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General Information Technology (GIT)

Teachers' Guide
Grade 12

(Effective from 2017)

Department of Information Technology
National Institute of Education
Maharagama
Sri Lanka
www.nie.lk

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General Information Technology
Grade 12 – Teacher's Guide

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Message from the Director General

With the primary objective of realizing the National Educational Goals recommended by the National Education Commission, the then prevalent content based curriculum was modernized, and the first phase of the new competency based curriculum was introduced to the eight year curriculum cycle of the primary and secondary education in Sri Lanka in the year 2007

The second phase of the curriculum cycle thus initiated was introduced to the education system in the year 2015 as a result of a curriculum rationalization process based on research findings and various proposals made by stake holders.

Within this rationalization process the concepts of vertical and horizontal integration have been employed in order to build up competencies of students, from foundation level to higher levels, and to avoid repetition of subject content in various subjects respectively and furthermore, to develop a curriculum that is implementable and student friendly.

The new Teachers' Guides have been introduced with the aim of providing the teachers with necessary guidance for planning lessons, engaging students effectively in the learning teaching process, and to make Teachers' Guides will help teachers to be more effective within the classroom. Further, the present Teachers' Guides have given the necessary freedom for the teachers to select quality inputs and activities in order to improve student competencies. Since the Teachers' Guides do not place greater emphasis on the subject content prescribed for the relevant grades, it is very much necessary to use these guides along with the text books compiled by the Educational Publications Department if, Guides are to be made more effective.

The primary objective of this rationalized new curriculum, the new Teachers' Guides, and the new prescribed texts is to transform the student population into a human resource replete with the skills and competencies required for the world of work, through embarking upon a pattern of education which is more student centered and activity based.

I wish to make use of this opportunity to thank and express my appreciation to the members of the Council and the Academic Affairs Board of the NIE the resource persons who contributed to the compiling of these Teachers' Guides and other parties for their dedication in this matter.

Dr. (Mrs.) Jayanthi Gunasekara
Director General
National Institute of Education

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Message from the Deputy Director General

Education from the past has been constantly changing and forging forward. In recent years, these changes have become quite rapid. The Past two decades have witnessed a high surge in teaching methodologies as well as in the use of technological tools and in the field of knowledge creation.

Accordingly, the National Institute of Education is in the process of taking appropriate and timely steps with regard to the education reforms of 2015.

It is with immense pleasure that this Teachers' Guide where the new curriculum has been planned based on a thorough study of the changes that have taken place in the global context adopted in terms of local needs based on a student-centered learning-teaching approach, is presented to you teachers who serve as the pilots of the schools system.

An instructional manual of this nature is provided to you with the confidence that, you will be able to make a greater contribution using this.

There is no doubt whatsoever that this Teachers' Guide will provide substantial support in the classroom teaching-learning process at the same time. Furthermore the teacher will have a better control of the classroom with a constructive approach in selecting modern resource materials and following the guide lines given in this book.

I trust that through the careful study of this Teachers Guide provided to you, you will act with commitment in the generation of a greatly creative set of students capable of helping Sri Lanka move socially as well as economically forward.

This Teachers' Guide is the outcome of the expertise and unflagging commitment of a team of subject teachers and academics in the field Education.

While expressing my sincere appreciation for this task performed for the development of the education system, my heartfelt thanks go to all of you who contributed your knowledge and skills in making this document such a landmark in the field.

M.F.S.P. Jayawardhana
Deputy Director General
Faculty of Science and Technology

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Introduction

In the modern world ICT is involved and integrated in every field. The knowledge of ICT has become an essential to make an empowered citizen who is confident enough in facing with future challenges. Therefore, students should have the basic skills to use ICT. Providing awareness of ICT and orienting to carrier path are the two main aspects considered in the revision of the GIT syllabus, which will contribute to achieve the necessary skills, thereby enabling students to best fit into the challenging society.

General Information Technology (GIT) was first introduced in 2002. According to the curriculum revision cycle, the current revision was carried out in 2016 and it will be implemented in schools from 2017 onwards for grade 12. General Information Technology (GIT) is a common subject for students in all streams of G.C.E Advanced Level. The total periods allocated for GIT is 60 (40 hours). National level examination, which is conducted by The Department of Examination of Sri Lanka for GIT, has been held annually since 2005.

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Common National Goals

1. Based on the concept of respecting human values and understanding the differences between the Sri Lankan multi-cultural society, building up the nation and confirming the identity of Sri Lanka by promoting national integrity, national unity, national coherence and peace

2. While responding to the challenges of the dynamic world, identifying and conserving the National heritage.

3. Creating an environment which comprises of the conventions of social justice and the democratic life to promote the characteristics of respecting the human rights, being aware of the responsibilities, concerning each other with affectionate relationships.

4. Promoting a sustainable life style based on the people's mental and physical well-being and the concept of human values

5. Promoting the positive feelings needed for balanced personality with the qualities of creative skills, initiative, critical thinking and being responsible

6. Through education, developing the human resources, needed for the progress of the well-being of an individual, the nation as well as the economic growth of Sri Lanka.

