a computer network in a digital form.
- Email can be sent internally to members of an organization through their internal computer network or it can be sent externally to anyone in the world by using the network of computer networks that make up the Internet

Definition of e-mail:
E-mail is short for "electronic mail" and is a method of composing, sending, and receiving messages over electronic communication systems. Most e-mail systems today use the Internet, and e-mail is one of the most popular uses of the Internet.

How does it work?
- In order for messages to be sent from one computer to another, your message needs to be converted into a digital form and forwarded to a computer that acts as a mail server or post office.
- This mail server sorts and directs your mail for you.
- The only way this mail server can direct mail through, to all users is by being connected to

a network that all the users are also connected to.
- In order to read or send any electronic mail you will need special software.
    E.g.: Eudora, Microsoft Outlook Express, Pegasus.

Creating an e-mail account:
There are two ways of obtaining an e-mail account.
1. Internet Mail Account (usually free of charge)
    e.g.: Gmail, Yahoo, Hotmail
2. From an Internet Service Provider (ISP) (You have to pay)

Main parts of an E-Mail message:

To:

Enter the E-mail address of the person that you are sending the message to in the "To" field.

If there a multiple recipients, then their addresses have to be separated by commas (,) or semicolons (;).

CC:

CC stands for "carbon copy". Anyone listed in the CC: field of a message will receive a copy of that message when you send it. All other recipients of that message will be able to see that the person you designated as a CC: recipient has received a copy of a message.

BCC:

"BCC" stands for "Blind carbon copy". This is similar to the CC: feature, except that BCC: recipients are invisible to all of the other recipients of the message.

Subject:

This field represents what the message is about. The message line summarizes the contents of the message.

Attachments:

Attachments are separate files that are sent along with your e-mail message. You can attach all sorts of the following files to an email

- spread sheets

- word processing documents

- database files

- Audio files

- video files

- graphic images

Important items in folders section in yahoo mail window

Folders:

All the main folders are located in this folders section. Inbox, Drafts, Sent and Trash.

- **Inbox:** Displays the messages you received. Read & unread messages will be displayed in this folder.

- **Drafts:** If you have saved the messages you have composed or created it will be sorted under this folder.

- **Sent:** Stores all the messages you sent.

- **Trash:** Stores all the deleted items. Note: You can also empty the trash by clicking on the "Empty" link on the Trash.

- **Instant Messaging (CHAT):**
  Chatting is one of the most popular activities on the Internet and involves people from all walks of life and just about all ages to coming together in areas where they can join in on in a variety of topics that they are interested in with people all around the world. Traditionally chat is text based but can also involve audio and video. In public chat areas people use "user names" or "nicknames" or sometimes represent themselves as graphical icons or "avatars" as they are known in the chat world.

- **Internet Relay Chat (IRC):**
  IRC is a multi-use talk program. IRC allows several people to simultaneously participate in a discussion on a particular channel, or even multiple channels.

- For Internet chatting the following will be needed.
  - A computer with Internet facility.
  - Speakers./Headphones with michrophone
  - Relevant software (e.g: Skype, Yahoo Messenger)
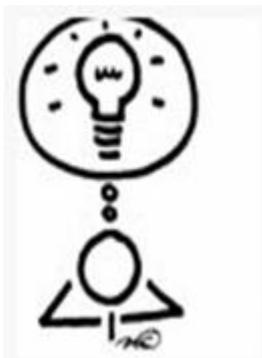
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency 4   **:**   **Uses computers efficiently and effectively with awareness of Operating System**

Competency Level 4.1   **:**   **Investigates the contribution of Operating Systems (OS) to the functioning of computer**

Duration   **:**   Two periods

Learning outcomes:

- Describes the basic functions of operating system software.
- Accepts the value of the operating system software as the driver of the computer.
- Analyses the basic functions of an operating system in terms of OS software categories.
- Uses analogies to familiarize oneself with abstract concepts.

Learning – Teaching Process

Engagement:

- Show the three Figure shown below to the class one at a time in the given sequence. Pictures of trishaws

Figure 4.1.1

Figure 4.1.2

Figure 4.1.3

- Get the students to explain the process observed.
- Conduct a discussion to highlight the following:
  - A vehicle given in the picture will function as a taxi only when there is a driver and passengers.
  - Similarly an electronic system will be called a computer only when a suitable means is selected to drive it.
  - For optimum use of the computer such means have to be analyzed and well acquainted with.

Instructions suggested for Learning:

Let's explore Operating Systems.

- Consider the following four functions related to operating systems.
  - Providing interface for computer operations
  - Process management
  - Managing Directories and files.
  - Controlling Input/output devices.
- Go through the reading material to acquaint yourself with the function given.
- Identify the part of the computer to which the function contributes and the purpose of the particular part.
- List the task associated with the function.
- Describe the task listed.
- Conduct a discussion to identify how you can explain the functions in relation to the three categories of operating system software, Windows, Linux and DOS.
- Describe the evolution of the function given in terms of Windows, Linux and DOS.
- Be prepared to make an innovative whole class presentation at the plenary session.

Points to clarify subject matter:

- Request each group to present its findings to the class.
- Give the first opportunity to the respective group to elaborate on the presentation.
- Get other groups to propose constructive suggestions.
- Elaborate highlighting the following points:
  - An Operating System is needed to work with the computer.
  - Windows, Linux, and DOS are some of the commonly used operating systems.
  - The basic functions of an operating system are as follows:
    - Providing interface for computer operations
    - Process management
    - Managing Directories and files.
    - Controlling Input/output devices.
    - Managing storage

Reading Material

Basic Functions of an Operating system

Providing interface for computer operation

Today, most modern operating systems contain Graphical User Interfaces (GUI). A user interface brings structure to the interaction between a user and the computer. A GUI has four essential elements, denoted by the characters WIMP. WIMP stands for Windows (rectangular areas), Icons, Menus and Pointing devices respectively. These GUI allows you to enter commands by pointing and clicking at objects that appear on the screen. There are other user interfaces, namely command line interface used by various operating systems. Many operating systems allow the user to install or create any user interface they desire. Windows, Linux, and DOS are some of the operating systems, we consider here.

Windows is one of the most popular operating systems in Sri Lanka. It is an example for a GUI based operating system. (Figure 4.1.4) You can explore the WIMP environment with Windows interface named as 'desktop'.

Windows screen:
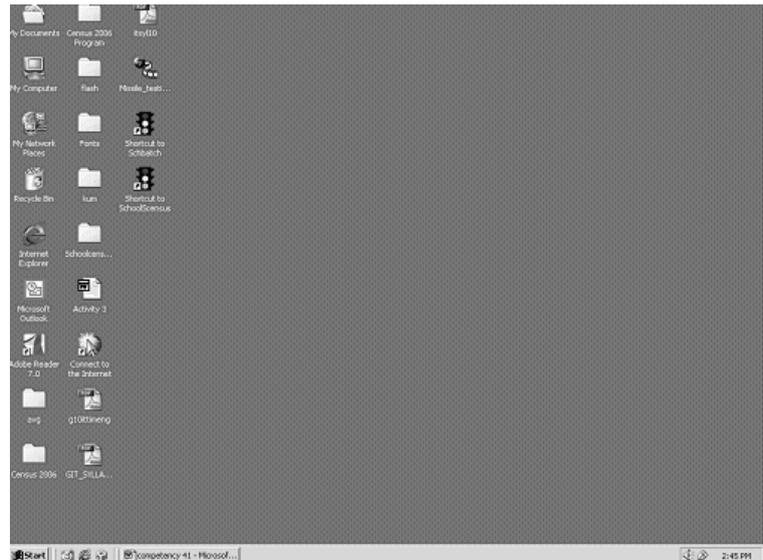
Figure 4.1.4

Linux is an open source operating system. Source code is freely available to everyone in open source systems. Linux is primarily a command line interface where programs are typed in by name. Later versions of Linux operating system support graphical user interface where WIMP environment is available. (Figure 4.1.5) There are many Linux based operating systems and some of them are Ubuntu, Fedora and Open Suse.
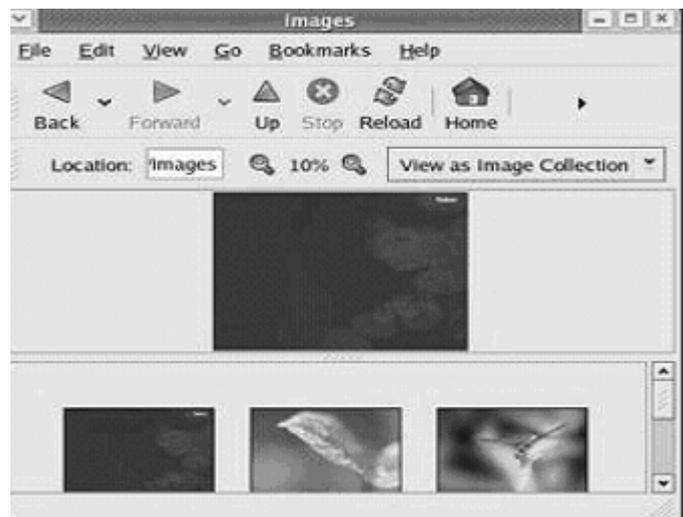
Figure 4.1.5

The DOS is an example for an OS which is uses a command line Interface.(Figure 4.1.6) In DOS, the user interacts with the operating system through a set of commands. MS-DOS (Microsoft-Disk Operating System) is the most widely used member of the DOS family of operating systems and was the dominant operating system during the 1980s. It has gradually been replaced by the Windows operating system. MS-DOS began as QDOS (for Quick and Dirty Operating System), IBM

Figure 4.1.6

and Microsoft both released versions of DOS; the IBM version was supplied with the IBM PC and is known as PC-DOS. To interact with the computer the user has to type DOS commands every time. Users need to learn DOS commands to drive the computer.
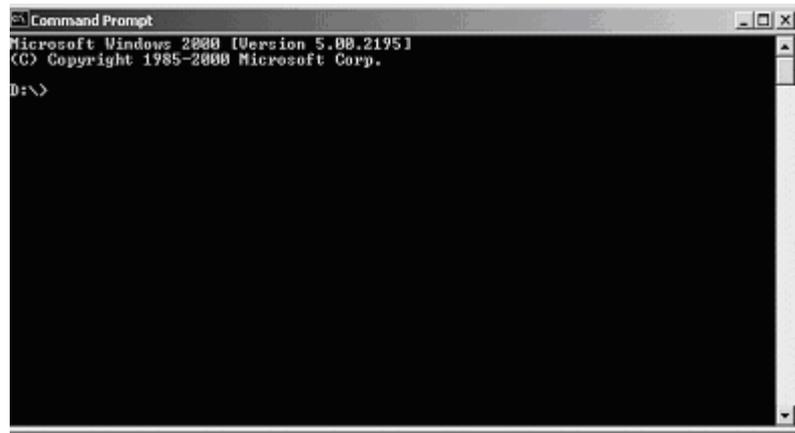
- **Process management**

Every program running on a computer or execution of a program is a process. Some processes interact with users and perform work for users. But some processes are not associated with particular users and they have specific functions such as checking incoming mail. Process management is an operating system's way of dealing with running multiple processes.

By typing CTRL, ALT, DEL keys, together in Windows environment, running processes can be seen (Figure 4.1.7) All processes are equal in the Windows operating system. But in Linux, a process creates another process. In Linux no process is independent of any other process. DOS does not have a resource protection mechanism and cannot do various tasks at the same time.
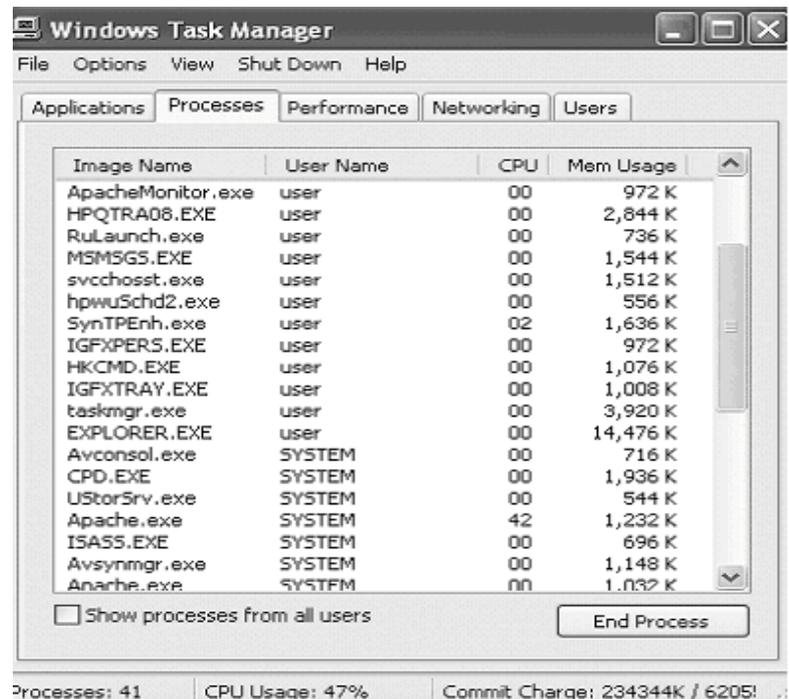
Figure 4.1.7

- **Managing directories and files**

A file is a collection of related information. Directories are used to store files. Directories may contain files and other directories. The following activities are carried out by the operating system in the directory and file management.

- o Create and delete files.
- o Create and delete directories.
- o Supports manipulating files and directories.
- o Makes backup files on storage media.
- o Mapping of files on to secondary storage.

Windows storage devices that contain files, have a drive letter prefix. For example. Floppy drives are typically A: drives, hard disks typically C: etc.(Figure 4.1.8)

On hardware derived from Intel or IBM PCs, both Windows and Linux use the Master Block Record. It is the part of the disk used to boot the operating system and to state whether the disk is partitioned or not. On both Windows and Linux, it is common to have, at most, one file system per partition. On Linux, each file system gets a device, like /dev/l1 ("hard disk A part 1"), which is represented as a file.

FAT (file allocation table) is a file system used by MS DOS and other Windows based operating systems to organize and manage files.

Each Windows file system has a FAT that states, which disk blocks, hold the topmost directory. On Linux, the equivalent on most file systems is the super block. A Linux file system has multiple copies of the super block physically saved on the disk. This provides redundancy in case of a partial disk corruption. The super block is just about always in memory on Linux; that is not the case for ancient DOS-like file systems. There are no special restrictions on files placed in the topmost directory on Linux, either.

On Windows, there is one drive letter per mounted file system: for example, C: for C: and D: for D:. On Linux there are no drive letters, so one file system is mounted on "/" and all other file systems are mounted on subdirectories of "/." This arrangement is like the little-used MS-DOS command SUBST.
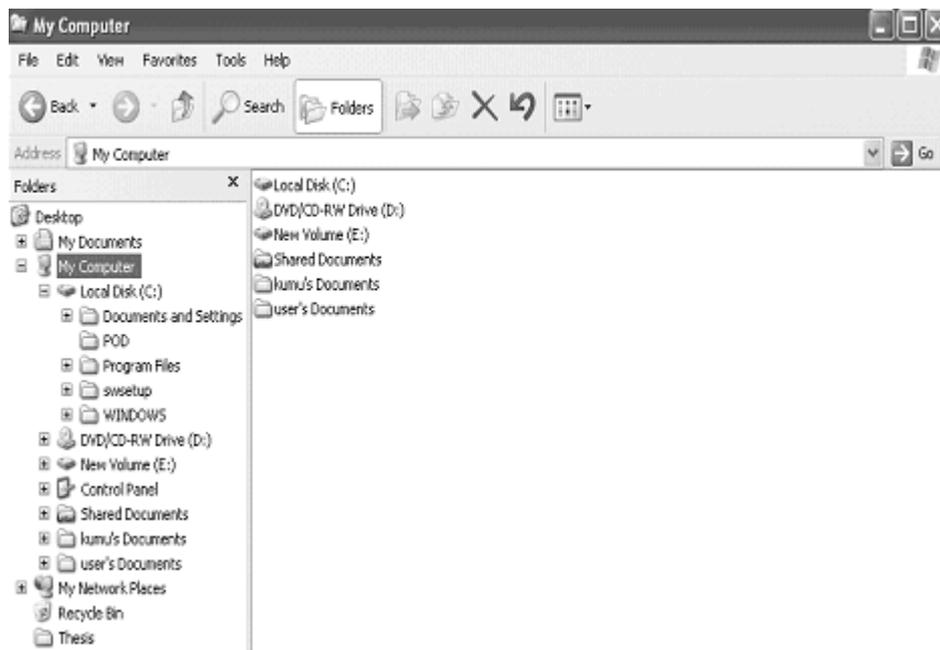
Figure 4.1.8

Controlling Input / output devices.

An operating system controls Input/output devices such as disk drives, keyboards, displays and printers. There are a set of programs for controlling the input from and output to the various devices. The path between the operating system and virtually all hardware not on the computer's motherboard goes through a special program called a driver. A device driver is a specific type of computer software developed to allow interaction with hardware devices. DOS has little convenience in controlling input, output devices. It is easy to control input/ output devices in Windows and Linuxthan DOS.

Competency Level 4.2   :   Uses functions of Operating Systems

Duration   :   Two periods

Learning Outcomes:

- Describes various tasks performed by an operating system.
- Accepts the value of selecting a task on the basis of the need.
- Analyses tasks performed by an operating system.
- Uses the directory structure of an operating system to work in day-today life.
- Uses relevant strategies for quick access of relevant information.

Points to clarify subject matter:

- The various tasks done by the operating system are
  - Make user accounts.
  - View and manipulate basic system settings and controls.
  - Create duplicate copies of data files, clear unnecessary files and make contiguous files.
  - Organize files and directories

Reading Material

User accounts

User is the person who uses a computer system. Users may need to identify themselves for the purpose of logging, resource management etc. In order to identify oneself a user has an account. When sharing a computer other users could look into your private files, software or change your computer settings.

System tools

Some of the system tools are,

- Disk defragmentation

Differents parts of the file are scattered across the hard disk in noncontiguous pieces. The Disk defragmentation utility recognizes noncontiguous files into contiguous files and optimize their placement on the hard drive to increase their reliability and performance.

- Backup

If the hard disk fails or if you accidentally delete files, Backup utility protects your data. Backup creates a duplicate copy of all the data on the hard disk and then achieves it from another store device.

- Disk clean up

Disk clean up determines which files on a hard disk drive may no longer be needed and delete those files.

- Character map

Character map selects special characters and copies them to the document.

Control panel

Control panel is the part of the MS Windows Graphical User Interface that allows users to view and manipulate basic system settings and controls such as adding hardware, removing software, controlling user accounts, and changing accessibility options. .

Directory Structure

Directories are used to store files. A directory can contain a number of files. It can also contain other directories which are called sub directories. The topmost directory is known as the root directory. The sub directory is said to be the 'child' of the directory that holds it.
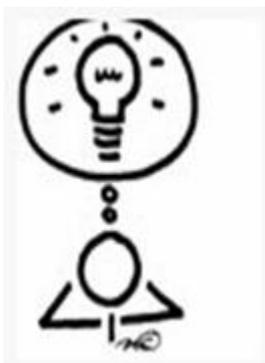
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency 5 : **Uses Word Processing software to create various types ofdocuments**

Competency Level 5.1 : **Analyses Integrated Development Environment of Word Processin software to identify its components**

Duration : One period

Learning outcomes:
- Names and describes the components of the screen layout.
- Accepts the need to produce documents electronically rather than manually.
- Uses the keyboard in word processing.

Learning – Teaching process:

Engagemaent :
- Ask two volunteers to draw up an invitation on the blackboard with the help of others for the English Day.
- Lead a discussion to highlight the following:
  - Handwriting styles, letter sizes, colours and layouts to ones ability
  - Pictures drawn for the invitation by unskilled persons are unattractive
  - This cannot be saved for later use
  - Anything on the board cannot be printed other than copying
  - Depending on the number of invitations, each copy
  - needs to be duplicated manually wasting time and resources
  - The computer word processors facilitate eliminatory of the above difficulties.

Instructions suggested for Learning:

Let's analyze Integrated Development Environment of word processor

Consider the following topics related to word processing software

- ° Title Bar
- ° Menu Bar
- ° Standard Toolbar
- ° Formatting Toolbar
- ° Vertical Ruler
- ° Horizontal Ruler
- ° Working Area
- ° Margins
- ° Minimize Button
- ° Maximize/Restore Button
- ° Word Close Button
- ° Document Close Button
- ° Vertical Scroll Bar

- ° Horizontal Scroll Bar
- ° Drawing Tool Bar
- ° Status Bar
- Boot computer and start word processing software .
- Go through the reading material and get a good idea of the assigned area.
- Practice typing your own words and symbols on the word processing application using the keyboard.
- Type the following text.

"Quick Brown Fox Jumped Over The Lazy Dogs."

- Save it and close the word processor
- Open the file you saved and edit it by changing font size
- Get a printed copy.
- Be prepared to share your experiences and findings with the class at the plenary session.
- Distribute the copies of labeled diagram to the groups.
- Help groups to start the word processing package and the features on the screen as well.
- Get groups to study the features
- Prepare groups for a whole class presentation.

Points to clarify subject matter:
- Get each group to present its findings.
- Lead a discussion to highlight the following:
  - o Word Processing application can be used to create documents electronically with enhanced features.
  - o There are text editors with very little enhancements.
  - o Notepad is one such editor.
  - o Title bar displays the title of the document
  - o There are several options in the menu bar.
  - o Several tools are available in a word processor.
  - o The Standard Toolbar and Formatting tool bar are very helpful in creating documents.
  - o The tools in the toolbars represent the options in the menu.
  - o Gray coloured parts in the rulers show the margins
  - o There are a number of buttons in the application window.

- Minimize button is used to minimize the application.
  - Maximize/Restore button is used to Maximize and Restore the application.
  - The Close button is used to close the application.
  - The Close button below the title bar is used to close the document.
- Scroll bars are used to scroll the document.
- Tools in the drawing toolbar facilitate drawing of lines, arrows and auto shapes.
- Status bar displays the status of the cursor position.
- Editing (working) area is used to type and edit documents.
- The small blinking vertical bar in the editing area is called cursor.
- Documents created in word can be saved for future use.

Reading Material

Let's consider MS Word (You may also consider Openoffice.org Writer for this activity)

Click **START** button from the task bar

Move to Programs >Microsoft Office > Microsoft Word(Click) or get help from teacher.