7. Preparing the people for the changes that occur in a rapidly changing world by adapting to it and controlling them; developing abilities and potentialities of people to face the complex and unexpected occasions.

8. Sustaining the skills and attitudes based on justice, equality, mutual respect which is essential to achieve a respectable place in the international community.

National Education Commission Report (2003).

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Basic Competencies

The competencies promoted through the education mentioned below might help to achieve the above mentioned National Goals.

1. Competencies in Communication

This first set of competencies is made up of four subsets - Literacy, Numeracy, Graphics and information communication skills:

Literacy: Carefully listening, speaking clearly, and Reading for comprehension, writing clearly and accurately.

Numeracy: Using numbers to count, calculate, code and to measure, matter, space and time

Graphics: Making sense of line and form, expressing and recording essential data, instructions and ideas with line, form, colour, two and three-dimensional configurations, graphic symbols and icons

ICT Competencies:
Knowledge on computers, and the ability to use the information communication skills learning or work as well as in the private life

2. Competencies relating to the Personality Development

- Generic skills such as creativity, divergent thinking, initiative, decision making, problem-solving, critical and analytical thinking, team work, inter-personal relationships, discovering and exploring
- Values such as integrity, tolerance and respect for human dignity
- Cognition

3. Competencies relating to the Environment

This is the second set of competencies related to the Social, Biological and Physical Environments.

Social Environment: Awareness, sensitivity and skills linked to being a member of society, social relationship, personal conduct, general and legal conventions, rights, responsibilities, duties and obligations.

Biological Environment: Awareness, sensitivity and skills linked to the living world, man and the ecosystem, the trees, forests, seas, water, air and plant -life, animal and human life.

Physical Environment: Awareness, sensitivity and skills relating to space, energy, fuels, matter, materials and their links with human living, food, clothing, shelter, health, comfort, respiration, sleep, relaxation, rest, wastes and excretion, media of communication and transport.

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Included here are the skills in using tools to shape and for materials for living and learning

4. **Competencies relating to preparation for the world of work**
Employment related skills to maximize their potential and to enhance their capacity to contribute to economic development; to discover their vocational interests and aptitudes; to choose a job that suits their abilities and to engage in a rewarding and sustainable livelihood.

5. **Competencies relating to religion and ethics**
This fourth set of competencies laden with values and attitudes. It is essential for individuals to assimilate values, so that they may function in a manner consistent with the ethical, moral and religious modes of conduct, rituals, practices in everyday living, selecting the most appropriate.

6. **Competencies in play and use of leisure**
Competencies that link up with pleasure, joy, emotions and such human motivations. These find expression in play, sports, athletics and leisure pursuit of many types. These also link up with such values as cooperation, team work, healthy competition in life and work. Here are included such activities as are involved in aesthetics, arts, drama, literature, exploratory research and other creative modes in human living.

7. **Competencies relating to 'Learning to learn'**
These competencies flow directly from the nature of a rapidly changing, complex and interdependent and crowded world whatever one learns, that learning will need updating and review. This requires that one should be aware of, sensitive and skilful in sustained attention, and be willing to persevere and attend to details that matter in a given situation.

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Objectives of the Subject

This syllabus enables students in Grade 12 to

- recognize and use ICT applications and devices for day to day life by:
    - Understanding the internal working of computers
    - Using appropriate application software for different daily activities
    - Using computers effectively, efficiently and ethically to interact with the society
- explore different career opportunities related to ICT

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- **Proposed number of periods for each units**

Term	Competency Level	No. of Periods
First Term	1.1, 1.2	03
	2.1, 2.2, 2.3	04
	3.1, 3.2	03
	4.1	06 (16 Periods)
Second Term	4.2, 43, 4.4	16
	5.1, 5.2, 5.3	07 (23 Periods)
Third Term	6.1, 6.2	05
	7.1, 7.2, 7.3, 7.4	10
	8.1, 8.2, 8.3	06 (21 Periods)

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Competency	Competency level	Content	Learning Outcomes	Periods

Competency 1:
Explores the computer and its potential to reap timely benefits
	1.1
	Describes the computer as a system using a block diagram
		• System concept
		• Introduction to computer
		• Components of a computer
		  • Hardware
		  ▪ Input / Output devices
		  ▪ Memory devices
		  ▪ Storage devices (Optical, Magnetic, Semiconductor)
		  ▪ Processor
		  • Software
		  ▪ System software (OS, Utilities)
		  ▪ Application software
		• Block diagram of a computer
		  ▪ Input
		  ▪ Processing unit (ALU, CU)
		  ▪ Output
		  ▪ Memory / Storage
		  ▪ Flow of data and control instructions among components
		• Data and information
		• Attributes of quality information
			• Defines a system
			• Identifies computer as a system (IPO)
			• Recognizes computer as a component of a system
			• Lists and describes the hardware components of a computer
			• Distinguishes peripherals as input devices, output devices and input/output devices
			• Lists and briefly describes the types of software
			• Draws the block diagram of a computer and names its components
			• Briefly explains each component of a computer
			• Distinguishes data and information with examples
			• Names and briefly describes attributes of quality in format
				02

	1.2
	Identifies the specification of personal computers
		• Hardware specifications of personal computers
		  ▪ Processor
		  ▪ Memory
		  ▪ Hard Disk
		  ▪ Motherboard
			• Identifies and selects specification of a personal computer according to requirements and affordability
			• Prepare specification of
				01

Competency	Competency level	Content	Learning Outcomes	Periods
		▪ Ports ▪ Chip set ▪ Display ▪ GPU (Graphics Processing Unit) • Software specifications for a PC ▪ Operating System ▪ Application Software ▪ Utility Software	computer and peripheral devices • Selects software according to user requirements	
Competency 02 Explores the representation of data inside a computer	2.1 Describes the data representation used in computers and the related fundamental concepts	• Number systems ▪ Decimal ▪ Binary ▪ Hexadecimal • Relevant methods of conversion (Positive integers only) ▪ Decimal to Binary ▪ Binary to Decimal	• Describes the number systems in terms of base value, place value and weight • Identifies the usage of number systems in computer • Converts decimal number into binary • Converts binary number into decimal	02
	2.2 Identifies Basic Boolean Operators	• Basic Boolean Operators ▪ AND ▪ OR ▪ NOT	• Draws Truth Tables for basic Boolean operators • Draws Truth Tables for given Boolean expressions	01
	2.3 Describes different character representation and their usage	• Encoding systems used in computers ▪ ASCII ▪ Unicode	• Briefly describes the need for encoding systems in computer • Explains and compares ASCII and Unicode encoding	01

Competency	Competency level	Content	Learning Outcomes	Periods
			systems	
Competency 3: Uses computers efficiently and effectively with awareness of Operating System (OS)	3.1 Investigates the contribution of OS to the functioning of computer	• Introduction to Operating System • Basic functions of an OS	• Briefly describes the use of OS in PC's • Lists the basic functions of an OS • Distinguishes CLI and GUI	01
	3.2 Uses functions of operating systems	• Managing Folders and Files (creating, naming, renaming, deleting, copying and moving) • File names and extensions • Making changes in Settings Panel ▪ Backup ▪ Fonts ▪ Mouse Settings ▪ Date and Time, Regional and Language Settings ▪ Add Remove Programs ▪ User Accounts • Tools in OS ▪ Character Map ▪ Disk Defragmentation ▪ Check Disk ▪ Disk Clean Up	• Creates folders and files with proper names • Identifies the file types by their extensions • Demonstrates the following operations for the existing files and folders ▪ rename ▪ copy and move ▪ delete • Adjusts the settings in setting panel when necessary • Identifies and uses the appropriate system tools for relevant tasks	02

Competency	Competency level	Content	Learning Outcomes	Periods
Competency 4: Uses Application software in day to day activities	4.1 Uses the word processing software in day to day activities	• Introduction to word processing software • Features of word processing software • GUI components in word processing software ▪ Title Bar ▪ Formatting Tools ▪ Editing Tools ▪ Page Setup Tools ▪ View Tools ▪ Designing Tools ▪ Scroll bars ▪ Editing Area ▪ Insertion Point, Cursor ▪ Status Bar • Creating a new document ▪ Page layout and page borders ▪ Headers, footer and page numbers ▪ Typing text, formatting text • Editing a document ▪ Find and replace ▪ Grammar and spell checker ▪ Cut / Copy / Paste • Inserting objects and usage of relevant editing tools ▪ pictures/charts/shapes/clip art /word art /text box etc. • Inserting equations, symbols, links,	• Briefly explains the word processing software • Briefly explains the usage of word processing software • Discusses the features of word processing software • Lists the components available in GUI of a word processing software • Creates a new document • Applies proper text formats • Applies proper paragraph formats • Uses editing features to edit a document if necessary • Uses grammar and spell checker tool • Inserts relevant graphic objects and edits those using relevant editing tools • Inserts equations, symbols, links, breaks, date and time if necessary • Uses relevant short cut keys • Creates a table using a preferred method • Inserts columns, rows to a existing table • Deletes unnecessary	06

Competency	Competency level	Content	Learning Outcomes	Periods
		breaks, date and time • Short cut keys ▪ open/new/save/select all/cut /copy/paste/undo/redo/print • Creating and formatting tables ▪ Methods of creating a table ○ Selecting rows and columns with mouse /insert table/draw table ▪ Insert and delete rows and columns ▪ Merge and split cells ▪ Change row height/column width ▪ Table borders ▪ Styles • Formatting paragraphs • Saving documents in different formats • Printing documents ▪ Print preview ▪ Print setup ▪ Printer properties ▪ Print	columns and rows • Applies cell formats to a table • Merges and splits cells • Changes height and width of rows and columns according to requirements • Saves document in different formats according to the needs • Previews the document before printing • Prints a document after applying necessary print setups	
	4.2 Uses spreadsheet software to solve simple mathematical problems	• Introduction to spreadsheet software • GUI of spreadsheet software ▪ Work Book ▪ Work Sheet ▪ Columns ▪ Rows	• Briefly explains the electronic spreadsheet software • Lists available spreadsheet software • Lists the functions of	06