Screen layout (Start up window) of Microsoft Word is shown below. (Figure 5.1.1)
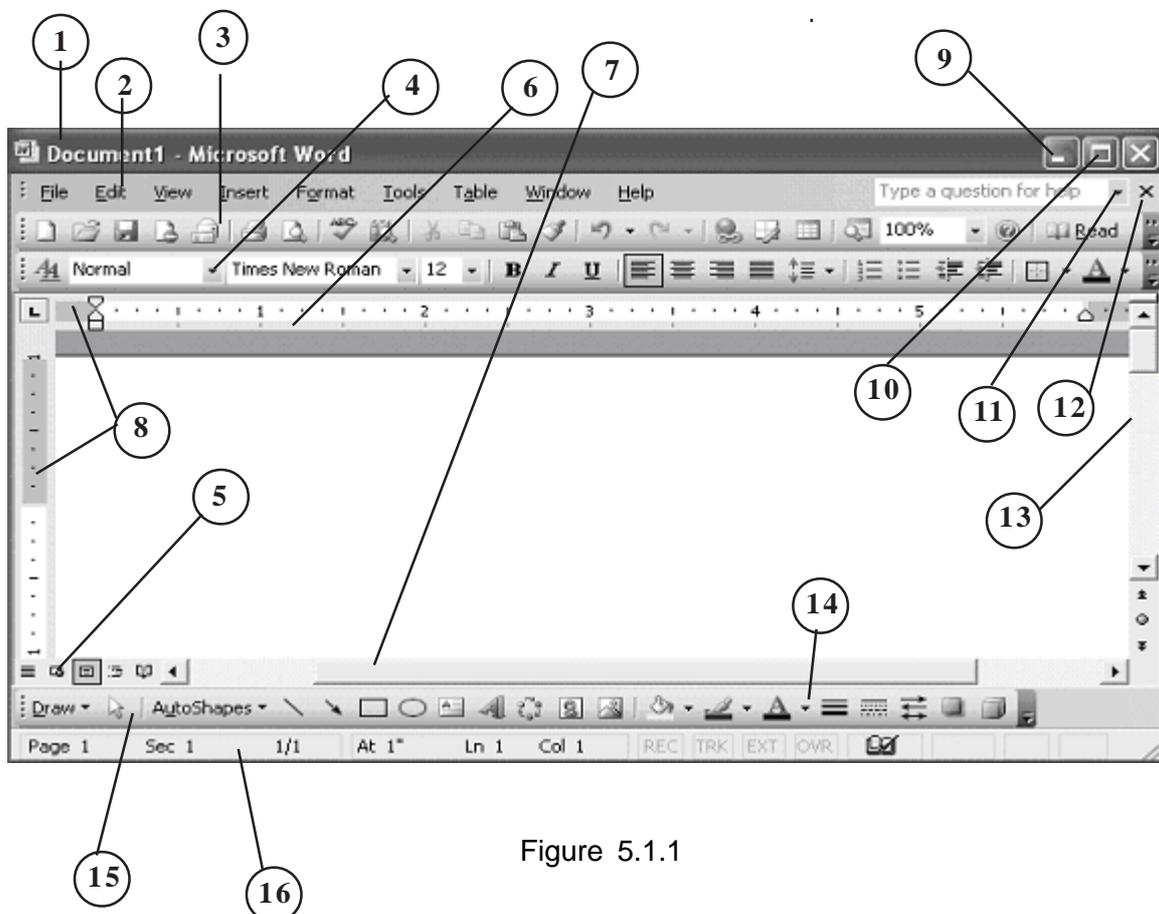
Figure 5.1.1

1. Title Bar
2. Menu Bar
3. Standard Toolbar
4. Formatting Toolbar
5. Vertical Ruler
6. Horizontal Ruler
7. Working Area
8. Margins
9. Minimize Button
10. Maximize/Restore Button
11. Word Close Button
12. Document Close Button
13. Vertical Scroll Bar
14. Horizontal Scroll Bar
15. Drawing Tool Bar
16. Status B
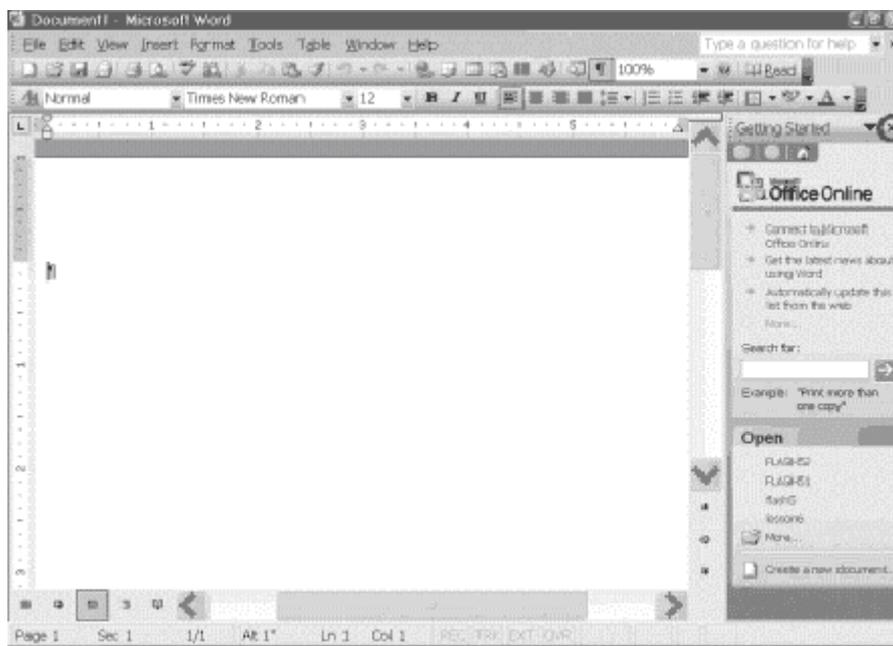
Figure 5.1.2

Click in the upper right corner of the New Document pane to close the New Document pane. Your screen will then look like the one shown above.(Figure 5.1.2)

Saving a File

You must save your files if you wish to recall them later. Before you can save, you must give your file a name. To save your file and close Word, follow the instructions given here:

1. Choose **File > Save As** from the menu.

2. Specify the correct folder in the Look In box.

3. Name your file by typing in the File Name box.

Click **Save**.

click on **save** icon in the standard tool bar (Figure 5.1.3)

Figure 5.1.3

Or

Press Key strokes **Ctrl+S**

Open File

To continue working on a file you previously saved, you must open the file. To open the file you already saved:

1. Choose *File* > *Open* from the menu.

2. Select the folder where you saved the file from Look In field.

3. Select the file or type the file name in the File Name field.

4. Click Open. The file you saved previously appears.

Or

Click Open tool in the standard toolbar and follow the above steps 2,3 and 4

Alternate Method – Opening a File by Using the Drop-Down Menu

1. Click File.

2. Look for the file name near the bottom of the drop-down menu.

3. Click the file you created during the previous lesson opens.

Print Preview and Printing

Preview your document by clicking the Print Preview button on the standard toolbar or by selecting File then Print Preview. When the document is ready to print, click the Print button from the Print Preview screen or select File and, then Print.

Competency Level 5.2 : **Creates document and obtains printout using word-processing software.**

Duration **:** Three Periods

Learning Outcomes:

- Names different formats used in word processing and describes them.
- Accepts the need to follow standard formats to create documents.
- Creates documents in professional level

Points to clarify subject matter:

- To change the format of a typed text, select the text and click on the relevant format button from the formatting toolbar.
- To change the font and the size of a selected text, the font or font size drop down button is clicked and the required font or font size is selected.
- Text can be aligned to Left, Center, Right or Justify.
- Numbering and bullets buttons are used to list the items.
- Drawing tool bar can be used to draw auto shapes, lines, circles etc.
- Objects created into the document can be moved and resized easily.
- Different styles of Word Art are available in word processing.
- The document can be made impressive by inserting clip art and pictures.
- Page setup facilitates to adjust
  - o Page margins
  - o Paper size
  - o Orientation - portrait or landscape
- Printing options facilitate to obtain hard copies to requirements**.**
  - o Number of copies
  - o Page range

Competency Level 5.3   **:**   **Creates tables using word processing software**

Duration   **:**   One period

Learning Outcomes:

- Describes columns and rows in the creation of tables.
- Accepts the value of tables in handling information.
- Creates tables to arrange data in meaningful way.

Points to clarify subject matter:

- In creating tables the number of columns and rows have to be specified.
- Column width and row height can be adjusted.
- New columns and rows can be inserted and unwanted columns and rows can be deleted
- Adjacent cells can be merged while cells also can be divided.
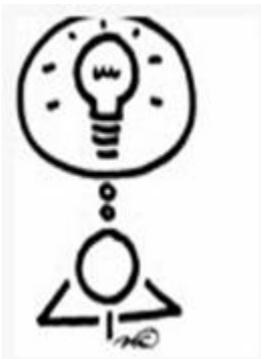
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency 6   **:**   **Makes electronic presentations to enhance attractiveness**

Competency Level 6.1   **:**   **Creates slides using basic features of presentation software**

Duration   **:**   Two periods

Learning Outcomes:

- Describes the main features of an electronic presentation
- Accepts the importance of presentation software in creating a presentation
- Creates a presentation using software
- Uses electronic presentations for better communication.

Learning – Teaching Process:

Engagement:

- Get a volunteer to display the posters about Environment Pollution.
- Present pre prepared presentation about Environmental Pollution
- Conduct a discussion to highlight the following:
  - o The differences between manual presentation and electronic presentation
  - o The electronic presentation is more attractive to the audience than manual presentation
  - o There are some software programs to create presentations such as:
    - Apple Keynote
    - IBM Lotus Freelance Graphics.
    - MS PowerPoint
    - OpenOffice.org Impress
  - o A presentation can be created using software and comprises a collection slides.

Instructions suggested for Learning:

Let's prepare a simple presentation

- Consider to design simple slide shows regarding the following topics distributed
  - o Our school
  - o Sports
  - o Animals
  - o Plants
- Go through the reading material provided to note the important points regarding presentations.
- Get hands-on experience about basic features of presentation software by reading the graded directions provided
- Prepare a presentation with four slides about the topic given.

- Make sure the presentation is attractive, precise and concise.
- Be prepared to present your slide show at the plenary session.

Points to clarify subject matter:
- Get each group to present its slide show.
- Request the presenters themselves to fill in any gaps they have left.

- Encourage the other groups to submit their constructive comments.
- Fill any gaps indicated.
- Conduct a discussion to highlight the following:
  - Blank presentation is used to create a presentation from scratch.
  - The layout of a slide may be with title, bulleted lists.
  - It is possible to insert various types of objects to the slide e.g. Tables, Charts, Graphs, Images, Organization charts, Text & Graphics etc.
  - It is possible to insert new slides to a slide show.
  - There are four types of views to view slides.
  - Common formatting is also possible with slides.

Reading Material

Presentation &. Presentation software

Presentation is the process of presenting the content of a topic to an audience. In order to make the presentation effective you need to
- Know your audience
- Keep the content simple
- Start with familiar visuals
- Make each slide independent
- Use space effectively
- Use text and colour effectively.

Presentations can be create easily by using computers. For this purpose we have to be familiar with software specially designed to make presentations, such as Microsoft PowerPoint, Apple Keynote, OpenOffice.org Impress, or IBM Lotus Freelance Graphics.

Graded Directions
Let's consider MS-Powerpoint (You may consider OpenOffice.org Impress for this activity)

MS PowerPoint is a powerful tool to create professional looking presentations and slide shows and it allows you to construct presentations from scratch (through Blank presentation) or by using wizard.

Starting MS PowerPoint

1. Start ➔ All Programs ➔ Microsoft Office ➔ Microsoft PowerPoint   or

2. Double click   on the Icon

Creating a presentation from scratch

1. File ➔ New / Ctrl+N

   Select Blank presentation
   Or

2. On the Standard toolbar, click   New

   The layout of a slide may be with title, bulleted lists, tables, charts, Graphs, Images, Organization charts, Text & Graphics etc

Inserting Slide layout

   Format ➔ Slide layout .

   Then select appropriate Slide (Figure 6.1.1)

·   Figure 6.1.1

Inserting a new slide

1.Insert è New slide Or Ctrl +M

2.Click on the New slide tool in the standard tool bar

Inserting an Object

Using insert menu we can insert the following objects (Figure 6.1.2)

Example:-

1.Clip Art

2.Autoshape

3.Charts

4.Organization Charts

5.Wordart
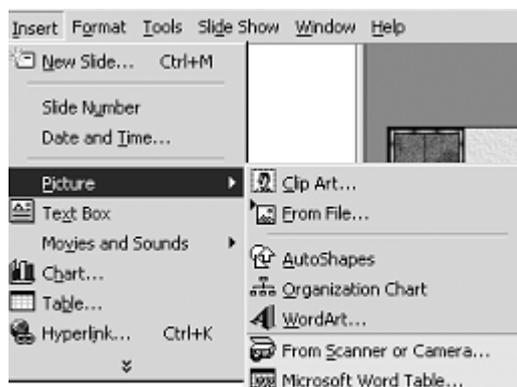
Figure 6.1.2

Formatting

Using formatting toolbar we can format the content of a slide (Figure 6.1.3)

Examples:-   1. Font Type   2. Font Size   3. Bold / Italic / Underline   4. Alignment

Figure 6.1.3

Viewing

There are four types of views in PowerPoint

Click this button to view in their types

          1. Normal View

          2. Slide View

          3. Outline View

          4. Slide Sorter View
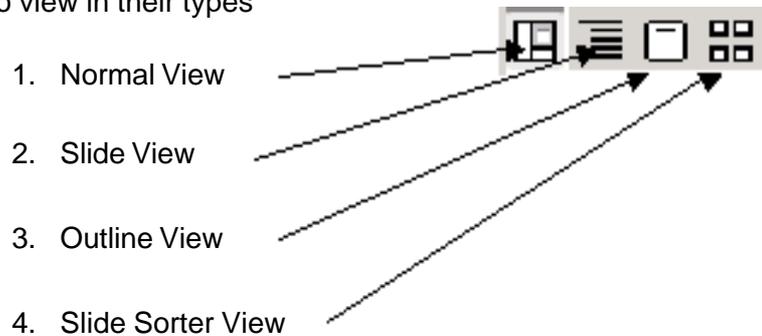
Competency Level 6.2 **:** **Makes presentations attractive through multi-media features of presentation software**

Duration **:** Two periods

Learning Outcomes:

- Describes the additional features that make presentations attractive.
- Accepts the features important to create an attractive presentation.
- Creates an attractive presentation using software.
- Uses presentation software to make presentations .more effective

Points to clarify subject matter:

- How to apply custom animations
- How to apply slide transitions.
- How to apply design templates.
- How to apply Timing.
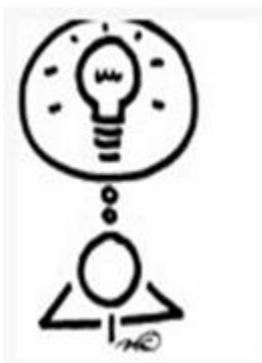
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency 7 : **Uses spreadsheet software to solve simple statistical problems and present findings**

Competency Level 7.1 : **Analyses spreadsheet software to identify its basic components.**

Duration : One period

Learning outcomes:

- Describes the components of a spreadsheet window.
- Accepts the value of spreadsheet application as a time saving device.
- Manipulates the worksheet according to instructions.

Learning – Teaching Process:

Engagement:

- Get a volunteer to mark the attendance register with the help of the others in the class.
- Conduct a discussion to highlight the following:
  o An attendance register displays the data in the form of rows and columns
  o When marking the attendance, the intersection of correct row and correct column is considered
  o Some software helps to substitute this paper worksheet and make easier the task.

Instructions suggested for Learning:

Let's investigate the basic features of Spreadsheets.

- Consider the following four topics related to spreadsheet software.
  o Entering Data into a worksheet
  o Entering Dates into a worksheet
  o Entering formulae into a worksheet

  o Entering a data series

- Go through the reading material to acquaint yourself with spreadsheets.
- Identify the components of the worksheet window by moving the mouse pointer around the sheet
- Get hands-on experience about data entry types with the assistance of the graded directions provided.
- Be prepared to make an innovative whole class presentation at plenary.

Points to clarify subject matter:

- Get each group to present its findings.

- Invite constructive comments from other groups.

- Conduct a discussion to highlight the following:

  o Spreadsheet software help to substitute the paper worksheet in the offices
  o Lotus 123, MS Excel,OpenOffice.org Calc, SuperCalc and VisiCalc are some of the spreadsheet software packages
  o Spreadsheet displays data in the form of rows and columns
  o A workbook is a file that consists of several worksheets
  o In a worksheet, rows are numbered from top to bottom and columns are labeled with letters from left to right
  o An intersection of a row and a column is known as a cell
  o The cell is referred by the column name and row number combination
  o The cell provides the place of data entry
  o The cells can contain values such as numbers, text, date, and formulae
  o An equal sign is entered before a formula, and without an equal sign the entry is treated as a text label
  o Label entries cannot be used for calculations
  o Arrow keys in the keyboard, and mouse can be used to move around a worksheet.

Reading Material:

Spreadsheet is a software that helps to substitute the manual worksheets in the offices. Spreadsheets display data in the form of rows and columns. The intersection of a row and a column is called a cell. Spreadsheets allow performing mathematical calculations; making graphs and doing functions. VisiCalc was the first spreadsheet to be created. Other spreadsheet packages are MS Excel, Lotus 123, SuperCalc and OpenOffice.org Calc.

Consider MS-Excel (You may consider OpenOffice.org Calc)

MS-Excel is a windows based spreadsheet. Workbook is a file which we work and store data. A workbook consists of several worksheets. Worksheets are used to list and analyze data. A worksheet can contain 65536 rows and 256 columns. In a worksheet, rows are numbered from top to bottom and columns are labeled with letters from left to right

Starting MS Excel

Start ———————► All programs ———————► MS Office ————► MS Excel

Create a new workbook

File ———————► New ———————► workbook ———————► OK

For entering data into a cell

- o   Select the cell by clicking on it.
- o   Type in the value.
- o   Press the enter key.

Let us enter the sales data for the three confectionary products, toffee, chocolate, and biscuits. (Figure 7.1.1)Place the mouse pointer on the cell A1 and click once.Type the word Item. As you type it appears simultaneously in the active cell and in the formula bar. Pressing enter key will store the entry in the active cellTexts like toffees, chocolates and biscuits are called **labels**. Label entries can be up to 255 characters in length.You can see the texts are placed on the right side of the cell and the numbers are placed on the left side in a cell.If you type a number with ' symbol, for e.g. '2500, it is placed on the right

Figure 7.1.1

side of the cell and considered as a label. Labels cannot be used for calculations.
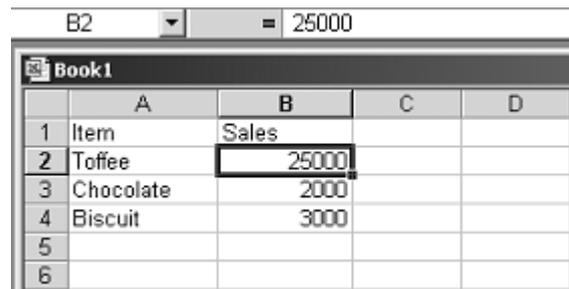
For entering date into a cell

To enter dates we consider following formats.
05/27/2007 (month/day/year) or 27-May-07
When you enter date and you enter two digits for the year, Excel interprets the year as,
For the years 2000-2029
If you type 5/27/19 , Excel assume that the date is May 27, 2019.
For the years 1930-1999
If you type 5/27/97, Excel assumes that the date is May 27, 1997.
Let us now enter the date
27 May 2007 in cell A1, press enter key.
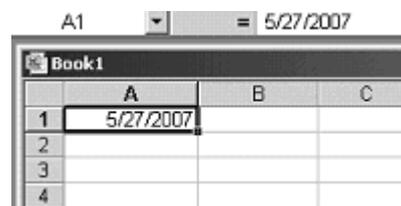
Figure 7.1.2

You can see in the formula bar the date as 5/27/2007. (Figure 7.1.2) Now enter various dates as per the task assign to you.

Entering Formulae

Let's enter 10 for the cell A1 and 60 for the cell C2. By entering the formula in cell C7, the result of the sum of cell A1 and C2 can be displayed as

=A1+C2 in the formula bar and the value 70 will be displayed in C7. (Figure 7.1.3)

An = sign is entered before a formula. Without the equal sign, the entry is treated as a text label. A cell displays the result of a formula when it is entered.
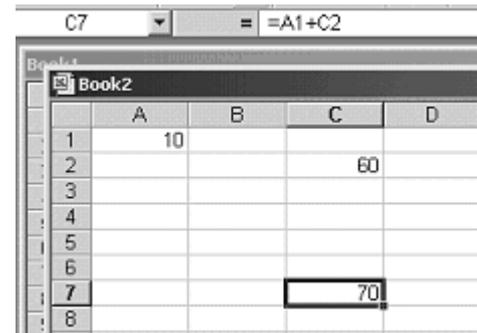
Figure 7.1.3

Entering a data series

To write a series of values in contiguous cells,

For e.g.

Months from January to December

Steps involved in creating the series are:

- o Enter the first two months in the adjacent cells. (Figure 7.1.4)
- o Highlight the two cells.
- o Drag the fill handle (a small black square at the lower right corner of the selected cells) to enclose the area that you want to fill with the series.
- o Release the right mouse button
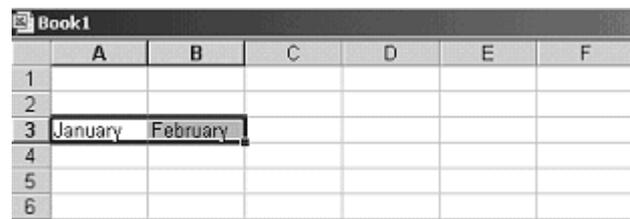
Figure 7.1.4

How to save your work

Save your worksheet in My Documents folder. (Figure 7.1.5) Type your group name as File name. Follow these steps

File ⟶ Save as

- Close your worksheet.

File ⟶ Close

- Exit from Excel

File ⟶ Exit

Figure 7.1.5

68
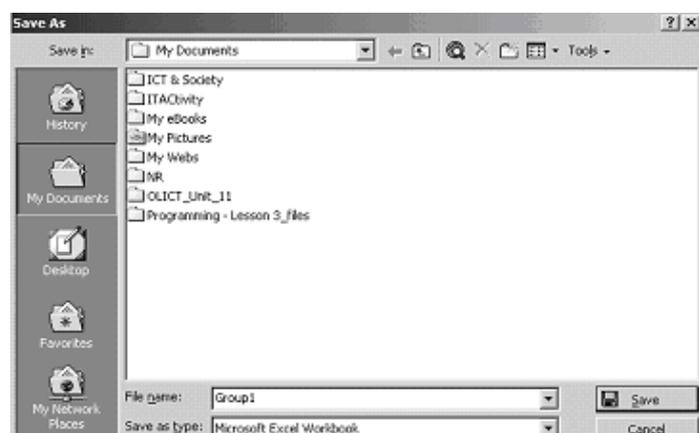
Competency Level 7.2 : **Formats worksheets to meet user requirements.**

Duration : One period

Learning Outcomes:

- Describes cell formatting, and editing cells, rows and columns.
- Accepts the value of spreadsheet application as a time saving device.
- Formats the worksheet according to instructions.

Points to clarify subject matter:

- Formatting is, changing the appearance of data on the worksheet.
- The Formatting toolbar or Format menu can be used for formatting a worksheet.
- The cell, row or column to be formatted is selected before formatting.
- Decimal places can be used for number in cell formatting.
- A worksheet can be expanded or contracted by inserting or deleting worksheet.
- Before inserting or deleting, selection of cells, rows or columns is needed.

Reading Material

Formatting is the changing of the appearance of data on the worksheet. The text entered into the cell can be aligned to the left, right, and center. It can also be made to appear as bold, italic or underline. The formatting toolbar, or the Format menu, or mouse buttons (default right mouse button) can be used for performing these activities. Electronic spreadsheet software can be used to format a worksheet. In spreadsheets rows, columns, and cells can be inserted or deleted without affecting the surrounding rows and columns. Before inserting or deleting rows, columns and cells selection is needed. A workbook can be expanded or contracted by inserting and deleting worksheets.