Competency	Competency level	Content	Learning Outcomes	Periods
		▪ Cell ▪ Formula bar ▪ Function of cell pointer based on its appearance • Moving around the worksheet • Types of data entries in a cell ▪ Text ▪ Numbers ▪ Formula • Formatting cells ▪ Number ▪ Alignment ▪ Font • Inserting rows and columns • Deleting cells, rows and columns • Worksheet ▪ Rename ▪ Insert ▪ Delete • Naming and selecting cell ranges • Copying and moving cell contents ▪ Cut, copy, paste and paste special • Simple calculations ▪ arithmetic operations with basic Operators (+ , - , * , /) ▪ calculations using cell references and operators - Relative cell references	spreadsheet software • Identifies the components and features of GUI of spreadsheet software • Moves around the worksheet • Lists the types of data entered into a cell • Applies relevant formats to the cells according to the requirement • Inserts rows and columns according to requirement • Deletes unnecessary rows and columns • Inserts, deletes and renames worksheets according to requirement • Selects and names a range • Copies and moves cell contents according to requirements • Performs simple calculations using numbers and basic operators • Performs simple calculations using relative cell references and absolute cell references • Uses inbuilt functions to perform simple calculations	

Competency	Competency level	Content	Learning Outcomes	Periods
		- Absolute cell references • Inbuilt Functions ▪ sum, average, max, min, count and rank • Types of charts ▪ Column, Bar, Line and Pie • Chart tools • design / layout / format • Data filtering • Data sorting • Printing a worksheet ○ Page setup ▪ Page options ▪ Margin options ▪ Sheet options ○ Print preview ○ Print	• Identifies relevant charts types according to the requirement • Creates charts • Uses filter tool to query information • Uses sorting tool to organise data in an orderly manner • Sets the page according to the requirements • Previews and prints the worksheet	
	4.3 Uses electronic presentation software to enhance presentation	• Introduction to electronic presentation • Attributes of an effective presentation • Features of presentation software • Usage of presentation software • Selecting slide layout • Selecting background • Inserting text & multimedia contents • Applying slide transition and custom animation • short cut keys specific to the presentation • Saving a presentation with different	• Briefly explains the electronic presentation software • Lists and explains the attributes of an effective presentation • Briefly explains the usage of presentation software • Discusses the features of presentation software • Creates a presentation attractively using	4

Competency	Competency level	Content	Learning Outcomes	Periods
		formats • Printing a presentation with different options	presentation software • Selects appropriate layout relevant to the content • Inserts texts, pictures, sounds, videos, graphics, shapes, clip arts, tables, smart art, header and footer, page numbers, hyperlinks, action buttons etc. • Applies a slide transition • Applies background • Applies a suitable custom animation to the content • Saves presentation in required format • Presents the presentation • Uses relevant shortcut keys • Previews the Slides before printing • Prints the presentation to suit different needs	
	4.4 Uses Database Management System (DBMS) Software to manage data in a database	• Introduction to database • Comparison of manual database and automated database • Introduction to DBMS software • Objects of DBMS software ▪ Table ▪ Query ▪ Form	• Briefly explains the database • Distinguishes manual from automated database • Defines DBMS • Identifies the need of DBMS • Lists objects of DBMS • Uses the fields and creates a table	06

Competency	Competency level	Content	Learning Outcomes	Periods
		▪ Report • Field names • Primary key and foreign key • Data types ▪ Text ▪ Number ▪ Date / Time ▪ Currency ▪ Yes / No • Field properties ▪ Field size ▪ Format • Designing queries ▪ Filter fields ▪ Filter records • Sort records • Form wizard • Report wizard	• Selects appropriate data types in creating tables • Briefly describes the usage of the primary key and the foreign key • Selects and sets the most suitable field as the primary key • Applies the relevant field properties according to the requirements • Retrieves required information by using queries • Sorts records as required • Creates form using form wizard • Creates reports using report wizard	

Competency	Competency level	Content	Learning Outcomes	Periods
Competency 5: Creates Multimedia contents to express ideas effectively	5.1 Designs still graphics using a graphic software	• Types of graphics ▪ Raster ▪ Vector • Properties of a digital image: pixel, resolution, size, color • Graphic file formats and their features ▪ Jpg, png, gif, bmp etc. • Image capacity and compression: lossy formats and lossless formats • Basic operations of a graphic software ▪ Open, save and edit ▪ Importing images ▪ Sizing and transformation ▪ Selections, cut, crop, replace ▪ Working with layers ▪ Working with Text	• Describes the properties of digital still images • Creates attractive graphics using graphics software tools • Edits digital graphics as required • Uses basic text effects to enhance the appearance	3
	5.2 Edits audio contents using an audio editing software	• Recording audio contents • Editing (editing a relevant segment from original content) • Audio file formats ▪ Mp3, wav, au etc.	• Records audio as required using audio editing software • Edits a relevant segment of audio from original • Converts audio files to other formats as required	2
	5.3 Edits videos using an video editing software	• Manipulating and rearranging video • Video file formats ▪ Mp4, avi, wmv etc.	• Edits videos as required • Converts video files to other formats as required	2
Competency 6: Uses the Internet	6.1 Explores the architecture	• Purpose of computer network ▪ Data communication	• Describes the requirements of a computer network	2

Competency	Competency level	Content	Learning Outcomes	Periods
efficiently and effectively to access and communicate information in day-to-day life	of the Internet	▪ Sharing resources • Network types ▪ PAN (Personal Area Network) ▪ LAN (Local Area Network) ▪ WAN (Wide Area Network) • Communication devices of a network ▪ Modem ▪ Router ▪ Network Interface Card(NIC) ▪ Switch ▪ Wireless Base Station ▪ Mobile communication GPRS, GSM etc. • Connectivity types ▪ Guided ▪ Unguided • Wired and wireless networks • Client server model • Peer to peer • Hybrid	• Names and describes the network types • Lists and briefly describes the communication devices of a network • Distinguishes between guided and unguided media • Briefly describes ▪ Client server model ▪ Peer to peer ▪ Hybrid • Distinguishes between wired and wireless networks	
	6.2 Uses the internet services to access relevant information	• Uniform resource locator (URL) / Uniform resource identifier(URI) • Web browsers and search engines • Internet services ○ WWW ▪ Information sharing and electronic transactions ○ Email ○ Social Media	• Briefly describes URL and URI • Briefly describes Internet and its services • Uses web browsers and search engines for accessing Information • Creates an email account • Uses emails in	3

Competency	Competency level	Content	Learning Outcomes	Periods
		▪ Internet based text and video based communication (Internet relay chat (IRC) / SMS / video calls etc.) ▪ Blogging and micro blogging ○ Cloud Computing ○ Cloud based services • Internet of Things(IoT) ○ Definition ○ Characteristics ○ Needs ○ Applications ○ Enabling Technologies	communication • Downloads required information • Describes instant messaging and its types • Uses internet based IRC, SMS, video calls etc. for communication • Defines blogging and micro blogging • Creates and uses blog to share information • Defines cloud computing • Uses cloud computing to store, manage and process data or information • Defines IoT • Briefly describes the characteristics of IoT • Identifies need of IoT • Discusses the applications of IoT • Identifies Enabling Technologies for IoT	
7.0 Develops websites incorporating multi-media components	7.1 Explores the arrangement and the composition of websites	• Contents of a website ▪ Home page ▪ Link page • Building blocks of a web page	• Identifies the web pages of a website • Identifies the contents of a web page	1

Competency	Competency level	Content	Learning Outcomes	Periods
	to organize pages and contents	▪ Text, graphics, audio, video, animation ▪ Hyperlink • Organization of contents ▪ Layout, frames, lists, tables	• Analyses the arrangement of contents of a web page	
	7.2 Analyses user requirements (multimedia contents) for web pages	• Defining the objectives of a website • Contents to be displayed	• creates effective and appropriate information layout of a web page	1
	7.3 Uses HTML to create web pages	• Introduction to Hyper Text Mark-up Language • Basic HTML tags of a web page ▪ Page definition ○ <html>, </html> ▪ Head section, ○ <head></head> ○ <title></title> ▪ Body section ○ <body></body> ▪ Background color ▪ Text formatting ○ <h1>…<h6>tags ○ ○ ○ Underline, bold, italic ○ <font:> • Size and color	• Explains Hyper Text Mark-up Language • Saves the source document with suitable extensions • Designs the web page by inserting appropriate multimedia objects according to user requirements • Organizes data using lists in web page	6

Competency	Competency level	Content	Learning Outcomes	Periods
		▪ Adding comments ▪ Lists o Ordered lists o Unordered lists ▪ Multimedia objects o Image o Audio o Video		
	7.4 Uses authoring tool to create web pages	• Introduction to web authoring tools	• Uses web authoring tools to create a simple web page	2
Competency 8: Uses ICT efficiently and effectively to be successful in life	8.1 Explains the contribution of ICT towards national development	• Application of ICT ▪ **Education** - Learning / Teaching Process - Learning Management System - School Management System ▪ **Health** - Investigation tools such as MRI scan, CAT scan etc. - Simulations in medical education - Tele-medicine ▪ **Agriculture** - Linking rural agricultural communities - Communicating with the administration - Meteorological Information	• Discusses advantages and disadvantages of ICT • Lists and briefly describes the applications of ICT in various fields • Appreciates the contribution of ICT in national development	2

Competency	Competency level	Content	Learning Outcomes	Periods
		- Computer controlled devices ▪ **E- Business** - Travel - Online shopping - Bank (ATM, Credit Card) - On-line Employment ▪ **E – Governance** - Issuing of identity cards, driving licence and passports - Issuing birth, marriage, death certificates		
	8.2 Seeks ICT career opportunities and paths to suit one's life	• Career opportunities related to ICT profession ▪ Software Engineer ▪ Software Quality Assurance Engineer ▪ Business Analyst ▪ IT Project Manager ▪ Graphic Designer ▪ Software Architect ▪ Quality Assurance Leader ▪ Technical Leader ▪ Network Administrator ▪ Database Administrator ▪ Computer Application Assistant ▪ IT Manager etc.	• Identifies the career paths and opportunities related to ICT • Identifies the tasks related to each ICT profession	1
	8.3 Makes safe use of ICT	• Ethical and legal Issues ▪ Cyber crime	• Identifies and briefly describes ethical and legal	3