Competency Level 7.3 : **Uses mathematical operators and inbuilt functions for calculations**.

Duration : One period

Learning Outcomes:

- Describes operators and functions.
- Accepts the value of spreadsheet application as the means of problem solving.
- Calculates simple problems.

Points to clarify subject matter:

- Operators are used to perform mathematical calculations.
- Arithmetic, logical, text and reference operators are used in Spreadsheet Applications.
- Arithmetic operators are used to perform basic mathematical operations.
- Reference operators combine a range of cells.
- The operator and values are written as a formula.
- Cell names and operators are also used to write a formula.
- A formula begins with an = sign in Spreadsheet applications.
- n addition there are functions in Spreadsheet applications.
- Functions are pre-defined formulae that perform calculations by using specific values called arguments, in an order.

Reading material

Operators are used for performing mathematical operations. In spreadsheet applications, arithmetic, logical, text and reference operators are used. Let's consider arithmetic and reference operators.

- Arithmetic operators are used to perform basic mathematical operations.

Operator	Operation
+	Addtion
_	Substraction
*	Multiplication
/	Division

- Reference operators combine a range of cells. Cell coordinates in the formula are known as cell references.

The operator and values are written as a formula. The cells in which formulae are stored, displays the result of the calculation. Cell names and operators are also used to write a formula. A formula begins with an = sign in spreadsheet applications. Name can be applied to refer to a cell or a range of cells. Names can include letters, numbers, underscore and period (.). Spaces, commas, exclamation points or other special characters cannot be used while naming cells.

In addition there are functions in spreadsheet applications. Functions are pre-defined formulae that perform calculations by using specific values called arguments, in an order. Some commonly used functions are, Sum, Max, Min, Average, Count and Rank.

Sum()	Adds all the numbers in a range of cells.
Max()	It gives the maximum value within the range specified.
Min()	It gives the minimum value within the range specified.
Average()	It gives the average of the value within the range specified.
Count()	Counts the number of cells that contain numbers and numbers within the list of arguments.
Rank	Ranks the numbers in a list.

The function wizard is a tool in the spreadsheet software which can be used to enter formulae in the correct format without any errors.

Competency Level 7.4   :   Creates charts to make presentations meaningful.

Duration   :   One period

Learning Outcomes:
- Describes different types of charts.
- Accepts the value of selecting a chart to suit the need.
- Selects the correct chart on the basis of the need.
- Uses charts to display data meaningfully and clearly in day- to – day life.
- Uses spreadsheet software to draw a chart attractively

Points to clarify subject matter::

- A chart is a graphical representation of data.
- Charts are used for displaying data meaningfully and clearly.
- Different types of charts are used for different purposes
- It is necessary to select the correct type of chart according to the need.

Reading Material:

Charts are used for many different reasons and can be found everywhere. We see charts in the newspapers, magazines, and on television because they help us to display data meaningfully and clearly. There are many types of charts. Each type of graph has characteristics that make it useful in certain situations. Charts can be created using Spreadsheet software.

- Line graphs

Line graphs compare two variables. Each variable is plotted along an axis. A line graph has a vertical axis and a horizontal axis. Line graphs are used to show specific values of data. This means that given one variable, the other can easily be determined. Line graphs show clearly whether one variable is increased or decreased compared to the other.

- Bar / column charts

Bar/ column charts make comparisons between different variables very easy to see. A Bar / column chart has a vertical axis and a horizontal axis. They clearly show trends in data, meaning that they show how one variable is affected as the other rises or falls.

- Scatter diagrams

Scatter diagrams are similar to line graphs in that they use horizontal and vertical axes to plot data points. Scatter plots show how much one variable is affected by another. The relationship between two variables is called their correlation. If the data points make a straight line going from the origin out to high x- and y-values, then the variables are said to have a positive correlation. If the line goes from a high-value on the y-axis down to a high-value on the x-axis, the variables have a negative correlation.

- Pie Charts

Pie charts don't use a set of axes to plot points. In addition, they don't work with the same type of data that line graph, bar chart or scatter diagram work with. Pie charts compare different parts of the same whole. The circle of a pie chart represents 100%. Each portion that takes up space within the circle stands for a part of that 100%. In this way, it is possible to see how something is divided among different groups.

Competency 8   :   **Uses Database Management Systems Software to manage information**

Competency Level 8.1   :   **Analyses Database Management Systems (DBMS) software to identify its components.**

Duration   :   One period

Learning Outcomes:
- Names basic components of a database.
- Accepts the database as a useful method of representing data systematically.
- Interprets a table in terms of the basic component of a database.
- Develops a complex concept in terms of its basic components.
- Organizes information systematically to facilitate decision-making.

Points to clarify subject matter:
- A collection of related data can be defined as a database, where data means recorded facts.
- A table is a primary object of a database.
- A database can consist of one or more tables.
- Data can be represented through a table.
- A table consists of rows and columns.
- Rows are identified as records and columns are identified asfields.
- A record shows information about a single item or a single person in the table.
- Information in a record can be broken down into several fields.
- A record can be defined as a collection of fields.
- There are four main components (objects) of a database;
  o Tables
  o Queries
  o Forms
  o Reports

Reading Material:

Database:

A database is a collection of information related to a particular subject, entity or an event. The data needs to be organized in a particular structure within a database. A database may be generated manually or it may be computerized. A computerized database may be created and maintained either by a group of application programs written specifically for that task or by a database management system.

Database Management Systems:

A database management system is a computer software designed for the purpose of managing databases. It facilitates the process of defining, constructing, manipulating and sharing databases among various users and applications. Defining a database involves specifying the data types, structures to be stored in the database. Constructing the database is the process of storing the data that is controlled by the DBMS. Manipulating a database includes querying the database to retrieve specific data, updating the database and generating reports. Sharing a database allows

multiple users and programs to access the database concurrently. DBMSs are typically used by Database administrators in the creation of Database systems. E.g. Oracle, DB2, Microsoft Access, MySQL, OpenOffice.org Base.

You may consider OpenOffice.org Base or Microsoft Access for the activities.

Competency Level 8.2 : **Creates Tables using DBMS software**

Duration : Two Periods

Learning outcomes:

- Names the basic components of a table and defines them.
- Accepts that a table as a useful tool for systematic organization of data.
- Create tables and enters data correctly.
- Organizes information systematically.

Learning – Teaching Process:

Engagement:

- Expose the datasheet shown below to the class prepared for developing a table
- Ask them to write down the column headings of the table
- Conduct a discussion to highlight the following:
  - o Column headings are referred to as field names.
  - o A collection of fields makes a record.
  - o A row contains one item from each column in the table.
  - o Each record is identified through a unique field.
  - o Data in a field is associated with type and size.

- There are different kinds of data types:

  - o Text

  - o Number

  - o Date/time

  - o Currency

  - o Yes/No

- Using field names & data types we can create a table.
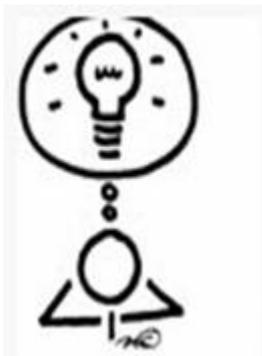
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Datasheet

Mr.Ajith Rajapaksha	Mr. Amali Silva	Miss. Dinithi Thilanga
Nagoda,	1 Cross Street,	487, Govt Housing Scheme,
Kalutara	Minuwangoda.	Aluthgama
1991.05.27	1990.06.01	1991.06.06
0777851517	0112245452	0342222755
Rs 1200.00.	Rs.1200.00	Rs 1200.00.
A1000	A1001	A1002
Miss.Arunakanthi	Miss. Rohini Perera	Miss. Sandini Amasha,
Palatota,	12,Jayagath Mawatha,	100, School Lane,
Kalutara	Panadura	Piliyandala
1990.04.09	1991.03.21	1990.05.24
0779023771	0785187701	0712221212
Rs 1200.00.	Rs 1200.00.	Rs 1200.00.
A1005	A1003	A1004

Instructions suggested for Learning:
Let's create a table

- On the basis of the reading material provided, identify field names and their data types.
- Try to develop one of the following databases:
  - o Daily sales at the school canteen.
  - o Salary particulars of school teachers.
  - o Student registration details.
  - o Production details for a company.
- Identify at least five fields for the database given.
- Enter data at least for five records.
- Identify a unique field of this database.
- Be prepared to make an innovative presentation at plenary.

Points to clarify subject matter:
- Get each group to present its findings.
- Request the presenters themselves to fill in any gaps they have left.
- Encourage the other groups to submit their constructive comments.
- Fill any gaps indicated.
- Lead a discussion to highlight the following:

Reading Material:

Data types:

There are different kinds of data types in databases. You have to select suitable data type for your fields for better performance. Each field has a Data Type.
E.g.

Field Name	Data type
Name	Text
Address	Text
Te.No.	Number
Date of Birth	Date/Time
Salary	Currency
Marks>50	Yes/No

- A text represents a group of characters of any kind, but it is limited to 255 characters.
- A number is for numeric data.
- The Date/Time to show date or time.
- The currency is used to represented a currency value.
- The Auto number sets numeric values automatically.
- The Yes/No is used to represent a Boolean value.

Primary Key:

 A primary key is any field or combination of fields in a table that uniquely identifies each record.

Graded Directions

Consider MS-Access (You may consider OpenOffice.org Base for this activity)

How to open Microsoft Access:

- **Star**t → **Programs** → **Microsoft Access** (Figure 8.2.1**)**

Figure 8.2.1

- Select: **Blank Access database** → click: **OK**

- Select a Drive → Give a name to the database → Click: **Create** (Figure 8.2.2)

Figure 8.2.2

- Select **Tables** object (Figure 8.2.3)
- Click: **New**
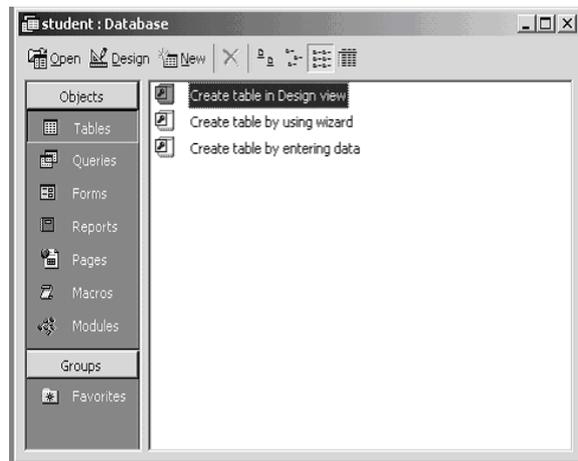
Figure 8.2.3

- Select: **Design view** from **New Table** window.(Figure 8.2.4)
- Click: **OK**
- Following screen will be appearing.
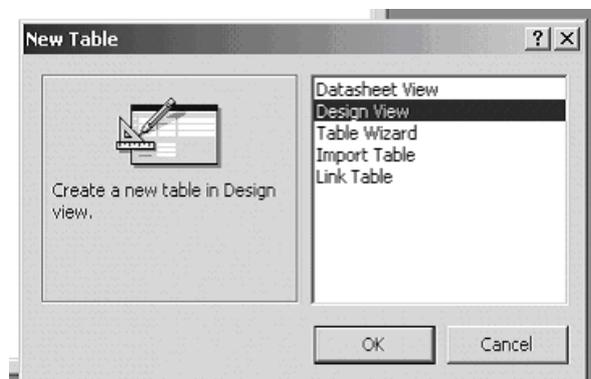
Figure 8.2.4

Change the suitable field size (Figure 8.2.5)
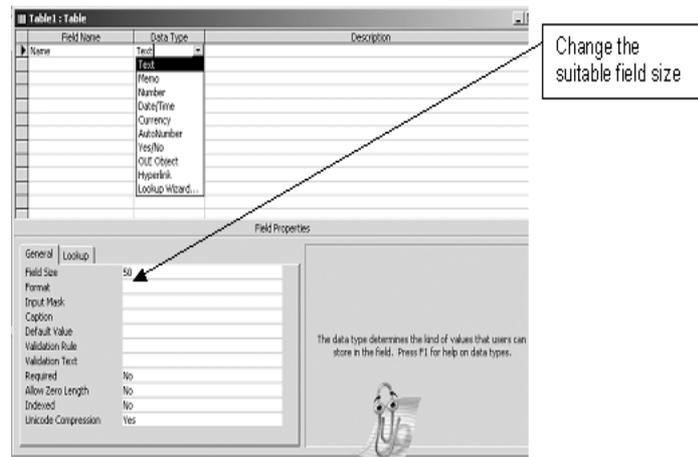
Figure 8.2.5

- In the Table view give **Field Names,** select **Data Types** and change the relevant Field Properties. (Figure 8.2.6)
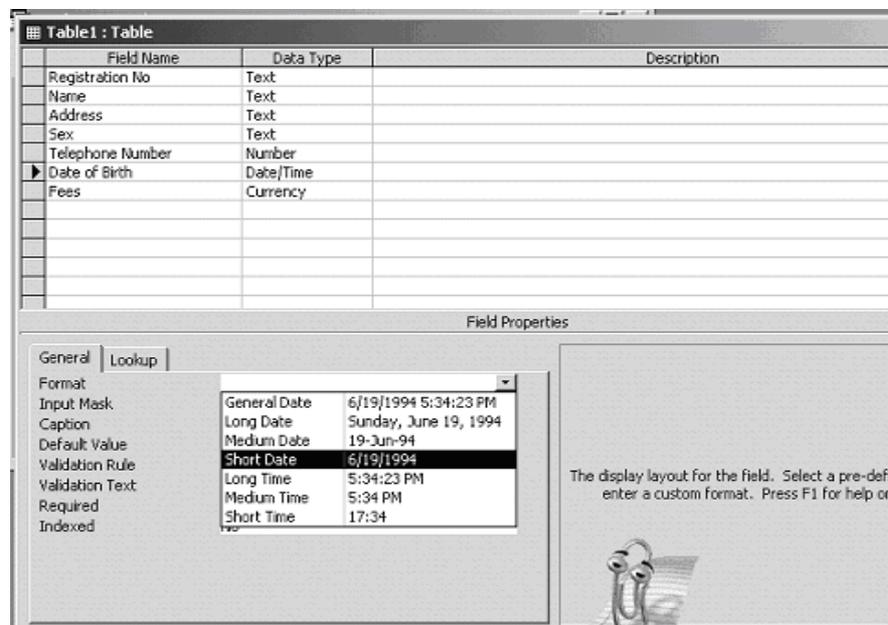
Figure 8.2.6

- Select the relevant field for the **Primary Key.** (Figure 8.2.7)
- Click: Primary Key tool from the tool bar or click: right mouse button and select: Primary Key.
- Save the table by giving a name (e.g. personal)

Figure 8.2.7

79
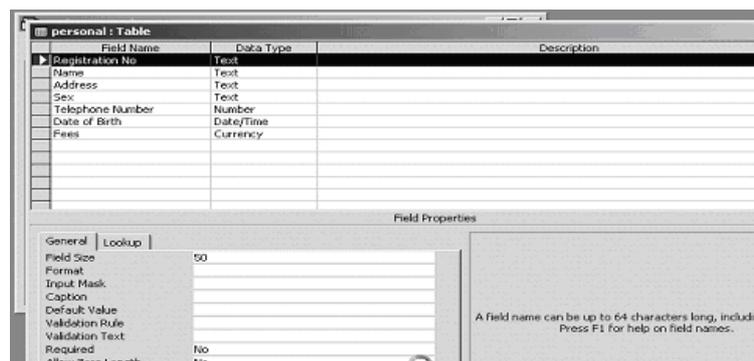
- Open the table 'personal'.
- Enter the data to the table. (Figure 8.2.9)

	Registration N	Name	Address	Sex	Telephone Nu	Date of Birth	Fees
✎	A1000	Ajith Rajapaksa	Nagoda,Kalutar:	Male	777851517	5/27/1991	Rs1,200.00
	A1001				0		
					0		

Figure 8.2.9

- Click on Save button.

Competency Level 8.3 : **Creates Queries using DBMS software**

Duration : Two periods

Learning Outcomes:
- Describes the usefulness of queries.
- Accepts that data duplication can be avoided by using queries.
- Creates queries to extract data from a table.
- Uses previous experiences to arrive at suitable answers.

Points to clarify subject matter:
- Queries are used to locate specific records within tables.
- Data can be extracted using conditions on one or more fields.
- Conditions should be written according to the valid syntax.
- Data from one or more tables can be retrieved (When they are relational).
- Filtering and sorting are some facilities that can be used when extracting data.
- The extracted data can be saved or printed

Competency Level 8.4 : **Creates Forms and Reports using DBMS software**

Duration : One period

Learning Outcomes:
- Describes the usefulness of forms and reports.
- Accepts that data can be input using forms.
- Creates reports to display data attractively.
- Maintains reports on activities in day-to-day life

Points to clarify subject matter :

.
- Form is an object that can be used to add and edit data.
- You can edit records in a table by using a form.
- A form is used when there are numerous fields in a table.
- Using forms, we can see all the fields on one screen.
- All the visual effects and features that you want to see on printed-paper from your database will be designed in a report.
- We can create a report using one or more tables, or using one or more queries.

Competency 9 : **Uses selected high-level language effectively to solve simple problems**

Competency Level 9.1 : **Uses flow charts to represent the sequence control structure determined for problem solving**

Duration : Two periods

Learning Outcomes :
- Breaks down a problem into simple tasks
- Accepts the advantages of breaking down a problem into smaller tasks
- Draws flow charts related to a given problem using appropriate symbols
- Solves problems after analyzing and breaking them into smaller components

Points to clarify subject matter:
- A complex problem can be broken down into manageable components
- Each step can be represented graphically by using basic flow chart symbols
- More complex problems require more symbols

Reading Material

Basic shapes for flowcharts are shown below (Figure 9.1.1)

→	Direction of flow
⬭	Start and Stop
◇	Decision point
▭	Processing
▱	Input or Output
⬭	Connector
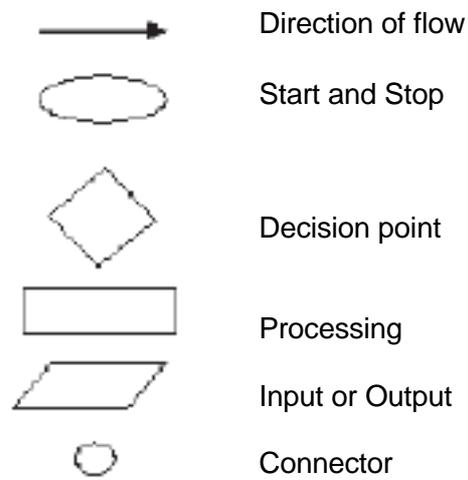
Figure 9.1.1

Basic Sequence
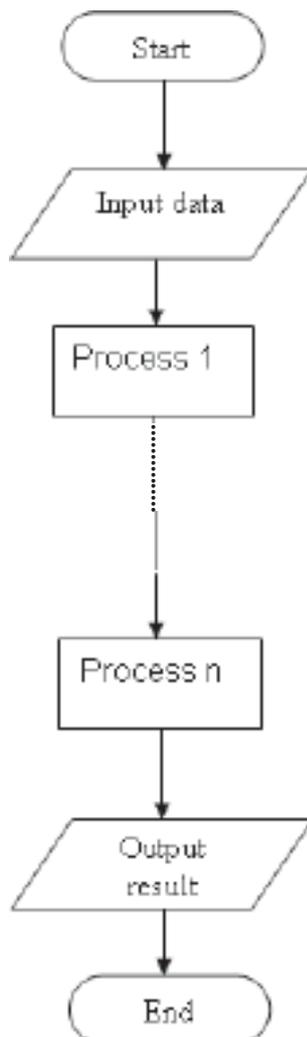
Sequence (Example)
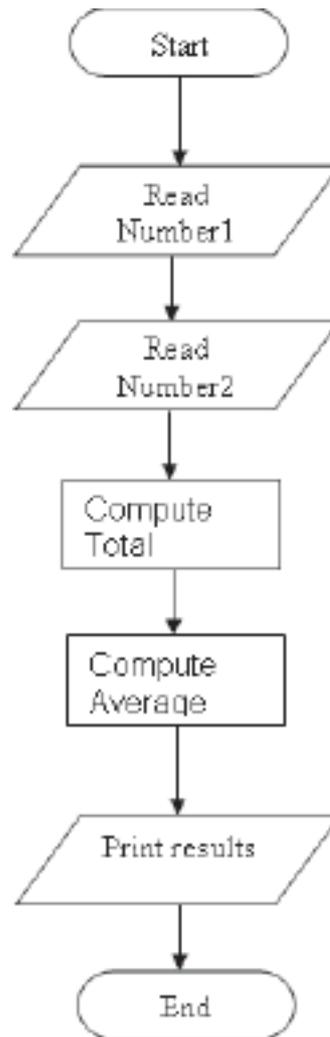
Teacher Instructions

Important : At this stage, Students should be directed to use only basic steps as below without taking any decision or making any repetition .