Competency	Competency level	Content	Learning Outcomes	Periods
	with awareness on relevant issues	▪ Privacy ▪ Piracy ▪ E- Laws ▪ Sri Lanka Computer Emergency Readiness Team (SLCERT) ▪ Unauthorised access ▪ Ethical behaviour on cyberspace - Cyber stalking - Intellectual property (patent, copyright) - Plagiarism - Blackmail • Ethical and legal issues in social media ▪ Inappropriate materials • Security ▪ Hardware protection - Physical protection ○ UPS ○ Surge arresters - Environmental protection ○ Dust, Humidity, Sunlight, Heat ○ Protection from natural disasters ▪ Software protection - Anti-threat software - Firewall • Precautions in using internet • Health & Safety	issues related to ICT • Gets aware of e-laws and SLCERT • Lists the good and bad impacts of social media • Identifies the threats to computer system • Take precautionary measures to protects the computer hardware and software • Identifies the issues arise from unsafe use of internet and takes precautionary measures to prevent them • Identifies the health issues arise from using computer • Takes precautionary measures to avoid health issues when using computers • understands about good and unfavourable computer habits • Defines e-waste • Briefly describes the adverse effects of improper disposal of E-waste • Disposes e-waste in a	

Competency	Competency level	Content	Learning Outcomes	Periods
		▪ Repetitive Strain Injury (RSI) ▪ E-Waste and green computing	proper way • Recognizes and appreciates green computing • Adapts relevant workplace practices to minimize the health issues when working for a long hours with computers	

Competency 1: Explores the computer and its potential to reap timely benefits

Competency level 1.1: Describes the computer system using a block diagram

Time: 2 periods

Learning outcomes:

- Defines a system
- Identifies computer as a system (IPO)
- Recognizes computer as a component of a system
- Lists and describes the hardware components of a computer
- Distinguishes peripherals as input devices, output devices and input/output devices
- List and briefly describes the types of software
- Draws the block diagram of a computer and names its components
- Briefly explains each component of a computer
- Distinguishes data and information with examples
- Names and briefly describes attributes of quality information

Contents:

- System concept
- Introduction to computer
- Components of a computer
- **Hardware**
  - Input / Output devices
  - Memory devices
  - Storage devices (Optical, Magnetic, Semiconductor)
  - Processor
- **Software**
  - System software (OS, Utilities)
  - Application software
- Block diagram of a computer
  - Input
  - Processing unit (ALU, CU)
  - Output
  - Memory / Storage
  - Flow of data and control instructions among components
- Data and information
- Attributes of quality information

Concepts and terms to be highlighted:

- Definition of a system
- Definition of a digital computer as a system
- Basic block diagram of a computer and Von Neumann Architecture
- Focus on the computer hardware and computer software
- Data and information
- Stress that data and information are relative terms and they can be better identified with respect to a data processing system. Information in a certain sense could be data with respect to some other system

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Guidance for lesson plans:

- Discussion about a system
- Discussion about a digital computer as a system
- Introduce the computer basic block diagram as input, process and output
- Comparison of the computer basic block diagram with the physical computer system
- Discussion about the components of a computer system
- Display and demonstrate the components of a computer
- Introduction of Von Neumann Architecture with block diagram and its components
- Discussion of data and information with suitable examples
- Discussion of the attributes of quality information

Quality inputs:

- Computers, Multimedia projector, Various sample Software CDs/DVDs

Guidance for assessments and evaluations:

- Give an assignment to classify the components of a computer
- Ask students to draw and name a block diagram of Von Neumann Architecture
- Provide students with scenarios and let them find data and information related to it and ask them to justify the answers
- Provide at least five attributes of quality information and ask students to give appropriate examples to them

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Competency level 1.2: Identifies the specification of personal computers

Time: 1 period

Learning outcomes:

- Identifies and selects specification of a personal computer according to requirements and affordability
- Prepare specifications of computer and peripheral devices
- Selects software according to user requirements

Contents:

- Hardware specifications of personal computers
  - Processor
  - Memory
  - Hard Disk
  - Motherboard
  - Ports
  - Chip set
  - Display
  - Graphics Processing Unit (GPU)
- Software specifications for a PC
  - Operating System
  - Application Software
  - Utility Software

Concepts and terms to be highlighted:

- Concept of personal computers
- Identification of important hardware specifications of PC
- Identification of software specifications of PC

Guidance for lesson plans:

- Assign the students to prepare hardware and software specifications of a personal computer according to the given requirements (examples – Video editing, library, computer lab, school office work, entertainment etc)

Quality inputs:

- Advertisements of available PCs in the market, Internet connection

Guidance for assessments and evaluations:

- Provide a scenario to students and ask them to prepare hardware and software specifications according to it

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Reading Material:

Introduction to a system
A system is a set of rules, an arrangement of things, or a group of related things that working together toward a specific goal. Every system contains a model made by three major parts calls Input, Process and Output (IPO).They describe the structure of a system.
Introduction to computer
An electronic device which is capable of receiving data in a particular form and of performing a set of operations in accordance with a predetermined set of instructions (program) to produce a result in the form of information.



fig 1.1: IPO Model

Computer as a system
Computer is an organization of hardware and software, often together with end-users that function as a unit to perform a specific task. As the above diagram illustrates, a computer follows the IPO model. Therefore we can classify computer also as a system.
As the computer is a system, each component can't work on its own. Computer works when its components are connected properly.
The basic components are,

- Keyboard and Mouse
- System Unit
- Monitor

The functions of the basic components as follows

- The Keyboard and Mouse are used to input Data and Instructions
- The system unit processes the data into information
- The monitor displays the (Output) information to the user

Peripheral Devices

A peripheral is a piece of computer hardware that is added to a computer in order to expand its abilities. The term peripheral is used to describe those devices that are optional in nature, as opposed to hardware that is either demanded or always required in principle. There are all different kinds of peripherals you can add your computer. The main distinction among peripherals is the way they are connected to your computer. They can be connected internally or externally.

All hardware peripherals can be categorized as follows

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- Input/output devices
    - Input devices: The devices are used to enter data and Instructions to computer
    - Output devices: The devices are used to get output from the computer
    - Input and output devices: The devices facilitate for both Input and Output
    - Storage devices: The devices that are used to store data and Instructions for later retrieval.
- Processor: The device is used to process data into information

Input devices:
The devices are used to enter data and Instructions to computer

- Keyboard
- Mouse
- Graphics Tablets
- Cameras
- Barcode reader
- Digital camera
- Joystick
- Microphone
- MIDI keyboard
- Scanner
- Webcam
- Touch pads
- Microphone
- OMR(Optical Mark Reader)
- OCR(Optical Character Reader)
- MICR (Magnetic Ink character reader)
- RFID(Radio Frequency Identification) Reader

- **Output devices:** The devices are used to get output from the computer

Output devices:

- Monitor (LED, LCD, CRT etc.)
- Printers (all types)
- Plotters
- Projector
- Speaker(s)
- Head Phone

Both Input–Output Devices:

- Touch Screen
- Modems
- Headsets (Headset consists of Headphones and Microphone)
- Electronic Whiteboard

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- **Storage Devices**
  - Magnetic (Hard Disk, Tape etc.)
  - Optical (CD/DVD/Blu-Ray Disc etc.)
  - Solid State (Flash drives, Memory cards etc.)

Software

Software is a general term for the various kinds of programs used to operate computers and related devices.

Software is often divided into two categories

- application software
- System software

  - **Application Software:**
    These are software that accomplishes user tasks. They act between the System Software and the User. A user interacts with the Application Software to get his tasks done. Application Software takes input from the user and processes it according to the users' request.
    Examples:

    - Word Processor
    - Spreadsheet
    - Presentation Graphics
    - Database Managers
    - Internet Browser
    - Media Player

  - **System Software:**
    This is a type of software which controls, co-ordinates computer operations and manages the hardware of a computer. System Software forms the base on which the Application Software work. They act as an interface between the hardware and the Application Software concealing the technical complexity of the hardware.

  - Examples of System Software:
    - Basic Input/output System(BIOS)
    - Operating System
    - Device Drivers
    - Software utilities (Disk clean-up, Disk optimizer, Antivirus, back up etc.)

- **Processor:** The device is used to process data into information

  The basic elements of a processor:

  - **Control Unit :**
    Control unit is responsible for all operations. It steps through instructions (Programs) and coordinates actions of other components.

  - **Arithmetic and Logic Unit (ALU):**
    ALU operates as directed by CU. It provides arithmetic (add, subtract, multiply, divided) and Logical (NOT, AND, OR) operations

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- **Registers**: Provide local storage which holds instructions and data for operations. Registers supply operands to the ALU for operations and store the results of operations.

Von Neumann architecture

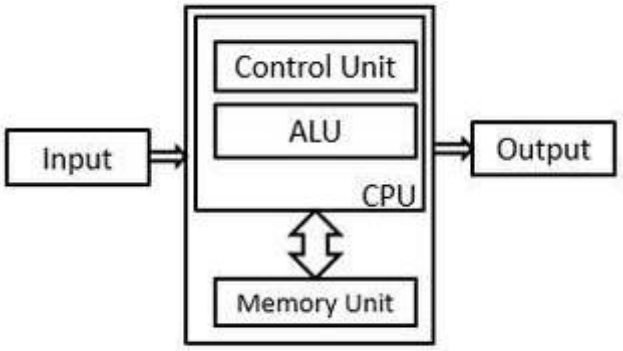


fig: 1.2 CPU

- **Control unit:** Controls the operation of the computer.
- Arithmetic and logic unit (ALU): Performs the computer's Arithmetic and logic operations
- **Registers:** Provides local storage for the processor
- **Internal interconnection:** Mechanism that provides communication among the control unit, ALU, and registers.
- **Input / Output Devices:**
  This architecture allows users to interact with the machine. For this purpose, IO devices provide connection between processor and external world.
  - Storage Devices: RAM, cache, a hard disk, an optical disk drive and externally connected USB drives.
    - **Primary Storage Devices**: Directly accessible to the processor, smaller in capacity, faster in access speed and expensive. They include **RAM, ROM and cache memory**.
    - **Secondary Storage Devices:** Indirectly accessible to the processor through I/O channels, larger in capacity, slower in access speed and inexpensive. They include magnetic disks, optical discs, solid state storage device.
- **Bus :**
  It is an electronic communication mechanism. It allows two or more functional units of the computer to transfer data, addresses and control signals.