Making a tea
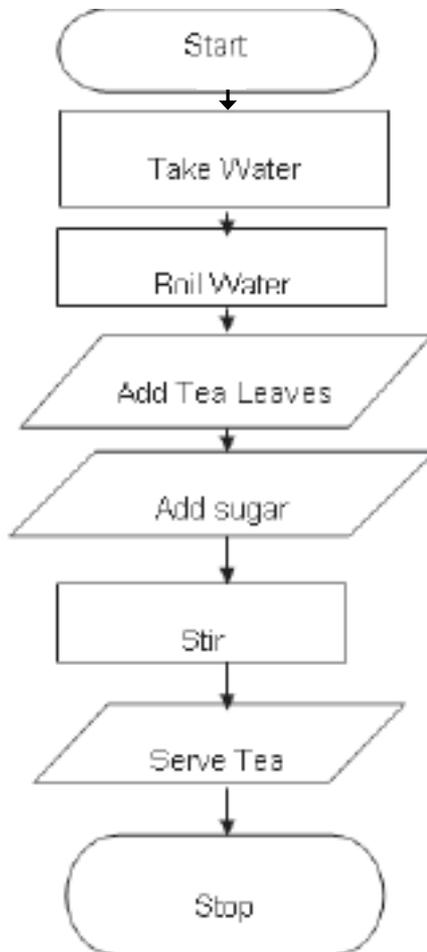
Making of Fruit salad
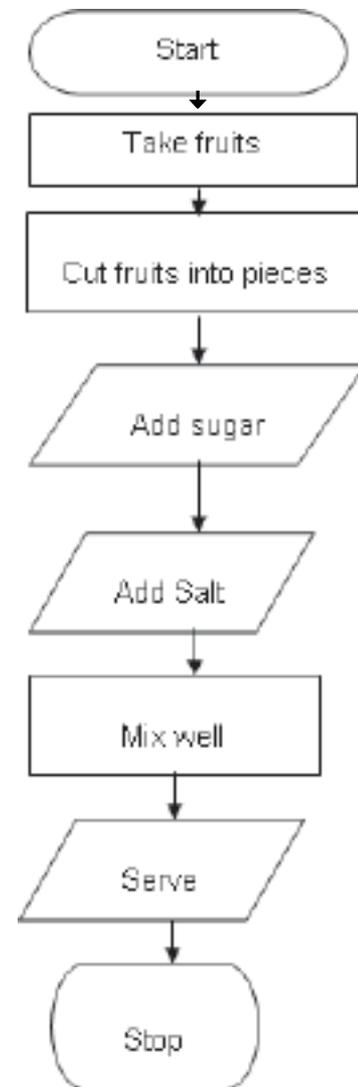
Making a kite
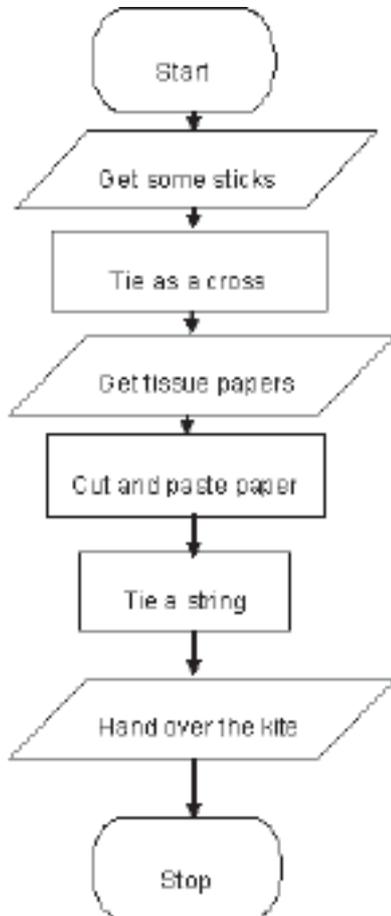
Preparing milk toffee
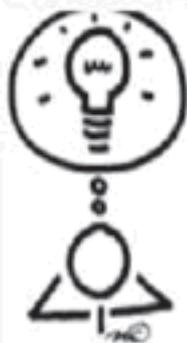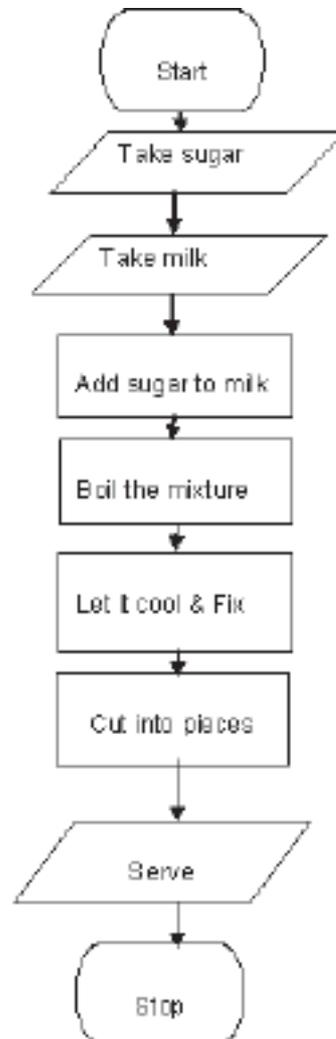
Start

Get some sticks

Tie as a cross

Get tissue papers

Cut and paste paper

Tie a string

Hand over the kite

Stop

Start

Take sugar

Take milk

Add sugar to milk

Boil the mixture

Let it cool & Fix

Cut into pieces

Serve

Stop

Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency Level 9.2 : **Uses flow charts to represent control structures of a design**

Duration : Two periods

Learning outcomes:

- Analyzes more complex problems to be solved by the computer

- Accepts the importance of breaking down complex problems into manageable components

- Draws flow charts to analyze problems with decision and repetition structures

- Takes correct decisions wherever necessary

- Solves complex problems by breaking them down into manageable components

Learning – Teaching process :

Engagement:

Conducts a discussion to highlight the following:

- In analyzing some problems, we have to take decisions
- Some tasks should be repeated to arrive at the final solution
- Computer programs can be designed to perform this type of control structures
- Different symbols are used to represent this type of control structures in flow charts

Instructions suggested for Learning:

Let's draw flow charts to analyze more complex problems with selection and repetition control structures

- Study the reading material and follow the instructions of the teacher to draw a flow chart to present the solution for the given task

- Consider following tasks to draw flow charts.

    1. Crossing the road that is divided into two one-way roads with a pavement in the middle

    2. Grading according to marks obtained by using the grade table given.

Grade Table

Marks	Grade
>=75	D
>50	C
>40	S
otherwise	F

    3. Adding odd numbers up to a given total (e.g. 81)

    4. Measuring 500g of sugar using a balance.

- Be prepared to make an innovative whole class presentation.

Points to clarify subject matter:

- Request each group to present its findings.

- Get the presenters themselves to make the first elaboration

- Get other groups to provide constructive comments

- Summarize the lesson using the students' work

- Conduct a discussion to highlight the following:
    - The Decision box is used to represent logical decisions
    - Repetition tasks can be shown as loops using flow lines
    - More complex problems may require a combination of both.

Reading Material:

A **flowchart** (also spelt **flow-chart** and **flow chart**) is a schematic representation of an algorithm or a process. (Figure 9.2.1) Basic symbols used to draw flow charts are shown in figure 9.2.2

Basic Decision   **Basic Repetition**
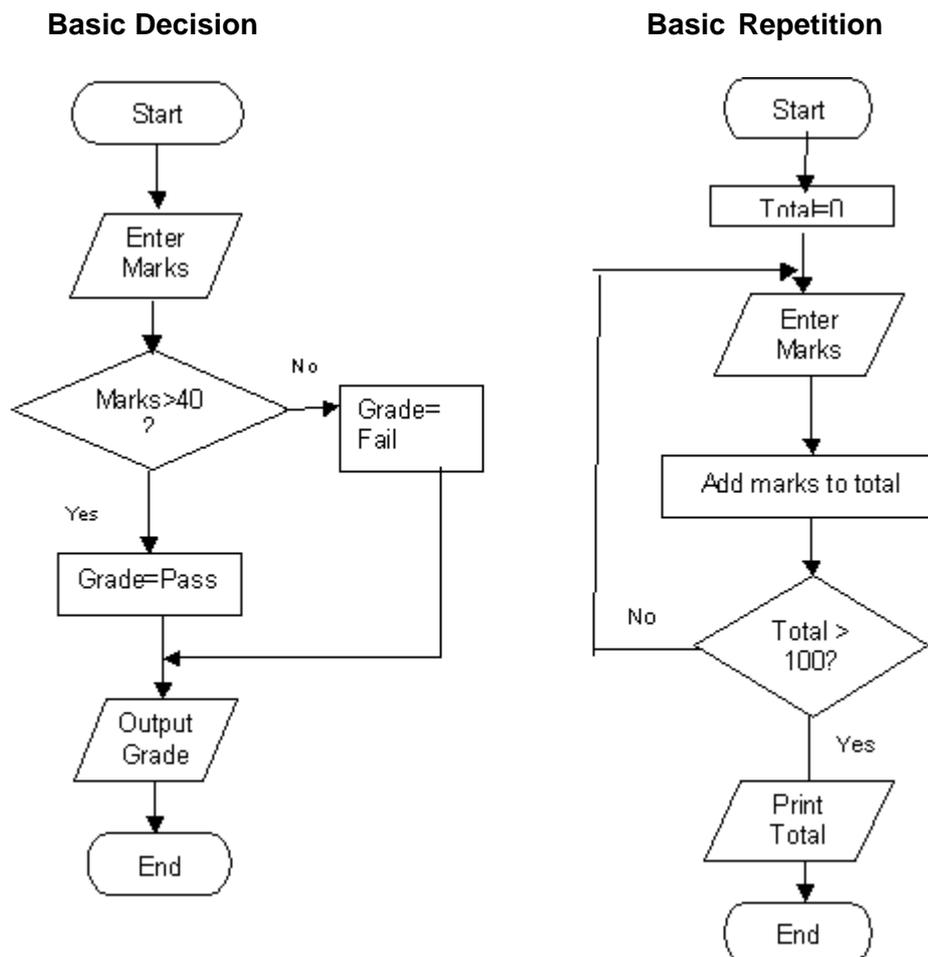
Figure 9.2.1

Basic Flowchart Symbols

Symbol	Symbol Name(Alternate Shape Name)	Symbol Description
	Terminator(Terminal Point, Oval)	Terminators show the start and stop points in a process. When used as a Start symbol, terminators depict a *trigger action* that sets the process flow into motion.
	Process	Show a Process or action step. This is the most common symbol in both process flowcharts and business process maps.
	Predefined Process(Subroutine)	A Predefined Process symbol is a marker for another process step or series of process flow steps that are formally defined elsewhere. This shape commonly depicts sub-processes (or subroutines in programming flowcharts). If the sub-process is considered "known" but not actually defined in a process procedure, work instruction, or some other process flowchart or documentation, then it is best not to use this symbol since it implies a formally defined process.
	Alternate Process	As the shape name suggests, this flowchart symbol is used when the process flow step is an alternate to the normal process step. Flow lines into an alternate process flow step are typically dashed.
	Decision	Indicates a question or branch in the process flow. Typically, a Decision flowchart shape is used when there are 2 options (Yes/No, No/No-Go, etc.)
	Data(I/O)	The Data flowchart shape indicates inputs to and outputs from a process. As such, the shape is more often referred to as an I/O shape than a Data shape.

Figure 9.2.2

Teacher Instructions:

- Students should be instructed to follow the following instructions to come out with the flow charts as given below (Figure 9.2.3 & Figure 9.2.4)

- Identify the decision steps

- Identify the repetition steps

- Draw a flow chart using appropriate symbols

Crossing the road　　　　　　　**Grading according to marks obtained**
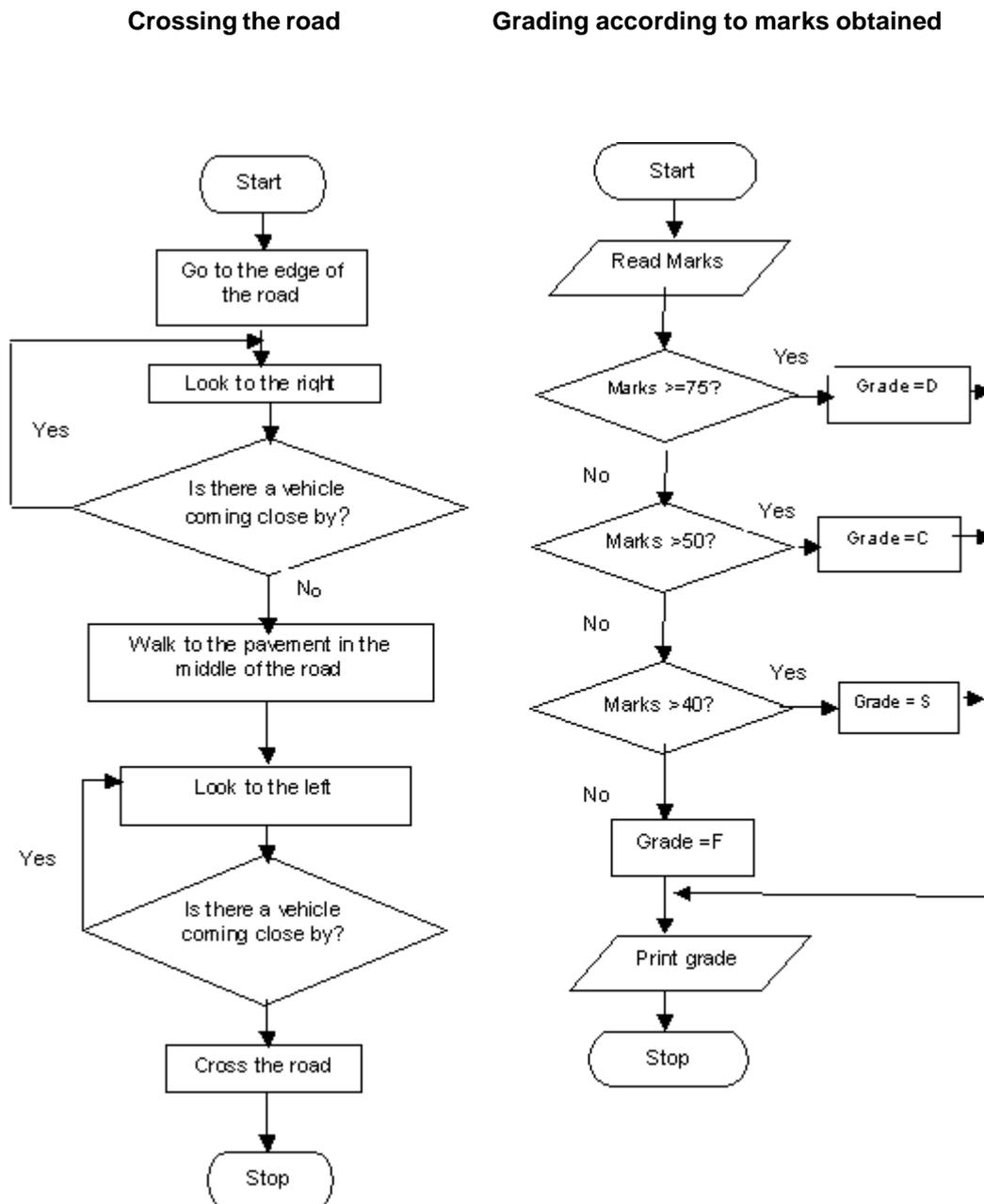
Figure 9.2.3
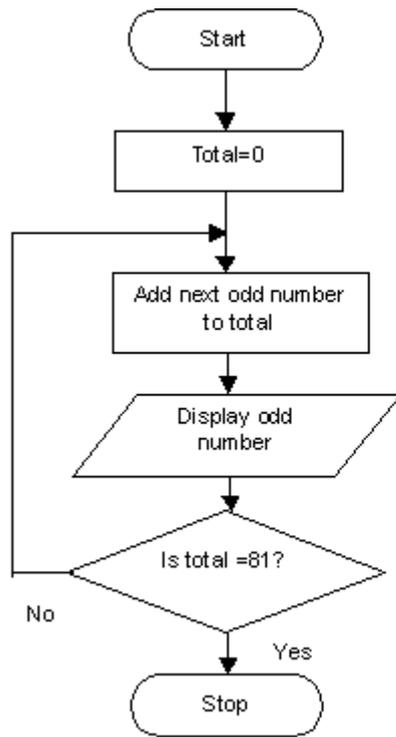
Add odd numbers   **Measuring 500g of sugar**
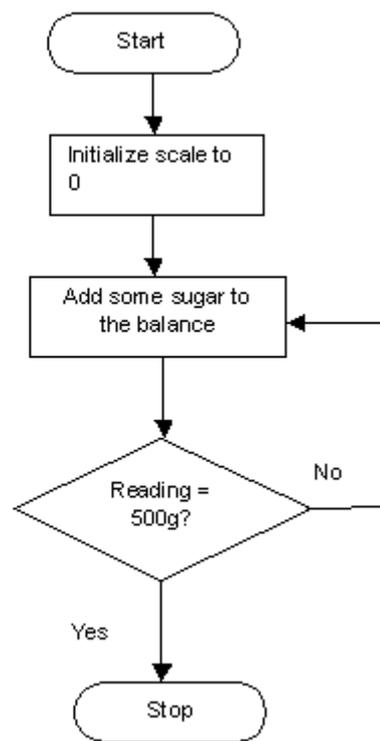
Figure 9.2.4

Competency Level 9.3 : **Uses flow charts to represent the integrated control structures**

Duration : One period

Learning Outcomes:
- Analyses more complex problems with decisions and repetitions that occur together
- Accepts that problems can be solved correctly by taking appropriate decisions at the correct time
- Draws flow chart to solve complex problems
- Solves problems by taking correct decisions at the correct time
- Takes decisions as a member of the group one belongs to

Points to clarify subject matter:
- More complex problems have both selection and repetition control structures
- Flow charts can be drawn to solve such complex problems using decision boxes and flow lines as in loops
- Flow charts can be converted into pseudo code and high level language

Reading Material

Using flow charts to design programs

Flow chart to calculate the summation of even numbers from 2 to 20 (Figure 9.3.1)
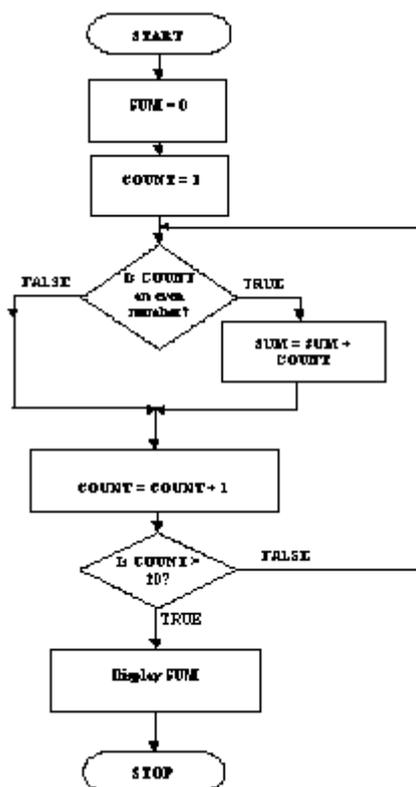
Figure 9.3.1

The major reasons are that the flow chart,

- is easier to read

- more closely follows a standard, this is not the case with pseudo code

- probably lends itself more readily to computer-aided techniques of program design

Teacher Instructions:

Students should be instructed to follow the following instructions to come up with the flow charts, as given below (Figure 9.3.2 & Figure 9.3.3)

- Identify the decision steps

- Identify the repetition steps

- Identify how they have been combined

- Draw a flow chart using appropriate symbols
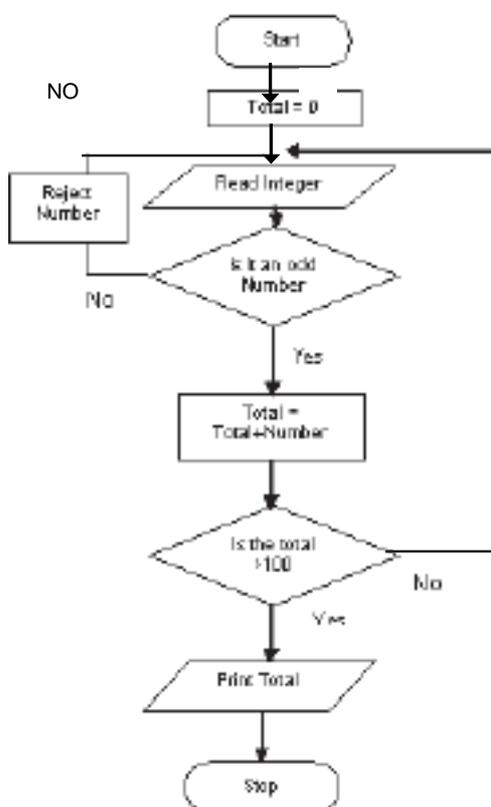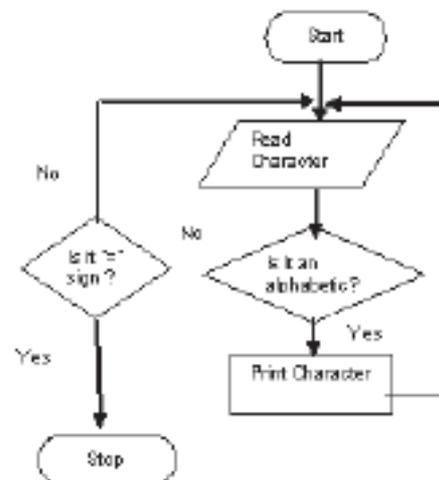
Figure 9.3.2

Flow chart to read marks of *forty students* and print
"PASS" if mark >39 and "FAIL" if mark <=39.
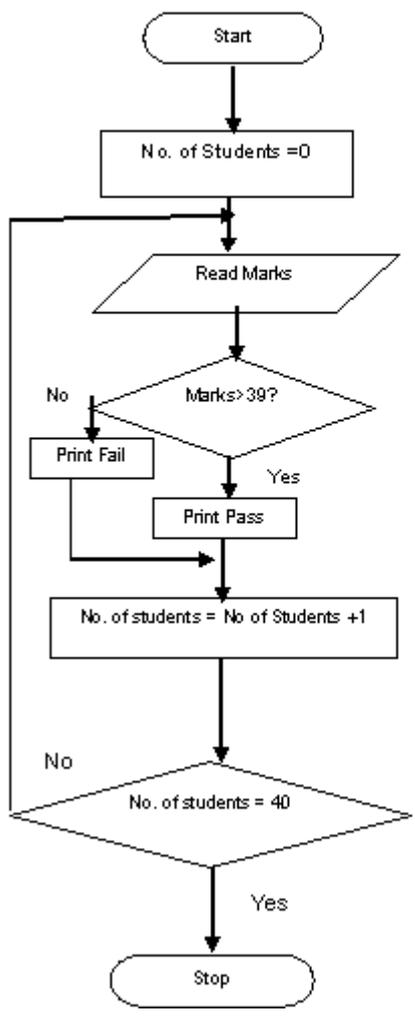
Flow chart to read prices of 10 items and if the price is less than Rs. 100/= that item is iincluded in the bill and print the name and price of each item and total price, in the bill
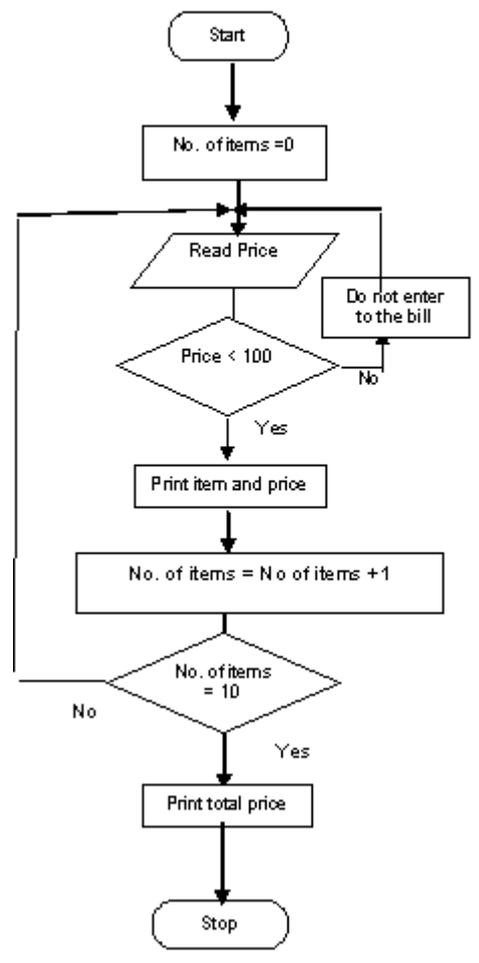
Figure 9.3.3

Competency Level 9.4 : **Identifies codes to represent data types used in high level computer programming languages**

Duration : Three periods

Learning Outcomes:
- Identifies the data used in a program
- Accepts the advantage of selecting suitable data types to represent data.
- Writes high level language codes using correct syntax
- Works on the basis of sequential thinking
- Takes decisions as a member of the group

Points to clarify subject matter:

- To declare variables of different data types specific key words (eg.integer, real, char, string, Boolean)are used
- Key words var(pascal) or dim(vb) are used to define variables.
- Const keyword is used to define constants.
- Naming rules are used to select suitable variable names.
- Language syntax is followed to assign a value to a variable follow rules.(eg: "=" for const , ":= "for var)

Reading Material:

Visual Basic Data Types

There are many types of data we come across in our daily life. For example, we need to handle data such as names, addresses, money, dates, stock quotations, statistics etc everyday. Similarly in Visual Basic, we also deal with these kinds of data. However, to be more systematic, VB divides data into different types.

Types of Visual Basic Data

Numeric Data

Numeric data are data that consist of numbers, which can be computed mathematically with various standard operators such as add, minus, multiply, divide and so on. In Visual Basic, numeric data are divided into 7 types,

Table 1: Numeric Data Types

Type	Storage	Range of Values
Byte	1 byte	0 to 255
Integer	2 bytes	-32,768 to 32,767
Long	4 bytes	-2,147,483,648 to 2,147,483,648
Single	4 bytes	-3.402823E+38 to -1.401298E-45 for negative values 1.401298E-45 to 3.402823E+38 for positive values.
Double	8 bytes	-1.79769313486232e+308 to -4.94065645841247E-324 for negative values 4.94065645841247E-324 to 1.79769313486232e+308 for positive values.
Currency	8 bytes	-922,337,203,685,477.5808 to 922,337,203,685,477.5807
Decimal	12 bytes	+/- 79,228,162,514,264,337,593,543,950,335 if no decimal is use +/- 7.9228162514264337593543950335 (28 decimal places).

Table 2: Nonnumeric Data Types

Data Type	Storage	Range
String(fixed length)	Length of string	1 to 65,400 characters
String(variable length)	Length+10 bytes	0 to 2 billion characters
Date	8 bytes	January 1, 100 to December 31, 9999
Boolean	2 bytes	True or False
Object	4 bytes	Any embedded object
Variant(numeric)	16 bytes	Any value as large as Double
Variant(text)	Length+22 bytes	Same as variable-length string

Example program 01

```
Dim number1, number2, number3 as Integer
Dim total, average as double
Private sub Form_Clicknumber1=val(Text1.Text)
number2=val(Text2.Text)
number3= val(Text3.Text)
    Total=number1+number2+number3
    Average=Total/5
    Label1.Caption=Total
    Label2.Caption=Average
End Sub
```

Assigning Values to Variables

After declaring various variables using the Dim statements, we can assign values to these variables. The general format of an assignment is

Variable=Expression

The variable can be a declared variable or a control property value. The expression could be a mathematical expression, a number, a string, a Boolean value (true or false) and etc. The following are some examples:

firstNumber=100

secondNumber=firstNumber-99

rojani="Sunimal"

userpass.Text = password

Label1.Visible = True

Command1.Visible = false

Label4.Caption = textbox1.Text

ThirdNumber = Val(usernum1.Text)

total = firstNumber+secondNumber+ThirdNumber

Pascal Variables and Data Types

Definitions:
- Variable: provides temporary storage of data.
- Data Type: defines the type of data that will be stored in a variable.
- VAR Heading: every variable must be assigned a data type and given a unique name. Declaration of variables must be done in the VAR heading section.

Overview of Pascal Data Types:

Name	Type of Data	Examples
String	Holds Text	'New York', 'Evan'
Integer	Holds whole numbers	3, 6, 1024
Real	Holds Decimal Numbers	3.14, 503.2
Boolean	Holds True or False	TRUE, FALSE
Character	Holds a single character	'A', 'e'

Strings: When declaring a string variable, you usually indicate its maximum length (1- 255). For example, to create a variable called City that can hold up to 25 characters, you would type: city: String[25]; If you do not include a maximum size, the string is given a default maximum size = 255.

Variable Ranges

Data Type	Minimum Value	Maximum Value
Integer	-32,768	32,767
LongInt	-2,147,483,648	2,147,487,647
ShortInt	-128	128
Real	2.9 x 10 E-39	1.7 x 10 E+38

Rules for Identifier Names
All identifier names, including program names and variable names must follow the following rules:

- Must begin with a letter or underscore (_)

- Can only contain letters, numbers, or underscore (_)

- Cannot contain any blank spaces

Let's define some constants of various data types: strings, characters, integers, real, and Boolean.

```
var
 age, year, grade : integer;
 circumference : real;
 LetterGrade : char;
 DidYouFail : Boolean;
```

An example: declaring several variables ;
```
const
 Name = 'Dharma sri';
 FirstLetter = 'a';
 Year = 2007;
 pi = 3.1415926535897932;
 UsingMozilla = TRUE;
```

Example 1. Pascal Program to add two numbers

```
Program sum,
        Var
        a, b:Integer;
        Sum:Real;
        Begin
                Writeln('Enter First Number');

                Readln(a);

                Writeln('Enter Second Number');
                Readln(b);
                Total:= (a+b);
                Writeln('Total = ' ,total);
        End.
```

Example 2 :

Find the sum and average of five integers. The sum should be an integer, and the average should be real. The five numbers are: 45, 7, 68, 2, and 34.

Use a constant to signify the number of integers handled by the program, i.e. define a constant as having the value 5. Then print it all out! The output should look something like this:

```
Number of Integers=5
Number1=45
Number2=75
Number3=68
Number4=2
Number5=34
Sum = 156
Average = 3.1200000000E+01
```

The Pascal program

```
program SumAverage;

const
  NumberOfIntegers = 5;

var
  A, B, C, D, E : integer;
  Sum : integer;
  Average : real;

begin    (* Main *)
  A := 45;
  B := 7;
  C := 68;
  D := 2;
  E := 34;
  Sum := A + B + C + D + E;
  Average := Sum / NumberOfIntegers;
  writeln ('Number of integers = ', NumberOfIntegers);
  writeln ('Number1 = ', A);
  writeln ('Number2 = ', B);
  writeln ('Number3 = ', C);
  writeln ('Number4 = ', D);
  writeln ('Number5 = ', E);
  writeln ('Sum = ', Sum);
  writeln ('Average = ', Average)
end.    (* Main *)
```

Instructions for teachers:

Students should be instructed to follow the flowcharts and select suitable data types as below.
- Declare variables and constants needed to write the program.
- Give valid identification names
- Code using correct syntax

Flow chart 01 – Add two numbers

Start

Greeting =Hello

Enter first initial

Enter last name

Print greeting + name with initials

End

Flow chart 02-Print "boy" or "girl" according the gender)

Start

Enter gender (male=true, female=false)

If (gender=TRUE)

No

Yes

Print "GIRL"

Print "BOY"

End

Flow chart 03 - Read a mark and print average

Start

Enter first number

Enter second number

Find average

Print average

End

Answers in PASCAL

Variable declaration for flow chart 01

Const
Greeting = 'Hello ';
Var
FirstInitial : char;
LastName , nameWithInitials: string;

Variable declaration for flow chart 02

Var

gender : Boolean;

Variable declaration for flow chart 03

Var
First_Number, second_number : integer;
Average : real;

Answers in VB

Variable declaration for flow chart 01

Const Greeting = 'Hello '
Dim FirstInitial as string
Dim LastName , nameWithInitials as string

Variable declaration for flow chart 02

Dim gender as Boolean

Variable declaration for flow chart 03

Dim First_Number, second_number as integer
Dim Average as real

Competency Level 9.5 : **Identifies codes to represent conditional logic used in high level computer languages**

Duration : Three periods

Learning outcomes:
- Gets relevant user data and assigns input values to variables
- Formats the output for readability and meaningfulness
- Uses correct syntax for assigned statements, calculations and logical operations
- Identifies the decision points and repetitive steps in a problem
- Accepts the advantage of selecting suitable selection method to represent the logic.

Learning – Teaching process:

Engagement:
Conducts a discussion to highlight the following ideas
- Different operators are used to perform various calculations.
  - o Mathematical operators (+, -, /, *, mod, div, ^)
  - o Relational operators (<, >, =, <=, >=, <>,!=)
  - o Logical operators (And, Or, Not)
- Input statement is used to get and set variable values
- Output statement is used to display messages and variable values
- Conditional statements (if, if. else, case)are used when taking decisions
- Repetitive statements are used to convert loops in flow charts

Instructions suggested for Learning:

Lets Identify coding related to conditional logic used in high level computer programming

languages
- Read the given reading material to identify input and output syntax of the programming language

- Recognize operations used in the Programming language

- Check how conditions are satisfied

- How repetitive tasks are performed and controlled in the programming language

- Identify the syntax and how they are defined

  - o Using Visual Basic or

  - o Pascal, programming language

- Prepare a presentation to demonstrate your findings to the whole class.

Points to clarify subject matter:
- Request each group to present its findings.

- Get the presenters themselves to make the first elaboration

- Invite the other groups to provide their constructive comments

- Summarize the lesson using the students' work

- Conduct a discussion to highlight the following:
  - Input
  - Output
  - Assign values to variables
  - Operations – arithmetic, relational, logical
  - Sequence
  - Selection – if then, if then else, case
  - Repetitions – for, while, repeat

Reading material

Visual Basic Operators

In order to compute inputs from users and to generate results, we need to use various mathematical operators. In Visual Basic, except for + and -, the symbols for the operators are different from normal mathematical operators, as shown in below

Arithmetic Operators

Operator	Mathematical function	Example
^	Exponential	2^4=16
*	Multiplication	4*3=12
/	Division	12/4=3
Mod	Modulus(return the remainder from an integer division	15 Mod 4=3
\	Integer Division(discards the decimal places)	19\4=4
+ or &	String concatenation	"Visual"&"Basic"="Visual Basic"

Example 1

```
Dim firstName As String
Dim secondName As String
Dim yourName As String
 Private Sub Command1_Click()
       firstName = Text1.Text
       secondName = Text2.Text
       yourName = secondName + " " + firstName
     Label1.Caption = yourName
End Sub
```

 In this example, three variables are declared as string. For, variables' firstName and secondName will receive their data from the user's input into textbox1 and textbox2, and the variable yourName will be assigned the data by combining the first two variables. Finally, yourName is displayed on Label1.

Example 2

```
Dim number1, number2, number3 as Integer
Dim total, average as variant
Private sub Form_Click
       number1=val(Text1.Text)
       number2=val(Text2.Text)
       number3= val(Text3.Text)
        Total=number1+number2+number3
       Average=Total/5
       Label1.Caption=Total
       Label2.Caption=Average
End Sub
```

In the example above, three variables are declared as integer and two variables are declared as variant. Variant means the variable can hold any numeric data type. The program computes the total and average of the three numbers that are entered into three text boxes. In the coming Lessons, we will see how to write more complex VB programs using mathematical operators and equations

Controlling Program Flow

Conditional Operators

To control the VB program flow, we can use various conditional operators. Basically, they resemble mathematical operators. Conditional operators are very powerful tools, they let the VB program compare data values and then decide what action to take, whether to execute a program or terminate the program etc. These operators are shown below.

Operator	Meaning
=	Equal to
>	More than
<	Less Than
>=	More than and equal
<=	Less than and equal
<>	Not Equal to

Conditional Operators

You can also compare strings with the above operators. However, there are certain rules to be followed: Upper case letters are less than lowercase letters, "A"<"B"<"C"<"D".......<"Z" and number are less than letters.

Logical Operators

In addition to conditional operators, there are a few logical operators which offer added power to the VB programs. There are shown below.

Operator	Meaning
And	Both sides must be true
or	One side or other must be true
Xor	One side or other must be true but not both
Not	Negates truth

Using If.....Then.....Else Statements with Operators

To effectively control the VB program flow, we shall use If...Then...Else statement together with the conditional operators and logical operators.The general format for the if...then...else statement is

If conditions **Then**

VB expressions

Else

VB expressions

End If

Any If..Then..Else statement must end with End If. Sometimes it is not necessary to use Else.

Example:

```
Private Sub OK_Click()

firstnum = Val(usernum1.Text)

secondnum = Val(usernum2.Text)

total = Val(sum.Text)

If  total = firstnum + secondnum And Val(sum.Text) <> 0 Then

        correct.Visible = True

        wrong.Visible = False

Else

        correct.Visible = False

        wrong.Visible = True

End If

End Sub
```

Select Case

If you have a lot of conditional statements, using If..Then..Else could be very messy. For multiple conditional statements, it is better to use Select Case
The format is :

```
Select Case expression
  Case value1
      Block of one or more VB statements
  Case value2
      Block of one or more VB Statements
  Case value3
      Block of one or more VB statements
  Case value4
  Case Else
      Block of one or more VB Statements
End Select
```

The data type specified in the expression must match that of Case values.

Example1

```
' Examination Grades
Dim grade As String
Private Sub Compute_Click( )
grade=txtgrade.Text
Select Case grade
 Case  "A"
      result.Caption="High Distinction"
  Case "A-"
     result.Caption="Distinction"
  Case "B"
```

```
            result.Caption="Credit"
      Case "C"
            result.Caption="Pass"
      Case Else
            result.Caption="Fail"
      End Select
```
*Please note that grade is a string, so all the case values such as "A" are of String data type.

Example 2
```
Dim mark As Single
Private Sub Compute_Click()
'Examination Marks
 mark = mrk.Text

Select Case mark
 Case Is >= 85
      comment.Caption = "Excellence"
Case Is >= 70
      comment.Caption = "Good"
Case Is >= 60
   comment.Caption = "Above Average"
Case Is >= 50
comment.Caption = "Average"
Case Else
comment.Caption = "Need to work harder"
End Select
End Sub
```
Note: we use the keyword is here to impose the conditions. This is generally used for numeric
          data.

Example .3
Example .2 could be rewritten as follows:
```
Dim mark As Single
Private Sub Compute_Click()
'Examination Marks
 mark = mrk.Text

Select Case mark
 Case 0 to 49

      comment.Caption = "Need to work harder"
  Case 50 to 59
      comment.Caption = "Average"
  Case 60 to 69
       comment.Caption = "Above Average"
  Case 70 to 84
        comment.Caption = "Good"
   Case Else
        comment.Caption = "Excellence"
End Select
End Sub
```

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Pascal code

Making decisions

Most programs need to make decisions. There are several statements available in the Pascal language for this. The **IF** statement is one of the them. The **relational operators**, listed below, allow the programmer to test various variables against other variables or values.

    =   Equal to
    >   Greater than
    <   Less than
    <> Not equal to
    <= Less than or equal to
    >= Greater than or equal to

The format for the **IF THEN** Pascal statement is,

```
if  condition_is_true  then
        execute_this_program_statement;
```

The condition (ie, A < 5) is evaluated to see if it's true. When the condition is true, the program statement will be executed. If the condition is not true, then the program statement following the keyword **then** will be ignored.

```
program IF_DEMO (input, output);  {Program demonstrating IF THEN statement}
var    number, guess : integer;
begin
     number := 2;
     writeln('Guess a number between 1 and 10');
     readln( guess );
     if number = guess then  writeln('You guessed correctly. Good on you!');
     if number <> guess  then  writeln('Sorry, you guessed wrong.')
end.
```

What is the resultant output when this program is run.

```
program  FOR_TEST ( output );
var     s, j, k, I, l : integer;
begin
     s := 0;
     for  j:= 1 to 5 do
     begin
        write( j );
         s := s + j
     end;
     writeln( s );
     for  k := 0 to 1 do write( k );
     for  I := 10 downto 1 do writeln( I );
     j := 3; k := 8; l := 2;
     for  I := j to k do  writeln( I + l )
end.
```

The CASE statement

The case statement allows you to rewrite code which uses a lot of if else statements, making the program logic much easier to read. Consider the following code portion written using if else statements,

```
if operator = '*' then result := number1 * number2
  else if operator = '/' then result := number1 / number2
    else if operator = '+' then result := number1 + number2
      else if operator = '-' then result := number1 – number2
        else  invalid_operator = 1;
```

Rewriting this using case statements,

```
case  operator  of
    '*' : result:= number1 * number2;
    '/' : result:= number1 / number2;
    '+' : result:= number1 + number2;
    '-' : result:= number1 – number2;
otherwise    invalid_operator := 1
end;
```

The value of *operator* is compared against each of the values specified. If a match occurs, then the program statement(s) associated with that match are executed.

If *operator* does not match, it is compared against the next value. The purpose of the *otherwise* clause ensures that appropriate action is taken when *operator* does not match against any of the specified cases.

You must compare the variable against a constant, however, it is possible to group cases as shown below,

```
case  user_request  of

    'A', 'a' :  call_addition_subprogram;

     's', 'S' :  call_subtraction_subprogram;
end;
```

```
1: program LoopADoop2;
2:
3:  var
4:    x: integer;
5:
6:  begin
7:    x := 1;
8:    while x <= 5 do
9:      x := x + 1;
10:   Writeln(x);
11:
12:   x := 1;
13:   repeat
14:     x := x + 1;
15:   until x >= 5;
16:   Writeln(x);
17: end.
```

The Result

6
5

Competency Level 9.6 : Uses selected high level language effectively to solve simple problems

Duration : Three periods

Learning Outcomes:
- Writes a program to solve the given problem
- Appreciates the importance of planning the solution
- Draws a flow chart to solve the problem
- Identifies the appropriate steps in solving a problem
- Accepts the advantage of selecting a suitable method to represent the logic.

Learning – Teaching process

Engagement :

Conduct a discussion to highlight the following ideas:
- Mathematical problems can be solved using the computer
- Control structure may be;
  - o Sequence
  - o Selection
  - o Repetition
- A single problem may contain one or more of these control structures

Flow charts can be converted to computer programs using high-level languages

Instructions suggested for Learning:

Let's draw flow charts and develop computer programs to solve problems

- Consider the following problems assigned to your group
  - o Read two numbers and carry out simple mathematical operators (+, -, x, /)
    Awards grades of marks according to the grade table given below
  - o Solve a quadratic equation
  - o Find the factorial of a number
- First, draw a flow chart to solve the problem assigned to you
- Then, write a program to solve the problem through the computer using Pascal or Visual Basic as the programming language
- Prepare for an innovative presentation at the plenary session

Marks	Grade
>=75	D
50-74	C
35-49	S
00-34	F

Points to clarify subject matter :

- Request each group to present its findings.

- Get the presenters themselves to make the first elaboration

- Invite the other groups to provide constructive comments

- Summarize the lesson using the students' work

- Conduct a discussion to highlight the following:
  - o Simple mathematical problems can be graphically represented using flow charts
    Flow charts are converted into programs using a programming language

Instruction for the teacher:

Program 01 – Simple Mathematical Operators
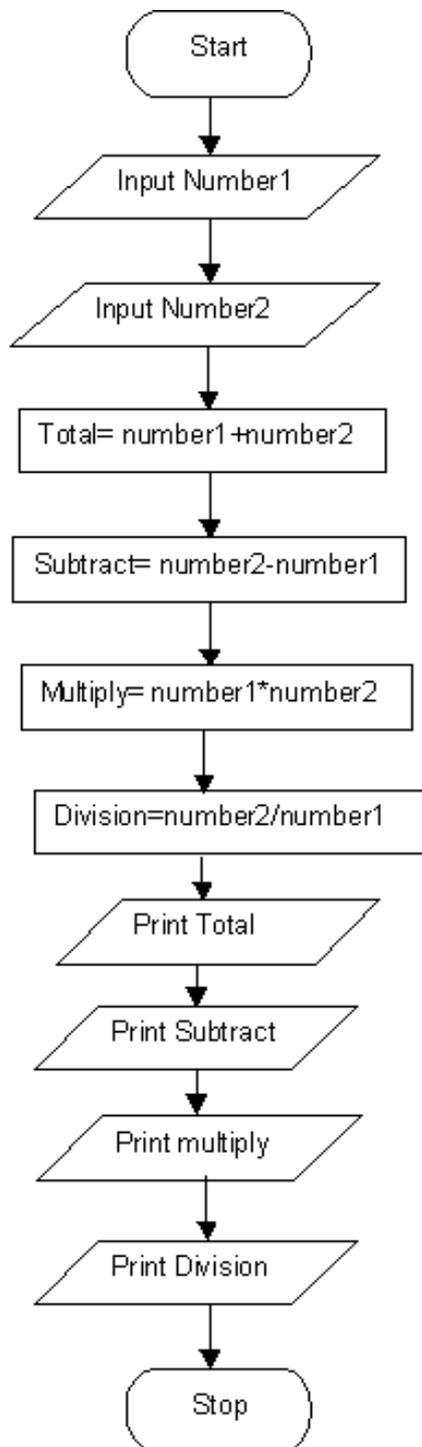

```
Pascal Program

Program maths(input, output);
Var
    number1, number2: integer;
    total, subtract, multiply, division: real;

Begin
   Writeln('Enter the First Number');
   Readln(number1);
   Writeln('Enter the Second Number');
   Readln(number2);
   total:=number1+number2;
   subtract:=number2-number1;
   multiply :=number1*number2;
   division:= number2/number1;
   Writeln( number1, '+', number2,' = ',total:6:2);
   Writeln( number2, '-', number1,' = ',subtract:6:2);
   Writeln( number1, 'x', number2,'',multiply:6:2);
   Writeln( number2, '/ ', number1, ' = ',division:6:2);
    Readln;
End.
```

```
VB Program
Dim number1, number2 as Integer
Dim total, subtract, multiply, division as variant
Private sub Form_Click
        number1=val(Text1.Text)
        number2=val(Text2.Text)
        Total=number1+number2
        subtract = number2-number1
        multiply=number1*number2
        division=number2/number1
        Label1.Caption=Total
        Label2.Caption=subtract
        Label3.Caption= multiply
        Label4.Caption=division
        End Sub
```

Program 2 – Grade Marks

Flow Chart

```
                    ┌──────────┐
                   (   Start    )
                    └────┬─────┘
                         │
                  ╱──────┴──────╲
                 ╱ Input Marks   ╱
                 ╲──────┬───────╱
                        │
                        │                        Yes
                 ◇ Marks>= 75 ◇──────────────────────┐
                        │                             │
                       No│                            ▼
                        │                      ┌────────────┐
                        │                      │ Grade="D"  │
                  ◇ Marks>= 50 ◇───Yes──┐      └─────┬──────┘
                        │               │            │
                       No│              ▼            │
                        │         ┌──────────┐       │
                        │         │Grade="C" │       │
                  ◇ Marks>= 35 ◇  └────┬─────┘       │
                        │    │         │             │
                       No│   Yes       │             │
                        │   ┌──────────┐│            │
                        │   │Grade="S" ││            │
                 ┌──────────┐└────┬────┘│            │
                 │Grade="F" │     │     │            │
                 └────┬─────┘     │     │            │
                      │◄──────────┴─────┴────────────┘
                      │
               ╱──────┴──────╲
              ╱ Print Grade   ╱
              ╲──────┬───────╱
                     │
                ┌────┴─────┐
               (   Stop     )
                └──────────┘
```
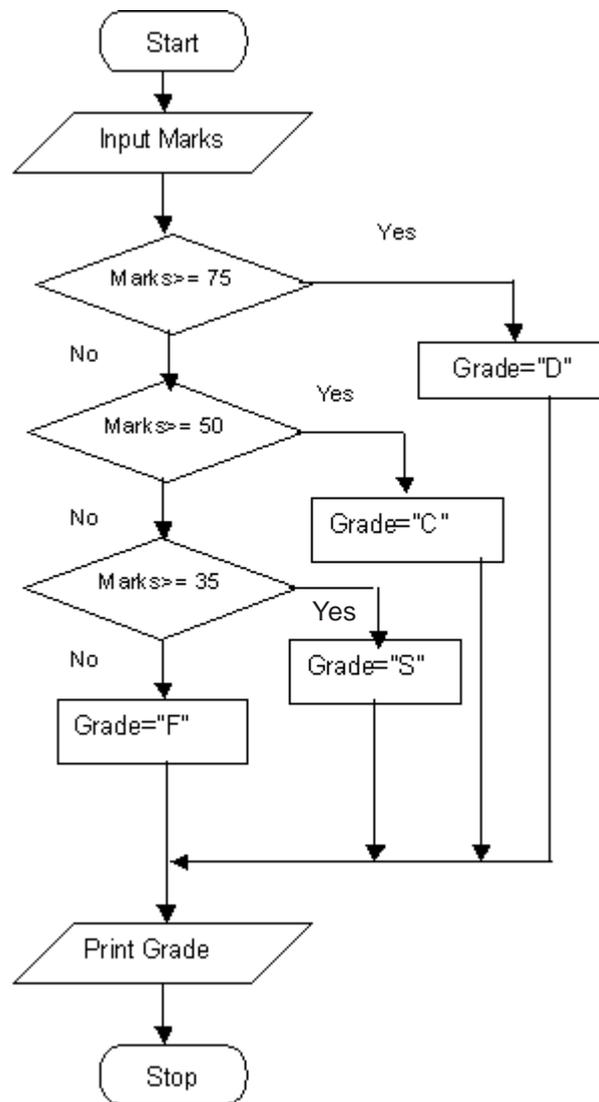
Pascal Program	VB Program

Program Marks(Input,Output);
Var
 	
Mark:Integer;
 	
Begin
 	
Writeln('Enter Marks :');
 	
    Readln(mark);
 	
    IF mark >=75 Then
 	
    Writeln('Grade =D')
 	
    Else if mark>= 50 Then
 	
        Writeln('Grade =C')
 	
    Else if mark>= 35 Then
        Writeln('Grade = S')
    Else
        Writeln ('Grade=F');
End.
	Dim mark As Single
	Private Sub Compute_Click()
	
	'Examination Marks
	
	mark = Val (mrk.Text)
	    Select Case mark
	        Case Is >= 75
	            comment.Caption = "D"
	        Case Is >= 50
	            comment.Caption = "C"
	        Case Is >= 35
	            comment.Caption = "S"
	        Case Else
	            comment.Caption = "F"
	    End Select
	End Sub

Program 3: Sample Solution of a Quadratic Equation
Flow Chart

$$Root1 = \frac{-b + \sqrt{(b^2-4ac)}}{2a}$$

$$Root2 = \frac{-b - \sqrt{(b^2-4ac)}}{2a}$$

VB Program

```
option explicit
Dim a,b,c As Variant
Dim x1,x2,t As Variant
Private Sub Find Root_Click ()
    a=Val(Text1.text)
    b=Val(Text2.text)
    c=Val(Text3.text)
    t=(b*b-4*a*c)
    If t>=0 Then
        x1=(-b+(t)^0.5)/(2*a)
        x2=(-b-(t)^0.5)/(2*a)
        Label6.caption=x1
        Label7.caption=x2
    Else
        Label6.caption="no real roots"
    End If
End Sub
Private Sub Clear_Click()
    Text1.text=""
    Text2.text=""
    Text3.text=""
    Label6.caption=""
    Label7.caption=""
End Sub
```

Pascal Program

```
program quadratic;
uses wincrt;
var
a,b,c : real;
t,r1,r2 : real;
begin
        writeln('enter a');
        readln (a);
        writeln('enter b');
        readln (b);
        writeln('enter c');
        readln (c);
        t := b*b-4*a*c;
        if t>=0 then
        begin
            r1:= (-b+sqrt(t))/(2*a);
            r2:= (-b-sqrt(t))/(2*a);
            writeln('root1 =',r1 :8:2);
            writeln('root2 =',r2 :8:2);
        end
        else
            writeln('no real roots');
end.
```

Program 4 – Factorial of a given number

Flow chart

```
Pascal Program
program Factorial_test;
uses wincrt;
var
Counter:integer;
Factorial:real;
Begin
    Factorial := 1;
    Readln(counter);
    while Counter > 0 do
    begin
            Factorial := Factorial *Counter;
            Counter := Counter – 1;
    end;
    Writeln(Factorial:8:2);
End.
```

```
VB program
Private sub Fact_click()
    Dim factorial As long
    Dim counter As integer
    factorial=1
    counter=Val(Text1.text)
    While (Counter>0)
      factorial=factorial*counter
      counter=counter-1
                                Wend
      Print "Factorial"; Text1.text; "=", factorial
End sub
```

Start → Factorial = 1 → Input Number → Factorial= Factorial *number → Number= Number-1 → Number>0 (Yes loops back; No) → Print Factorial → Stop
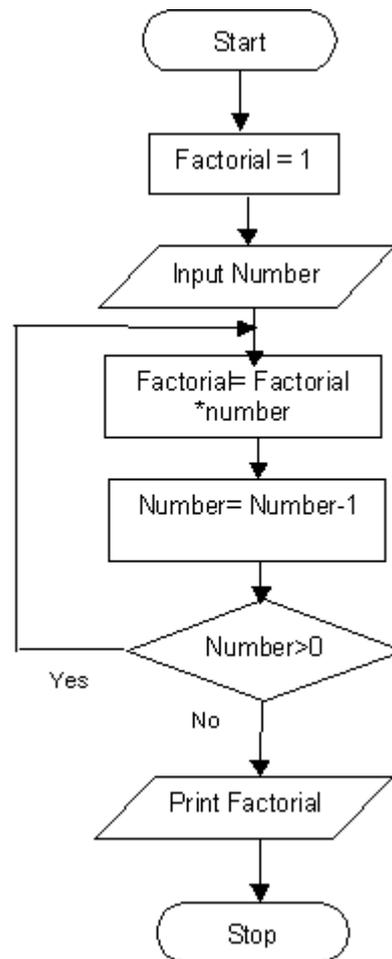
Competency 10 : **Uses ICT efficiently and effectively to be successful in life**

Competency Level 10.1 : **Explains the contribution of ICT towards national development.**

Duration : Two periods

Learning Outcomes:

- Describes the use of ICT in Education, Health, Agriculture and Business sectors.
- Accepts the need to select ICT tools for different purposes.
- Distinguishes the relevance of various ICT tools used in many fields.
- Searches for relevant information as required, from various sources.
- Seeks job opportunities on-line.

Points to clarify subject matter::

- ICT provides opportunities for learners in rural areas, in resource allocation, through distance learning, e-learning and on-line courses.
- Conducting on-line exams, consultation sessions, discussions and maintaining records are possible in education management system.
- By using ICT tools such as Magnetic Resonance (MR) scan and CAT scan doctors and patients get a clear picture for detecting / identifying diseases and minimizing the number of failures.
- Simulations in medical education provide experience close to real life for doctors and medical students.
- Tele medicine minimizes cost of traveling & equipment.
- Tele-medicine helps us to channel or consult doctors and specialist.
- ICT enables information sharing among agricultural communities on market prices, research, new inventions and experience, products genetically improved.
- ICT provides agro meteorological information to increase harvest.
- Computer controlled devices help to incubate eggs, sterilize milk for the consumer market.
- Reduces unnecessary traveling for people.
- Online-shopping makes it easier for the customer to place orders and have items delivered to their doorstep.
- Banking is possible anytime using Automated Teller Machine (ATM), Credit card facilities. Hence, they do not always need to carry cash in hand.
- A person need not be confined to a traditional office and they can do their jobs using a terminal, laptop, at home.

Reading Material:

Introduction to Information and Communication Technology (ICT) and Society

This unit will provide an introduction to the relationship between ICT and Society. It assumes that we cannot understand ICT without reference to the concept of 'society', a term that requires careful theoretical reflection. The unit therefore explores economic, social and cultural theories about ICT, and encourages students to think about ICT from a variety of perspectives.

ICT is constantly changing and advancing as scientists and engineers create new technologies for us to use and enjoy it.

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For example, in the past 50 years the use of following technologies have become common.

- Personal Computers
- Mobile Phones
- The Internet
- Medical scanners
- Satellites
- Lasers
- CD and DVD
- Television
- Automobile electronics
- ATM facilities
- Credit cards

ICT in Education

ICT in the education (Figure 10.1.1) sector both ensures that schools have access to ICT but that education is enhanced with ICT. ICT can enhance education content, teacher training, and technological skills development and can reduce cost and locate barriers to providing these services. Students living in remote areas can gain access to teachers in e learning modules through ICT tools and can enhance the formal classroom by those. Online courses are available in most of the university websites.

ICT has made major contributions in the areas of;

o **Teaching**

- Supporting teacher professional development through computer-mediated networks that facilitate tele-collaboration

- Using technology to break down entrenched rote-based teaching practices and to support educational reform towards more student-centered learning

- Using computers in classrooms for on-line access to the latest textbooks and teaching materials

Figure 10.1.1

- Integrating broadcast technologies, such as interactive radio instruction (IRI), TV and video programs, with digital technologies to improve delivery and content of teaching and learning activities

o **Learning**

- Developing networks that promote student collaboration both within the country and with students abroad.

- A Learning Management System (or LMS) is a software package, usually of a large scale (that scale is decreasing rapidly), that enables the management and delivery of learning content and resources to students. Most LMSs are web-based to facilitate "anytime, anywhere" access to learning content and administration.

- At a minimum, the LMS usually allows for student registration, the delivery and tracking of e-learning courses and content, and testing, and may also allow for the

management of instructor-led training classes. In the most comprehensive of LMSS, one may find tools such as competency management, skills-gap analysis, succession planning, certifications, virtual live classes,   Consultancy sessions and resource allocation (venues, rooms, textbooks, instructors, etc.). Most systems allow for learner self-service, facilitating self-enrollment, and access to courses.

- o **Educational Management**
  - Developing education management information systems (EMIS) to improve the administration of the education setting
  - Learning Management Systems(LMS)
  - Most of the courses introduced online hold their examinations online.

An International corporation located in foreign country may want to train their staff located in Sri Lanka on a new computer application. Normally, the staff would have to come to that countryfor training. But now, the foreign office can set up a video link with the office, they also set up remote control of the PCs in Sri Lanka and they run the training course directly from that country. Everybody wins.

ICT in Health

With the development of   ICT the health sector has developed in various aspects.

- o It has made the life of the patient easier by facilitating channeling of the doctor from home reducing unnecessary traveling.

- o For doctors, diagnosis and medical testing have become easier and reliable

- o ICT collaborates with the administrations (hospitals, local and regional health organizations) in projects to computerize hospital and territorial services by sustaining strategic initiatives to reach the objectives of the National Health Plan.

ICT can be used to design and develop medical teleconsulting products targeted at providers of second opinion services . In the past twenty years, ICT has fundamentally changed both practice and medical education. Large hospitals use ICT systems to run – accounts, digitized radiography, laboratory ordering, processing and reporting systems, electronic patient record systems, etc., that have now become an integral part of the hospitals function. All laboratories are computerized, Can be observed. Digital radiography started with the Computer-Aided Tomography (CAT) scan. Magnetic Resonance Imaging (MRI) and general digital imaging are now widespread, and film is becoming obsolete in radiology. Digital imaging has enormous advantages – images can be processed and improved and analyzed: they can also be viewed quickly and at a number of locations within a hospital, or even at remote locations. Earlier, some decisions taken might have been altered and possibility of a failure was very high but with the use of new tools it has been reduced.

 ICT has changed the way we access information in Medicine. Twenty years ago, to get information on the published material on a topic would necessitate a few days in the Medical Library. Now, in a few minutes, one can access an online Medline Database and in minutes have the search completed back many years, have abstracts of the papers published on the computer desktop with a very simple method of ordering (or in some cases downloading directly) papers required.

Medical schools in this part of the world do not appear to have kept abreast of these technological changes. Computer simulation can reduce the need for animal testing. The use of a computer simulation to investigate saves time, money – and the lives of animals.

Some systems enable clinicians to interpret three-dimensional x-ray pictures together – at their respective hospitals via the Internet.

The electronic medication card sends automatic messages between the patient's physician and the local hospital, or the pharmacy, or the home care services using a complete electronic system for the exchange of prescription information.

A new and revolutionary series of antibiotics – aimed at HIV, cancer and organ transplant medicine, are well under way.

ICT In Agriculture

ICT in the agriculture sector facilitates knowledge sharing within and among a variety of agriculture networks including researchers, importers/exporters, extension services, and farmers. ICT enables vital information flows by linking rural agricultural communities to the Internet, both in terms of accessing information and providing local content.

ICT activities in agriculture :

- Use of Internet and e-mail for extension purposes

- Communicating agro-meteorological information

- Communicating market price information

- Facilitating networks of agriculture researchers

- Developing land registries

Figure 10.1.2

In addition to Internet as the backbone, the province run television station, call center, telephone, mobile phone, and village-run broadcast will be used to meet farmers' needs using so-called "all-round ICT service". It will be a participatory approach to the development strategy of information service. All stakeholders should be mobilized to contribute their money, labor, or knowledge including government agencies, private sectors, companies, farmers, marketers, technicians and professionals with agricultural information and knowledge. Some computer-controlled devices have been introduced to conduct testing of animal breeding and genetically breeding of animals and tissue transplanting of trees. (Figure 10.1.2)

Travel and the Environment

Video conferencing and email have reduced the need for business travel.(Figure 10.1.3) This has allowed people to have more time at home with their families rather than being stuck in an airport somewhere. Less travel also means less pollution, as fewer cars and aircraft need to be used.

Figure 10.1.3

Online shopping

Online shopping is said to be one of the most popular uses. Users are able to do many chores online if we wish. For example food shopping is simple with most of the big supermarkets having an online store. Marketplace is not a place to travel anymore. Once an order is placed, it will be delivered by van within an agreed time slot. Other specialist shops can supply organic food and direct-from-farm produce.

ICT in banking

- Visa card
- Master card
- Credit card
- ATM cards

Figure 10.1.4

An **automated teller machine** or **automatic teller machine (ATM)(** Figure 10.1.4) is an electronic computerized telecommunications device that allows a financial institution's customers to directly use a secure method of communication to access their bank accounts, order or make cash with drawals (orcash advances using a credit card) and check their account balances without the need for a human bank teller (*cashier*). Many ATMs also allow people to deposit cash or cheques, transfer money between their bank accounts, anytime anywhere top up their mobile phones' prepaid accounts or even buy postage stamps.

On most modern ATMs, the customer identifies him or herself by inserting a plastic card with a magnetic stripe or a plastic smartcard with a chip, that contains his or her account number. The customer then verifies their identity by entering a passcode, often referred to as a **PIN** (**P**ersonal **I**dentification **N**umber) of four or more digits. Upon successful entry of the PIN, the customer may perform a transaction. Handling cash in hand has become a historic evevntIf the number is entered incorrectly several times in a row (usually three attempts per card insertion), some ATMs will attempt to retain the card as a security precaution to prevent an unauthorised user from discovering the PIN by guesswork. Captured cards are often destroyed if the ATM owner is not the card issuing bank, as non-customer's identities cannot be reliably confirmed.

Doing a job by attending an office or an institute or a workplace is old practice. Tasks assigned can be accomplished at a terminal or a laptop.
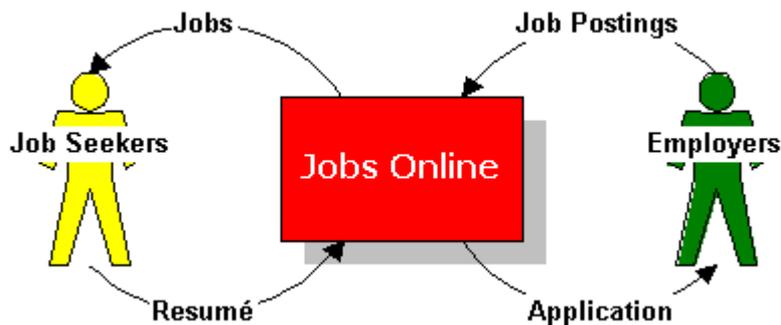
Figure 10.1.5

Jobs posted (Jobs Online & JobsNet) can be found at the websites. All you have to do is to find the job that interests you and then apply for it. (Figure 10.1.5)

Finding Jobs online

JobsOnline website

There are two ways to find jobs at the Jobs Online website, through the quick search facility and power search a detailed search facility.

Quick Search

This facility allows you to go directly to the job posting by entering a Job Code. The Job Code is a five-digit code that identifies a job posting uniquely. See sample shown as (Figure 10.1.6).
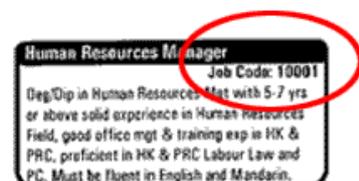
Figure 10.1.6

You might also find text similar to the one below. Something similar to this will appear for jobs ads that use our e-recruitment service:

Apply Online at http://www.jobsonline.com.ph using Job Code: 00234

Either way, go to the Jobs Online web site, enter the Job Code, then view or apply for the job openings.

JobsNet Website

This is a Sri lankan website developed by ministry of Employment and Labour, Sri Lanka. You can visit this site at http://www.jobsnet.lk. The facility of getting information in Sinhala or Tamil language is also possible with this website.
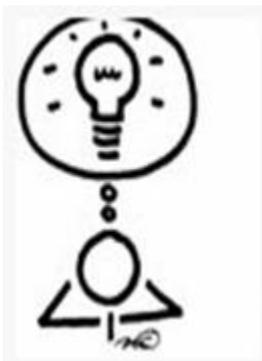
Dear Teacher!
Please feel free to design your own activities,
Perhaps within the parameters specified.

We shall be delighted if you could
Communicate your innovations to us.

Competency Level 10.2 : **Evaluates IT equipment to select these that meets user needs.**

Duration : One period

Learning Outcomes:

- Specifies the names, capacity, speed and the price of a hardware component to run applications.

- Accepts that the variety of needs and costs increase or decrease the price of a machine.

- Distinguishes and evaluates the components of the system and the peripherals.

- Seeks warranty and after-sales service in purchasing equipment.

- Distinguishes between marketing hype and real requirements.

Points to clarify subject matter:

- Purchasing a computer requires many aspects to be considered (A) The specification of the machine (B) The company reputation (C) The warranty agreement (D) The price (F) After sales service.
- The computer that we have decided to purchase should meet the probable needs of most people and should be capable of being upgraded.
- The key features that are considered when buying a computer are as follows :
  o Processor
  o Memory
  o Storage
  o Graphics and display
  o Removable Storage
  o Communications
  o Sound and design
- Users should find perfectly acceptable Operating System software and other related applications.
- Warranty and technical support are crucial factors in this process.
- The performance of a computer varies according to the devices such as 3.8 GHz processor plus 256 MB RAM, 4.0 GHz processor plus 512 MB RAM that are fixed inside the machine.
- The purchaser can ask for and opt for a different hardware in terms of cost and efficiency.
- Parts of a computer can be selected from a group and can be assembled according to the purchasers wish.
- Memory, Processor and storage are the most important facets of a computer.
- Software is also a cost enhancing factor in purchasing a computer.(copyright is also a factor to be considered)

Reading Material:

Evaluation of Computer Systems
Many different microcomputers with different features and processing capabilities exist on the market today. If you are going to purchase a computer, you should consider carefully your processing needs. Not only should you define your software and hardware requirements clearly before you purchase a computer system, but you should also get to know the company from which you are buying the computer to make sure it will offer support in the long run.

If you are a first-time buyer of a computer, you should choose your applications software first, after you identify your processing needs. Once your applications software requirements have been determined, choose compatible hardware models and systems software.

The following five factors should greatly influence you when you purchase a computer:

1. Specifications
2. The company reputation
3. The warranty agreement
4. The price
5. After sales service

How to Buy a Desktop PC

Introduction

Before you go out shopping for a new desktop computer, you have to decide what you want to use it for. This will guide you through the options.

The Specifications Explained

From CPUs to RAM to optical storage, it is important break down the jargon–and identify which specifications are most important to your purchase.

Desktop PC Shopping Tips

These recommendations will help you build a system that fits both your needs and your pocket.

The Big Picture

Today, almost any PC on the market can more than adequately handle such standard office applications as word processing and spreadsheets, as well as basic Internet functions such as e-mail and general internet browsing. So,a standard PC will suit most people's needs.

If you're a more demanding user who wants to edit digital video or manage a large database, however, you may need more than the basics. For high-end needs, check out other reviews of power systems, usually cost more than a standard PC.

The best way to pay only for what you need is to carefully consider what you want to do with your system now and anticipate what might interest you next year. Specific applications call for certain types of hardware, whether at home or in the office.

Key Features

Processor: If you plan to use your PC for standard office productivity and basic Internet tasks, most any processor will do. But if you want more power, an Intel Core 2 Duo chip or an Athlon 64 X2 processor is sufficient as of 2009. Both are dual-core processors, which will allow for faster multitasking and speedier performance on certain kinds of graphics and video applications. To save a considerable amount of money, buy one or two levels down from the top–you're unlikely to lose more than 5 to 10 percent per tier in performance.

If you need top performance, choose a PC with a high-end Core 2 Duo chip or perhaps the Athlon 64 FX-62 processor or better. These CPUs are best for the most demanding applications, such as video editing or high-resolution game play. You can find some reasonably priced PCs with these chips, but to get the lower price you may have to sacrifice graphics performance, hard-drive size, and possibly monitor size (among other things). Expensive higher performance processor such as, the 2.93-GHz Core 2 Extreme X6800 are available.

Memory: To give Windows XP and applications sufficient room to work, you should get a minimum of 512MB of RAM and for Windows Vista minimum of 1GB RAM is required. If you can afford to get more, do it. RAM costs a lot less today than it did some years ago. High-end PCs should have at least 1GB–that amount lets you keep more applications open and comfortably handles memory-intensive applications like Photoshop. (For application such as Photoshop need 2GB of RAM; to perforn better.)

Storage: In most cases basic PCs come with hard drives of 80GB or larger. This amount of storage is fine for the majority of mainstream tasks. If you plan to work with graphics files, large databases, video, or music, however, you'll want to increasa the storage capacity up to at least 120GB. You'll need it because 30 minutes of uncompressed digital video takes up nearly 6.5GB of space, while 250 4-minute MP3s at 128 kbps use more than 1GB.

Graphics and display: Responsible for generating all images on your monitor, the graphics subsystem in a PC ships either as a removable expansion board or as a chip that's soldered permanently–or integrated–onto the motherboard.

Only dedicated gamers or people who work with 3D modeling need a high end graphics card. Home users who want an inexpensive system with decent graphics should choose a card with an older-generation nVidia chip such as the GeForce 6600 or a base-level ATI chip such as the Radeon X1300; They can boost performance even with recently released games. If you want to do some gaming and are keeping an eye on the future, get a card with at least an nVidia GeForce 6800 chip or a Radeon X800 chip. Try to get a board with 256MB of RAM. In the office, integrated graphics should satisfy your needs and save you money unless you're doing high-end graphics, Web, or multimedia development. Some motherboards with integrated graphics, such as models from Intel or nVidia, allow you a graphics upgrade option via an unoccupied PCI Express slot. Ask for the slot when you buy, if you want to be able to upgrade later.

Get at least a 15-inch CRT monitor and prices are low. You can spend more for a high-quality model.Such as, a 17-inch monitor, which provides better quality pictures

Removable storage: Your most cost-effective removable-storage option is a CD-RW drive. However, home users may want to consider substituting the more flexible DVD-rewritable drive: You still get CD-RW functionality, and DVDs store at least 4.7GB of data, versus 650MB for most CDs. They also let you create your own video DVDs to play in your living-room DVD player. DVD write speeds are much slower than CD write speeds, though DVD drives cost more than CD-RW drives, but prices are falling quickly. If you want the latest, buy a drive that supports dual- or double-layer DVD writing, which allows you to put more data on a single disc.

USB thumb drives (Pen drives) and micro-drives are also growing in popularity. These keychain-size devices, made by a number of manufacturers, can store large amounts of data, even 1GB or more. If you use Windows 2000 or XP, a thumb drive requires no additional software; Windows will detect the device as soon as you pop it in a port, and will assign it its own drive letter in Explorer

Communications: Most PCs come with a modem for dial-up Internet access and an ethernet port for broadband access. If you want to connect to the Internet wirelessly, you'll need a wireless network adapter.

To share your broadband connection or to network your PCs, get a gateway or router. A PC and router with gigabit ethernet will give you a faster local network connection than products with 10/100 ethernet. If you go wireless, you'll also need a card or an external adapter for each PC.

Sound: In the office, the basics should suffice; integrated sound in your PC is more than adequate for most work. At home, though, you'll probably want surround sound. If your PC doesn't already support surround sound, you can buy an upgraded sound card , plus a decent set of speakers that includes a subwoofer.

Design: A good case can make your everyday work easier and can simplify the task of upgrading or servicing components–an especially valuable perk in offices with multiple systems. A well-designed case will offer tool-less access to the interior, hard drives mounted on easy slide-out trays, and color-coded cables for internal and external parts. At home, look for at least two USB ports in front so that you can easily hook up peripherals. If you have a digital video camcorder, a PC with a FireWire (IEEE 1394) port is usually required.

If you plan to keep the system for a while, make sure you have some room for expansion. You'll want at least a couple of open drive bays and probably a free PCI slot as well.

Software: An operating system such as Windows Vista or Linux (e.g. Ubuntu or Fedora) is required.

Warranty and tech support: Because most PC problems tend to crop up in the first year, a one-year comprehensive warranty should be fine. Normally comprehensive warranty covers labour charges as well as charges for parts. Before buying a computer ,it is better to clarify these warranty terms. A two- or three-year comprehensive warranty will add a considerable amount to your cost. Businesses can get options like 24-hour on-site response, but they must pay for it.

Keyboard and mouse: Almost all systems include these commodity components, usually a Windows-compatible 102-key keyboard and a two-button mouse with a scroll wheel. Many vendors are switching from PS/2-connected devices to USB models that offer more features, such as additional programmable keys that can launch favorite applications or Web sites. Wireless keyboards and mice are also available. Optical mice, which use a small camera to detect motion, provide smoother, more precise control over mouse movement. They also eliminate the need for you to remove and clean a coated ball, as with older mice.

Competency Level 10.3 **:** **Seeks IT carrier paths to suit ones life.**

Duration **:** One period

Learning – Teaching Process:
- Names and describes the various designations available in the field of IT.
- Accepts that qualifications required to land good jobs in IT vary.
- Selects the appropriate IT professional to get the IT requirements done.
- Selects a suitable academic course for personal advancement.

Points to clarify subject matter:
- There are many opportunities in the carrier path of the IT profession such as
  - a. Computer application assistant /Data entry operator /
  - b. System analyst
  - c. Programmer
  - d. Computer System Engineer
  - e. Network Administrator.
  - f. Web Designer/Developer
  - g. Desktop publisher
  - h. Hardware Engineer.
- A programmer or software developer is someone who programs computers, that is, one who writes computer software.
- A system analyst studies the present system, analyzes, plans, designs and monitors in order to update the system.
- Data entry operators and Computer application assistants use Office Applications and enter data into the computer.
- Web Developer is specifically engaged in the development of World Wide Web applications.
- Network Administrator is the specialist and analyst who concentrates on the network design, security and the maintenance of hardware and software that comprises the network
- Computer Systems Engineers assist in the selection and installation of computer systems by providing technical advice and support.
- Desktop publishers often perform writing and editing tasks as well as page layout and design visual graphic elements to produce publication-ready material.
- Computer Hardware Engineers research, design, develop, test, and oversee the installation of computer hardware and supervise their manufacture and installation.
- There are three levels of education that anyone can achieve namely, Academic, Professional, Vocational
- Anyone who wishes to pursue a specific profession will have to complete one level of academic or professional and vocational level education to be considered to have the relevant qualifications

Reading Material:

A Career in IT

Programmer

A programmer or software developer is someone who programs computers, that is, one who writes computer software. The term computer programmer can refer to a specialist in one area of computer programming or to a generalist who writes code for many kinds of software. One who practices or professes a formal approach to programming may also be known as an analyst programmer , software engineer. A programmer's primary computer language (Java, C++, etc.) is often prefixed to the above titles, and those who work in a web environment often prefix their titles with web.

System Analyst

Computer systems analysts start their work by asking people what they need their computers to do.

Then, they plan a computer system that can do these tasks well. After analysts have understood what the system needs to do, they break down the task into small steps. They draw diagrams and charts to show how information will get into the computers, how that information will be processed, and how it will get to the people who need it. For example, analysts might decide how sales information will get into a store's computers and how the computer will add up the information in a way that makes it useful for store managers. Analysts experiment with different computer system plans. They try various tools and steps until they find the system that is fastest, easiest, and costs least.

Next, analysts decide which computers, software, and tools to buy. They also tell computer programmers how to make any new software that is needed. They give the programmers step-by-step instructions. Some analysts help make the software, too.

The main job for some systems analysts is getting computers to work together. They connect them into a network. Analysts decide how to get information from one computer to another.

Computer Applications Assistant (CAA)

Computer Applications Assistants normally use personal computers with stranded operating systems. Usually their main duty is to assist their higher-ups with work related to office applications. Prepare electronic document using word processors, data bases, spread sheets and create electronic presentations are main duties of a CAA. In addition, CAA has the skill of searching information form the Internet and ability of using e-mail for communication purposes.

Data Entry Operator

Data entry and information processing workers help ensure the smooth and efficient handling of information. By keying in text, entering data into a computer, operating a variety of office machines, and performing other clerical duties, these workers help organizations keep up with the rapid changes that are characteristic of today's "Information Age."

Web designer

Web designers are responsible for the layout, visual appearance and usability of a website. This role may overlap that of a Multimedia programmer and web architect. Using a combination of graphic design skills and technical knowledge of how web pages are created, the work involves:

- liaising closely with a customer or client at the design stage to answer questions such as: why is the site needed? who are the target audience? who are the leading competitors? etc;

- producing a design that will be attractive to the target user, has a logical navigation system and has all the features required;
- writing web pages in a combination of codes, such as hypertext mark-up language (HTML), Javascript, Actionscript, ColdFusion, Java, Perl and Flash, or using code-generating programs, such as Dreamweaver;
- deciding on how images and other material will be digitally optimized and presented for the web;
- ensuring that material on the web site is accessible to all groups including those with disabilities;
- testing the site for functionality in different browsers and at different resolutions; fixing errors.

Web designers will have knowledge of graphic design packages such as Fireworks or Photoshop in order to produce basic layout and manipulate images. Skills in cascading style sheets (CSS), e-commerce and server side technologies, such as PHP and Perl, and Internet security are also important. As users gain faster access to the Internet via broadband, web designers with skills in multimedia and interactivity are likely to be in greater demand.

Web Developer

Web developer is a software developer or software engineer who is specifically engaged in the development of World Wide Web applications, or distributed network applications that are run over the HTTP protocol using an HTTP server, a web server, and an HTTP client, a web browser. Web developers can be webmasters who handle website administration and web design as well as web application development or can simply be web application developers. Web developers are formally in charge of web development within their respective organizations or also as freelance software developers.

Network administrator

Network administrators are basically the network equivalent of system administrators: they maintain the hardware and software that comprises the network.

This normally includes the deployment, configuration, maintenance and monitoring of active network gear: switches, routers, firewalls, etc. Network administration commonly includes activities such as network address assignment, assignment of routing protocols and routing table configuration as well as configuration of authentication and authorization – directory services.

It often includes maintenance of network facilities in individual machines, such as drivers and settings of personal computers as well as printers and such. It sometimes also includes maintenance of certain network servers: file servers, Virtual Private Network (VPN) gateways, intrusion detection systems, etc.Network specialists and analysts concentrate on the network design and security, particularly troubleshooting and/or debugging network-related problems. Their work can also include the maintenance of the network's authorization infrastructure, as well as network backup systems.

They also perform network management functions including:
- provide support services
- ensure that the network is used efficiently, and
- ensure prescribed service-quality objectives are met.

Computer Systems Engineer

Computer Systems Engineers usually assist in the selection and installation of computer systems by providing technical advice and support, and by helping organizations acquire and set up affordable, workable data processing systems suited to current and projected needs.

Most Computer Systems Engineers work for companies which manufacture or sell complete computer systems to corporations. As members of the marketing/sales staff, they serve as the primary technical resource, both for customers and sales crew. They are closely involved in all phases of product sales and installation and maintain contact with their customers.

During the presales phase, for example, systems engineers visit the customer's site, where they analyze daily operations and confer with managers and other personnel to determine information handling needs.

Then, drawing on their knowledge of data processing technology and their company's products and systems they recommend appropriate hardware, software, and accessories to the customer. Working with other members of the account team, they develop written proposals and give product demonstrations. After the sale, systems engineers oversee system installation and may develop custom software to adapt the system to special applications. They evaluate the technical capabilities of the customer's staff to determine the training required, then prepare and conduct classes and seminars. They are also responsible for following up on established accounts, making regularly scheduled visits to monitor the system, and to provide additional guidance. They remain available for problem solving or to handle special projects, such as helping customers design and implement their own programs. Some systems engineers work for data processing consulting firms or for management consulting firms specializing in selecting, modifying, and setting up computer systems for a variety of clients. In many respects, the work of consulting systems engineers is similar to that of systems engineers who represent one computer company.

However, as independent experts, consulting systems engineers review proposals from different computer vendors and objectively evaluate all of the client's options – including that of retaining and improving the existing manual system or contracting with an outside computer service bureau.

Some systems engineers work in large organizations with separate data processing departments. Sometimes known as Computer Applications Engineers or Project Engineers, they help design and install computer-based information systems to support other departments, such as Payroll. They also prepare hardware and software specifications for outside vendors and consultants, code and test software for special purposes, and handle on-going system maintenance.

Desktop Publisher

Using computer software, desktop publishers format and combine text, numerical data, photographs, charts, and other visual graphic elements to produce publication-ready material. Depending on the nature of a particular project, desktop publishers may write and edit text, create graphics to accompany text, convert photographs and drawings into digital images and then manipulate those images, design page layouts, create proposals, develop presentations and advertising campaigns, typeset and do color separation, and translate electronic information onto film or other traditional forms. Materials produced by desktop publishers include books, business cards, calendars, magazines, newsletters and newspapers, packaging, slides, and tickets. As companies have brought the production of marketing, promotional, and other kinds of materials in-house, they increasingly have employed people who can produce such materials.

Desktop publishers use a keyboard to enter and select formatting properties, such as the size and style of type, column width, and spacing, and store them in the computer, which then displays and arranges columns of type on a video display terminal or computer monitor. An entire newspaper, catalog, or book page, complete with artwork and graphics, can be created on the screen exactly as it will appear in print. Operators transmit the pages for production either into film and then into printing plates, or directly into plates.

Typesetting and page layout have been affected by the technological changes shaping desktop publishing. Increasingly, desktop publishers are using computers to do much of the typesetting and page-layout work formerly done by prepress workers, posing new challenges for the printing industry. The old "hot type" method of text composition—which used molten lead to create individual letters, paragraphs, and full pages of text—is nearly extinct. Today, composition work is done

primarily with computers. Improvements in desktop-publishing software also allow customers to do much more of their own typesetting.

Desktop publishers often perform writing and editing tasks as well as page layout and design. For example, in addition to laying out articles for a newsletter, desktop publishers may be responsible for editing content they receive or for writing original content themselves

Depending on the establishment employing these workers, desktop publishers also may be referred to as publications specialists, electronic publishers, DTP operators, desktop publishing editors, electronic prepress technicians, electronic publishing specialists, image designers, typographers, compositors, layout artists, and web publications designers.

Computer Hardware Engineers

Hardware Engineers usually research, design, develop, test, and oversee the installation of computer hardware and supervise its manufacture and installation. Hardware refers to computer chips, circuit boards, computer systems, and related equipment such as keyboards, modems, and printers. (Computer software engineers—often simply called computer engineers—design and develop the software systems that control computers.) The work of computer hardware engineers is very similar to that of electronics engineers, but, unlike electronics engineers, computer hardware engineers work exclusively with computers and computer-related equipment. The rapid advances in computer technology are largely a result of the research, development, and design efforts of computer hardware engineers.

LEVELS OF ACADEMIC STANDING
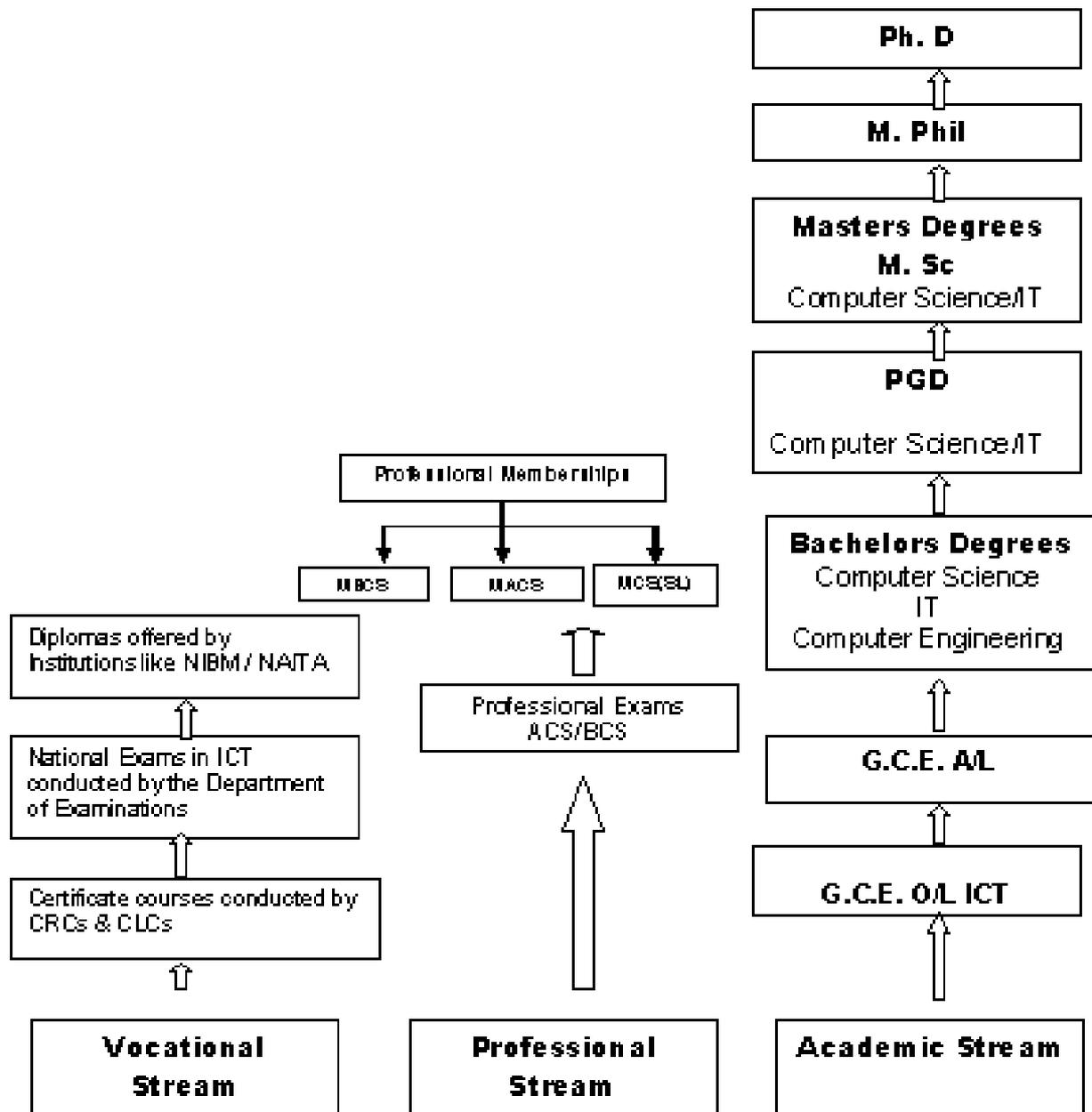
Please note that No parallel correspondence between vertical columns is implied

Competency Level 10.4   :   Makes optimum use of ICT with awareness on relevant issues.

Duration   :   Two periods

Learning Outcomes:

- Names and describes the ethical, moral, protective and hygienic practices of the computer and the uses of IT.

- Accepts that copying a software without a license is wrong.

- Avoids using the computer in a manner that endangers ones health.

- Selects suitable practices of computer usage.

- Works with respect for legal issues of IT.

Learning – Teaching Process

Engagement:

- Get two volunteers to present the following dialogue.
- Lead a discussion to highlight the following:
  - The person who wishes to buy a computer must pay not only for the hardware but also for the software
  - Copying software is Illegal according to copyright law
  - Rights and ownership of an innovative person's properties should be respected
  - Computer hardware as well as software require protection from viruses.
  - It is necessary to practice ethical and moral behaviour in computer usage viz:
    - other people's computers
    - accessing other people's software and files
    - copying software.

<div align="center">Dialogue</div>

Tania : You know, I bought a computer yesterday.

Shiny : How nice! How much did you pay for it? Is that a P4?
Tania : Rs 60,000 Yes, it is a P4.
Shiny : What software did you install?

Tania : XP, MS OFFICE, AUTOCAD, PHOTOSHOP, FLASH

Shiny : Did you pay any money for those software?

Tania : No, We can copy them free. Can't we?

Shiny : No, copying is illegal. Perhaps you may have to go to courts.

Tania ; Why?

Shiny : Because there is a law called copyright law where you can't copy other's creations.

Tania   :   Oh! really

Shiny   :   Did you buy an anti virus software?

Tania   :   No! what is it for?

Shiny   :   It protects your computer from viruses.

Instructions suggested for Learning:

Let's maintain computers ethically, morally, safely and hygienically.

- Consider the following topics to deliver a dialogue or make a short dramatic presentation

    (1) Doctor and patients group

        1.Virusus

    (2) Doctor and patients group

        2 Health practices of computer usage

    (3) Investigating officer and complaints group

        Software theft, unauthorized access

    (4) Ombudsmen and Citizen's group

        Digital divide, Technical rich Environment

    (5) Lawyer and Clients group

        Software piracy

- On the basis of the document provided, read and discuss the area assigned to you and understand it thoroughly.

- Prepare the necessary dialogues and set the scene to depict the situation.

- Make sure the dramatic presentation refers the given topic

- Be prepared to present your creation and findings at the plenary session.

Points to clarify subject matter:

- Request each group to present its role-play

- Conduct a discussion to highlight the following:

    o Continuous usage of the computer by an individual leads to various conditions like eye strain, backache uneasiness.

    o There are good computer habits that are helpful in protecting computers for a long.

    o Digital divide means the problem of the gap between the haves and not haves of information and equipment.

    o At present, without a basic knowledge of IT, getting a job is impossible.
    o The workplace is the most important place to practice good habits of compute usage.
    o Computer Ethics are relevant to Software, Hardware, and Networks.

- o Copying computer software is called piracy

- o Accessing a computer without permission is Hacking

- o Hardware should be protected from viruses as well as humidity and dust.

- o Viruses destroy hardware and software.

- o Trojan Horse is a kind of virus

- o Fire walls safeguard hardware

- o Antivirus software is necessary to avoid viruses

- o Eye strain, Backaches, Uneasiness, are major illnesses resulting from the abuse of computers

- o Wrong posture leads to backache and uneasiness and maintaining a correct posture helps us to get rid of this.

- o Blinking eyes frequently, sitting erect help to some extent.

Reading Material:

Issues in the use of ICT

Ethical, Legal and social issues

Computers involve a special technology and they raise some special ethical issues. Computer ethics is the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of such technology. It concerns software as well as hardware and concerns networks connecting computers as well as computers themselves.

Privacy

As more and more information is held there is the chance of some of it being incorrect. Your private life can become less and less private.

What is Piracy

Piracy can be defined as illegal copying of programs, counterfeiting and distributing software, and even sharing a program with a friend. In other words piracy is the manufacture, distribution or use of software without a license. Computer piracy includes anything that is in digital format. That means any software, video, game, digital audio, or e-book.

What is Software Piracy?

Computer software is protected under the USA's federal copyright law which states that, "Users may not make a copy of a piece of software for any other reason than as an archival back-up without permission of the copyright holder." The unauthorized reproduction of a computer program is considered theft.

Computer piracy is different from copying other recorded media, such as videotapes and compact disks, because there is no degradation in the quality of the copy. The computer industry is the only industry that empowers the end user to become a manufacturing subsidiary. Trust and responsibility is placed in the hands of the computer user. A computer program copied over and over

again will work exactly like the original. A program that took years to develop can be copied in a few seconds. And, although software is expensive to develop, almost any PC can be used to generate a cheap copy.

Software theft
It could be said that the use of personal computers has turned many users into thieves. How many people could honestly say that all the software on their hard disks has been purchased by them? As you can see from the Copyright, Designs and Patents Act 1989, it is a criminal offence to copy or steal software. However, these are many free and open source soft were available for many different applications.

Hacking (Unauthorized access)
Hacking means gaining illegal access to someone else's computer system. Many people see this type of thing as a challenge and not as an illegal activity.

Social Issues

Digital Divide (Social Exclusion)
Digital divide is the division of people according to the accessibility to ICT Resources. There is a gap between those who can access ICT resources easily and those who cannot.

The digital divide results from the socio-economic differences between communities that in turn affects their access to digital information mainly but not exclusively through the Internet. Broadly speaking, the difference is not necessarily determined by the size or depth of the user group. Any digital medium that different segments of society can use can become the subject of a digital divide.The digital divide is not a clear single gap that divides a society into two groups. Researchers report that disadvantages can take such forms as lower-performance computers, lower-quality or high-priced connections (i.e. narrowband or dialup connections), difficulty in obtaining technical assistance, and less access to subscription-based content.
Simply speaking; Digital Divide refers to the inequality in access to information technology, including computers, Internet and other digital equipments. Those who have access to and have the ability to use digital information easily are referred to as the "haves", while others are the "have-nots".

Bridging the Digital Divide

Raise awareness of the issue to the community
 "Together we are better". A united effort is needed to bridge the Digital Divide. Get empowered with knowledge so you can educate and rally your peers to bridge the gap.

Validity of Internet
The Internet provides access to a variety of information on every topic and this information comes from many different countries throughout the world. One problem with the Internet is that all the information is freely available once a user is connected. There are areas of the Internet, which contain large amounts of illegal material. Material that is illegal in some countries may be perfectly legal in others.

Use IT in teaching

There is a significant shortage of teachers with IT literacy that can enrich the students' learning experience with modern technology.

Techno-rich employment opportunities

With the development of Information and Communication Technology a lot of new employment opportunities appeared. Some of them are,

1. Data entry operator
2. Computer operator
3. Programmer
4. Software developer
5. Software Quality assuarance engineer
6. System analyst
7. Software engineer
8. Hardware engineer
9. Network administrator
10. IT manager
11. Web developer
12. Desktop publishing
13. Computer applications assistant

The new technological advancement in IT has become a challenge to the traditional professionals. For instance: artists, designers. They should transform themselves to use the latest technology to sustain themselves in their profession at their own skill level.

Job losses

Is it right to develop new systems in the knowledge that staff will inevitably be made redundant? Should we put shareholders' dividends and profits before people? These are difficult questions and ones, which need to be addressed. Everyone has his own opinion on this. What is yours?

Build websites for specific social groups

Lack of Websites of interest discourages users from minor social groups from using information technology. By building Websites of interest targeted at these users, you can help to bridge the content gap.

Security issues

Physical security

Environmental factors

Your computer should be kept in a
- Dust free
- Dry (moisture free)
- Smoke free environment.

Hardware protection

Your computer should be equipped with

- A UPS(Uninterrupted Power Supplier) to avoid risk of sudden power failure and fluctuations.
- Surge protection to protect against lightening and thunder.
- Stabilizer to control voltage.

Logical Security

The software and the data in your computer can be protected through the use of

- Passwords
- Backups

Malicious codes

A common misconception is that other kinds of electronic malware such as worms and Trojan horse applications are viruses. They aren't. worms, rojan horses, and viruses belong to a broader category analysts call "malicious codes."

e.g.

- Virus
- Worm
- Trojan Horse

Virus

A program or piece of code that is loaded onto your computer without your knowledge and runs against your wishes. Like any other program, it contains instructions that tell your computer what to do.

- Viruses can also replicate themselves.
- All computer viruses are manmade.
- A simple virus that can make a copy of itself over and over again is relatively easy to produce.
- A virus can be very destructive; it could format your hard drive, overwrite your hard drive boot sector, or delete files and render your machine inoperable.
- Even such a simple virus is dangerous because it will quickly use all available memory and bring the system to a halt.
- An even more dangerous type of virus is one capable of transmitting itself across networks bypassing security systems.

How do we get Viruses?

- Viruses enter your system via;
  - e-mail or an e-mail attachment
  - downloads
  - shared infected floppy disks
  - (occasionally) hacking

How Viruses work?

Once you open an infected file or application, the malicious code copies itself into a file on your system, where it waits to deliver its payload – whatever the programmer designed it to do to your system. Simply deleting the e-mail after you open the attachment won't get rid of the virus, since it has already entered the machine.

A virus writer can set the payload to trigger immediately, at a preset future time or date, or upon the execution of a specific command, such as when you save or open a file. The Michelangelo virus, for example, was programmed to release its payload on March 6 of any year – the artist's birthday.

Antivirus software

Since 1987, when a virus infected ARPANET, a large network used by the Defence Department and many universities, many anti-virus programs have become available. These programs periodically check your computer system for the best-known types of viruses.

Antivirus software can detect nearly all types of known viruses, but it must be updated regularly to maintain effectiveness. Virus experts have recorded more than 40,000 viruses and their variant strains over the years, While most viruses are just annoying time-wasters, the ones that do deliver a destructive payload are a real threat.

Viruses have been around since the early 1960s, almost since the earliest computers existed, though until the 1980s they were largely laboratory specimens, created by researchers and released in a controlled environment to examine their effect. e-mail viruses can infect thousands of machines in a matter of minutes.

How anti-virus software works

Scanning software looks for a virus in one of two ways. If it's a known virus (one that has already been detected and has an antidote written for it) the software will look for the virus's signature – a unique string of bytes that identifies the virus like a fingerprint – and will remove it from your system.

Most scanning software will catch not only an initial virus but many of its variants as well, since the signature code usually remains intact.

In the case of new viruses for which no antidote has been created, scanning software employs heuristics that look for unusual virus like activity on your system. If the program sees unusual processes, it quarantines the questionable program.

Firewall

A firewall is a system that prevents unauthorized use and access to your computer. A firewall can be either hardware or software. Hardware firewalls provide a strong degree of protection from most forms of attack coming from the outside world and can be purchased as a stand-alone product or in broadband routers. Unfortunately, when battling viruses, worms and Trojans, a hardware firewall may be less effective than a software firewall, as it could possibly ignore embedded worms in out going e-mails and see this as regular network traffic. For individual home users, the most popular firewall choice is a software firewall.   A good software firewall will protect your computer from outside attempts to control or gain access your computer, and usually provides additional protection against the most common Trojan programs or e-mail worms. The downside to software firewalls is that they will only protect the computer they are installed on, not a network. It is important to remember that on its own a firewall is not going to rid you of your computer virus problems, but when used in conjunction with regular operating system updates and a good anti-virus scanning software, it will add some extra security and protection for your computer or network.

Practice safe computing

The best way to protect you from viruses is to avoid opening unexpected e-mail attachments and downloads from unreliable sources.

Avoid double-click in everything in your mailbox.

For added safety, you need to install reliable anti-virus scanning software and download updates regularly.

Major anti-virus software vendors, including Symantec, Network Associates, Computer Associates, and Trend Micro, provide regular updates.

Some of the vendors also offer a service that will automatically retrieve updates for you from the company's Web site.

Health and Safety Issues

Computer habits can impact health

Using of computers continuously over longer periods may cause of certain illnesses in your body. (Figure 10.4.1) Some of them are;

- o Eyestrain
- o Back aches
- o Uneasiness
- o Tumors in the brain etc.

Figure 10.4.1

Are you bent out of shape with your computer? No, not because it won't print or because you have to keep pressing "control-alt-delete."

If you surf or type for hours without taking a break, you may literally be bent out of shape. In addition to frustration, the ills that come with prolonged computer use range from eyestrain to headaches to repetitive motion injuries to back pain.

There are three basic components of healthy computing: The physical environment, how you use the computer, and how you don't use the computer.

Workstation adaptation

In a perfect world, you'd sit in your very own comfortable and supportive chair to work on your large-screen computer in a well-lit room. In reality, you may be sitting in an office chair that's been handed down from someone six inches taller or shorter than you, squinting at a small, blurry computer screen. Given that, know that most of the critical elements of a healthy workstation – chair, desk, mouse, monitor and lighting – can be tweaked to make them more user-friendly. The highlights:

- Your head should be about 18 – 30 inches from the monitor.

- The keyboard should be at elbow height, and at a distance and angle that allow you to keep your wrists straight.

- If your chair doesn't have arms, use a pillow to support your arms.

- Adjust your chair so that your feet are flat on the ground and your hips are slightly higher than your knees.

A special note for those of us who are approaching "a certain age." Computer users who wear bifocals or trifocals often tilt their head back to read through the bottom part of their glasses. This can cause neck, shoulder, and back problems. The Centers for Disease Control recommends lowering your monitor or using glasses designed specifically for computer work. (Figure 10.4.2)

User modification

Proper sitting techniques for computer work:

- Keep your feet flat on the floor.

- Don't slouch.

- Keep your head in a "neutral" position

Figure 10.4.2

Shift your position slightly every so often to maintain good circulation and avoid stressing one area. If you have to look at books or printed documents while working, keep them close in front of you instead of twisting around to look at them.

And do you cradle the telephone between your shoulder and jaw while you're working? No good can come of this! If you must chat and work, either use a speakerphone or invest in a lightweight headset.

Operator exercises

Even if you have the perfect ergonomic set up and posture, you still need to take frequent breaks. "Repetitious static work," i.e., using the computer, is very fatiguing mentally as well as physically (although it's not the "good tired" that you get from physical activity). You can take a break from the computer without goofing off. Instead of leaving all the filing until the last hour of the day, intersperse it in 15 minute chunks. The same goes for making phone calls, etc.

Some experts recommend a three-minute break every half hour or so. In addition, those of us in the wellness world also recommend several breaks a day to stretch and use your larger muscles – like your heart! A few brisk, five-minute walks can leave you healthier as well as more refreshed and ready to tackle your work.

The body parts that often take the brunt of intense computer work are the eyes, neck, back, and hands. Some quick tips:

- Blink frequently so your eyes don't get dry.

- Clean the screen every once in a while so you're not peering through a layer of dust that has become one with your screen through the magic powers of static electricity.

- Refocus your eyes every ten minutes or so by looking away from the computer and briefly focusing on an object at least 20 feet away.

- Release neck strain by looking back over your shoulder while sitting up straight. Hold for 10 seconds, then slowly turn and look the other way.

- Relax shoulders by rolling them backwards and forwards.

- Reduce muscle tension in your hands by spreading your fingers wide apart. Hold, and then make a tight fist.

Health and safety issues inherent in ICT

Using a computer can affect different parts of your body, like your fingers, hands, wrists, arms, shoulders, neck, back, and eyes. While computers look safe enough, there are some dangers that are good to know about, and you will want to avoid them as much as possible. Read on for some hints on staying healthy at the computer.

Using a computer can affect different parts of your body, like your fingers, hands, wrists, arms, shoulders, neck, back, and eyes. While computers look safe enough, there are some dangers that are good to know about, and you will want to avoid them as much as possible. Read on for some hints on staying healthy at the computer.

Repetitive Stress Injuries

Bodies

- If you have to use unsuitable chairs and desks for computing, you may be uncomfortable sitting and have awkward arm and head positions.

- There are some things you can do to feel more comfortable and protect your body at the same time. Let us see what can go wrong and how we can fix it!
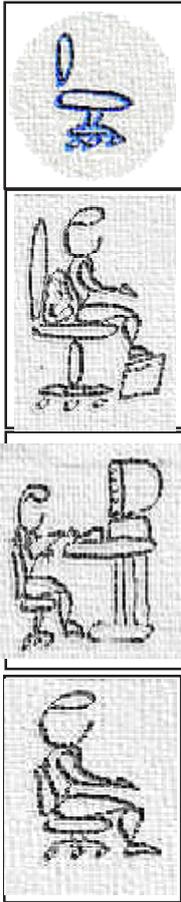
Sitting

- Your body does not move much when using the computer, so you want to make sure you are sitting comfortably in your chair.

- Pillows, pads, boxes, and big books can be used to help make the chair fit you better. If your feet don't reach the floor, use a footrest, or ask if you can stack up some thick books or a box under your feet.

- Pillows and pads can take up all that extra seat room. This way you have something to lean back against and your feet to rest on.

Fitting the Chair to the Computer

- If you have a chair that fits you, but the computer is on a table that is too high, pillows and pads can also be used to help you sit higher if you need to. If that does not work, try a larger chair or maybe a smaller computer table can be found.

- The computer keyboard should be about as high as your belly – not chest or shoulder height where you have to reach up to use it. Your arms, shoulder, and neck can get sore fast if the keyboard is too high for you!

Perfect Fit!

- If you don't have any of the problems above, you may be one of the lucky one that actually have a chair and computer table that fits!

Computer Slump

- Even with the perfect chair and computer table, you need to remember to lean back in your chair and rest on the backrest when you are typing. Don't slouch or lean forward, as this is bad on your back! Get into the habit of keeping a good back posture now and it will be happy for a long time.
- But this is not the only thing you need to watch

Keyboarding

- When your use the keyboard, keep it close in front of you. Don't put it so far back that you need to reach forward to use it.

Straight Shot

- Try to keep your wrists straight and level with your lower arms while you type. Avoid bending your wrists too much as it makes it harder for your fingers to work and could hurt your wrist over time. Some kids like wrist rests in front of keyboards to help keep their wrists straight, but don't rest on them while typing.
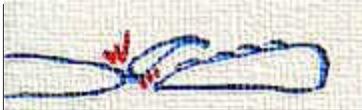
Natural Curve

- Your fingers have a natural curve, like a rainbow or waterfall. Allow your fingers to keep their curve as you type – don't stretch and flatten them too much while typing.

Home Stretch

- If you know how to rest on the home row and touch type, remember to move the whole hand to reach far-away keys . . . don't make your fingers stretch too far from home. Sometimes keyboards are too big for small fingers, move the hand to the keys and keep your fingers happy.

Thor's Hammer vs. Butterfly Dance

- Type lightly. You don't need to pound on the keys like thunder . . . a light touch will work fine – think of your fingers as butterflies dancing on the keys.

Mousing

- Almost all computers have mice now. They are nice to point with and move things around on the computer, but you need to watch how you use them – otherwise they might turn around and bite you.
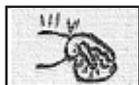
Squeeze Play

- Some people like to hold the mouse tightly. However, like hitting keyboard keys too hard, it is not a good idea. Use a light touch on the mouse while holding it as well as clicking its button(s). Too much force on the mouse tires the hands and arms using it – a form of mouse bite!

- Computer mice may be too big for hands. You might try looking for a smaller mouse or use a trackball that does not need to be held, and you can also use several fingers at once to move the ball.
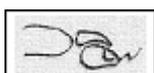
Straight Shot

- Like when using the keyboard, try to keep your wrists straight and level while mousing around!

Wrist rests can be helpful here as well. Many mouse pads come with built-in wrist rests to help keep straight wrists.

Eye Strain

Left, Right, High, Low . . . Where does the Monitor Go?

The computer monitor (screen) should be right in front of you and a little lower than your eyes. By having the monitor off to the side or too high or low, you can end up being a real headache . . . not to mention that the neck and shoulders will surely hurt as well.
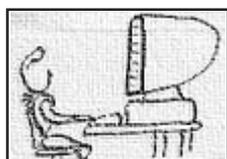
- Remember that where the eyes go, the body follows. If you have to look to the side, up, or down, then your head and neck turn as

- well. Having the monitor too low can also cause you to slump in your chair as well.

Sometimes the monitor sits on the computer case, so by moving the computer case to the side, the monitor can be lowered. If you need to raise the monitor, a few books underneath it will usually do the trick. There is also the option of adjusting, yourself – maybe you can adjust the height of your chair until you are in the right place.

Blinding Light

- Windows and indoor lights can make it harder to use computer monitors. It is hard on the eyes to try to adapt to see the monitor when there is a bright light that can also be seen at the same time (direct glare). There should be about the same amount of light coming from the screen and the area you can see around the computer monitor. Moving the computer so that windows and lights are not in front of you, or putting a shade over windows and lights, can help to avoid this problem.

Washout

- Another problem with light is that it can come from behind you and bounce off of the computer screen (indirect glare). When this happens it becomes harder to read what is on the screen. Moving the light or the computer may also be possible to solve the problem. Otherwise, a monitor hood or glare screen may be needed.

Break Away

- Time can pass very fast when you are at the computer, or playing video games. It is important to do lots of different things during the day. Our bodies are not intended to hit keyboard, mice, and game controller keys for hours straight. Take a break and get away from the computer about every 30 minutes or so – whether or not you feel an ache or pain. And if you do feel an ache or pain, that's a sure clue that you need to stop for a little while! Make sure to listen to your body's signals . . . it may be a cry for help!

Get up and move around for a few minutes, some ideas are:

- Take a quick walk around the house or apartment

- Call a friend and see how her work on the computer is going

- If you're hungry, grab a snack to give you some energy

- Anything you do is OK, as long as it gets you to rest the muscles you've been using and use the muscles you've been resting.

- Pay special attention to your eyes, too: if they hurt or your eyelids twitch, you should stop for a bit. Looking away from the monitor every once in a while and focusing on something far away for a few seconds or blinking eyes frequently should give your eye muscles enough of a workout to keep them feeling OK.

Real World

Cyberspace and other computer uses can be educational and fun, but nothing compares to adventures and activities in the "real world". Don't get lost in cyberspace . . . get out and explore the world around you.

Introduction- School Based Assessment

Learning –Teaching and Evaluation are three major components of the process of Education. It is a fact that teachers should know that evaluation is used to assess the progress of learning – teaching process. Moreover, teachers should know that these components influence mutually and develop each other .According to formative assessment (continuous assessment) fundamentals; it should be done while teaching or it is an ongoing process. Formative assessment can be done at the beginning, in the middle, at the end and at any instance of the learning teaching process.

Teachers who expect to assess the progress of learning of the students should use an organized plan. School based assessment (SBA) process is not a mere examination method or a testing method. This programme is known as the method of intervening to develop learning in students and teaching of teachers. Furthermore, this process can be used to maximize the student's capacities by identifying their strengths and weaknesses closely.

When implementing SBA programmes, students are directed to exploratory process through Learning Teaching activities and it is expected that teachers should be with the students facilitating, directing and observing the task they are engaged in.

At this juncture students should be assessed continuously and the teacher should confirm whether the skills of the students get developed up to expected level by assessing continuously. Learning teaching process should not only provide proper experiences to the students but also check whether the students have acquired them properly. For this, to happen proper guiding should be given.

Teachers who are engaged in evaluation (assessment) would be able to supply guidance in two ways. They are commonly known as feed-back and feed- forward. Teacher's role should be providing Feedback to avoid learning difficulties when the students' weaknesses and inabilities are revealed and provide feed-forward when the abilities and the strengths are identified, to develop such strong skills of the students.

Student should be able to identify what objectives have achieved to which level, leads to Success of the Learning Teaching process. Teachers are expected to judge the competency levels students have reached through evaluation and they should communicate information about student progress to parents and other relevant sectors. The best method that can be used to assess is the SBA that provides the opportunity to assess student continuously.

Teachers who have got the above objective in mind will use effective learning, Teaching, evaluation methods to make the Teaching process and learning process effective. Following are the types of evaluation tools student and, teachers can use. These types were introduced to teachers by the Department of Examination and National Institute of Education with the new reforms. Therefore, we expect that the teachers in the system know about them well

Types of assessment tools:

1. Assignments
2. Projects
3. Survey
4. Exploration
5. Observation
6. Exhibitions
7. Field trips
8. Short written
9. Structured essays
10. Open book test
11. Creative activities
12. Listening Tests
13. Practical work
14. Speech
15. Self creation
16 Group work
17. Concept maps
18. Double entry journal
19. Wall papers
20. Quizzes
21. Question and answer book
22. Debates
23. Panel discussions
24. Seminars
25. Impromptus speeches
26. Role-plays

Teachers are not expected to use above mentioned activities for all the units and for all the subjects. Teachers should be able to pick and choose the suitable type for the relevant units and for the relevant subjects to assess the progress of the students appropriately. The types of assessment tools are mentioned in Teacher's Instructional Manuals.

If the teachers try to avoid administering the relevant assessment tools in their classes there will be lapses in exhibiting the growth of academic abilities, affective factors and psycho- motor skills in the students

Assesment Plan

1. **Evaluation** : Term 1
2. **Objectives** : • To motivate students for production of independent creations
   • To awaken of creative thinking
3. **Competency levels covered:** 1.1, 1.2,1.3,1.4,1.5,1.6,1.7,1.8,2.1,2.2, 3.1,3.2, 10.1,10.2,10.3, 10.4,
4. **Subject content covered** : Contents covered by the competency levels
5. **Nature of Instrument** : An exhibition
6. **Instructions for implementation:**

   ❖ **For teachers:**

   - In every activity direct students to the creation of attractive products like demonstrations, working models, new creations, setups, plans etc. for the feed forward of the subject content suitable for exhibition.
   - Maintain records of these creations
   - Provide scientific and technological assistant to students, where necessary
   - Whatever the creations provide constructive encouragement through reinforcement of a high level
   - Conduct an appropriate exhibition at term end

   ❖ **For students:**

   - Construct suitable exhibits based on the experience gained in the course of your involvement in activities.
   - For the constructions of these equipment make use, as far as possible, of common /low-cost/discarded material found in the environment.
   - Concentrate on the possibility of putting your creation to developmental use of some form

7.   **Format for assessment and evaluation   :**

Student Names	Marks Obtained for each Criteria				
	1.Relevance of exhibits	2.New experience is provided	3.Finish of the exhibits	4.Clarify of explanation	5.Functionality

Marking scheme

    4 – Excellent

    3 - Good

    2 - Average

    1- Needs development

Assesment Plan

1. **Evaluation** : Term 2

2. **Objectives** : • To establish learning experiences gained through the using, organizing and disseminating knowledge

   • To develop organizing skills to conduct a seminar

   • To develop presentation skills.

3. **Competency levels covered:** 4.1, 4.2, 5.1, 5.2, 5.3, 6.1, 6.2, 7.1, 7.2, 7.3, 7.4, 8.1, 8.2, 8.3, 8.4

4. **Subject content covered** : Contents covered by the competency levels

5. **Nature of Instrument** : A Seminar

6. **Instructions for implementation:**

   ❖ **For teachers:**

   - o Direct students to the creation of an attractive, correct and complete presentation to highlight the usefulness of the office package and necessity of the operating system.
   - o Provide assistance to the students in the organization of their knowledge to suit the purpose of a particular seminar.
   - o Assign date, time and venue for seminar.
   - o Decide on duration, ensure that the relevant audience (group of students from Grade 8 or 9) is present.
   - o Provide necessary resources and technical assistance for seminar.
   - o Maintain a record of this presentation.
   - o Provide constructive encouragement through reinforcement.

   ❖ **For students:**

   - o Prepare a suitable, attractive presentation in simple language based on the experience gained in the previous lessons.
   - o Make presentation so as to impress upon the audience the usefulness of office package and the necessity of operating system.
   - o Organize venue to suit the seminar.
   - o Conduct seminar so as not to disturb the rest of the school.

7. **Format for assessment and evaluation   :**

Student Names	Criteria				
	Organization of knowledge	Attractiveness of presentationed	Clarity of presentation	Cooperation within the group	Responses to questions from audience

Marking scheme

4 – Excellent

3 - Good

2 - Average

1- Needs development

1. **Evaluation**   :   Term 3

2. **Objectives**   :   • To develop a solution to a given problem

                                              using a flow chart.

                                            • To convert a flow chart into a program.

                                            • To test the program using computers.

3. **Competency levels covered:**   9.1, 9.2, 9.3, 9.4, 9.5, 9.6

4. **Subject content covered** :   Main steps to analyze a problem

                                            Symbols used in flow charts
                                            Representation of control structures in flow charts

                                            Identifying coding related to high level programming

                                            languages to write computer programs

                                            Write simple programs

5. **Nature of Instrument**   :   Computer Program.

6. **Instructions for implementation:**

   ❖ **For teachers:**

      o At the commencement of activity 9.1, tell students that they have to develop a

         program to solve a problem to be identified on the basis of the examples

         given below. Tell students that they should,
         o   Provide an algorithm by means of a flowchart.
         o   Provide Pascal or visual basic codes for the flowchart.
         o   Demonstrate a Pascal or Visual Basic program on the computer

      o Also inform them about the following aspects to be included in the solution

         developed.

         o   Use all three control structures (sequence, selection, and iteration).

         o   The problem selected by the student to develop the program should

             represent one of the following examples.

   Example 1
      o   To input marks of all subjects of all students using suitable control
          structures.

      o   To calculate the total and average marks of each students.

      o   To display an error massage when invalid marks are entered.

      o   To print student name, marks for each subject, total and average.

   Example 2
      o   To enter monthly attendance of each student in each month using

          suitable control structures.

      o   To calculate the percentage of attendance of each student.

o   To giving a warning "your attendance is below 80%" if the percentage is below 80%.

o   The program can be adjusted according to the number of students at the runtime

o   Use the criteria suggested under section 7 to provide feed back on both theoretical and practical abilities developed by students.

❖ **For students:**

o   Identify a problem similar to the examples given.

o   List the inputs and outputs of the program.

o   Develop the algorithm and draw the relevant flow chart.

o   Write the relevant code on a sheet.

o   Get ready to demonstrate your program on the computer, to justify your actions and to present the problems you have encountered with methods for solving them.

o   Discuss with your teacher the proficiency level you have reached and take action for further improvement.

7. **Format for assessment and evaluation   :**

Student Names	Criteria				
	Uses of key words and syntax in the program	Use of relevant control structures.	Design andConversion of flow chart	Presentation of program,	Justification one's own actions

Marking scheme

4 – Excellent

3 - Good

2 - Average

1- Needs development