Data and Information

What is data?

- Data can be defined as a representation of raw facts, such as quantities, characters, or symbols on which operations are performed by human or a

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computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.

- Data is represented with the help of alphabetical letters (A-Z, a-z), Numbers (0-9), and or other symbols (+,-,/,*,<,>,= etc.).

What is Information?

- Information is organized or classified data which has some meaningful values for the user. Information is the processed data on which decisions and actions are based. To be meaningful, Information should contain the following characteristics:

    - **Relevance**: Information should be communicated to the right person. It should be relevant to the purpose for which it is required. It must be suitable. What is relevant for one person may not be relevant for another.
    - **Accuracy:** Information should be fair and free from bias. It should not have any arithmetical and grammatical errors. Information comes directly or in written form likely to be more reliable than it comes from indirectly (from hands to hands) or verbally which can be later retracted
    - **Completeness:** Accuracy of information is not just enough. It should also be complete which means facts and figures should not be missing or concealed. Telling the truth but not wholly is of no use.
    - **Timeliness:** Information should be communicated in time so that receiver of the information has enough time to decide appropriate actions based on the information received. Information which communicates details of the past events earlier in time is of less importance than recently issued information like newspapers. What is timely information depends on situation to situation. Selection of appropriate channel of communication is key skill to achieve.
    - **Reliability:** Reliable information if information that you can rely on as being correct. It will be from a valid and trusted source. An example of reliable information would be information from your sales department that is supplied to the financial department on the sales figures for last month. As this comes from an internal information source it is reliable and can be trusted.
    - **Accessible:** Accessible information is information that is stored in a way that it can be easily accessed at any time. If we refer back to the example of looking at sales figures on a cash register at any time of the day having the feature of printing out current sales from the cash register means that the information is accessible. If it took one hour to process the sales figures and print them then this information would not be easily accessible. Accessible is an important characteristic of good information as users need to have information available to them as and when they need it.

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Specifications for Personal Computer (PC)

What is the Specification?

The specification is a list of the key components that make up the computer. It is provided by retailers to help buyers decide which PC, and which combination of features, they need. When buying a PC, it is important to start by deciding what you need to do with the PC.

When reviewing a computer specification, the most important components to take account of are

- Clock speed of the processor
- Capacity and clock speed of the RAM
- Capacity and speed of Hard Disk Drive(HDD)
- Type, size and resolution of the Monitor
- Mother board: compatibility and connect criteria (Wi-Fi, RJ45, USB etc.)

Operating Systems (OS)

PCs are generally purchased with an operating system pre-installed. It is worth checking that your existing software will still work with the operating system of any new systems being purchased. It may be possible to choose a particular operating system and, if so, this may help standardize new machines with existing PCs.

Some operating systems are proprietary and required a license to use while others are freely available.

Purchasing Considerations

consider the following points when purchasing PCs

- What is the intended use of the PC and will the chosen specification fulfil these requirements?
- Is the PC compatible with existing computer hardware and software?
- Is the technical support service satisfactory?
- Warranty (comprehensive, limited, onsite, number of years)

Application Software

If you choose to purchase any application software for your personal computer, select newer compatible versions for your operating system and computer hardware. Do not install unnecessary free software to your computer because they can be potentially harmful to the computer.

Anti-Virus Software

- Anti-virus software should be installed on your personal computer, configured to automatically update, and scheduled to run regular scans. You may install either a free or subscription-based anti-virus suite.
  NOTE: Do not run multiple anti-virus programs on the same machine.
- Anti-malware / anti-spyware software, or a security suite which provides similar functionality, is also recommended. Enable your computer's firewall for additional protection

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Competency 2: Explores the representation of data inside a computer

Competency level 2.1: Describes the data representation used in computers and related fundamental concepts

Time: 3 periods

Learning outcomes:

- Describes the number systems in terms of base value, place value and weight
- Identifies the usage of number systems in computer
- Converts decimal number into binary
- Converts binary number into decimal

Contents:

- Number systems
  - Decimal
  - Binary
  - Hexadecimal
- Relevant methods of conversion (Positive integers only)
  - Decimal to Binary
  - Binary to Decimal

Concepts and terms to be highlighted:

- Base, place value and weighing factor of decimal, binary and hexadecimal number systems
- Focus on positive integers only
- Examples on applications of these number systems with reasons (RGB, hexadecimal)
- Conversion of decimal to binary vice versa

Guidance for lesson plans:

- Discussion on base, place value and weighing factor of decimal, binary and hexadecimal number systems
- Demonstration on conversions

Quality inputs:

- Internet connection, Model of a counting frame

Guidance for assessments and evaluations:

- Exercises on identifying the base, place value and weighing factor
- Exercises on conversions

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Competency level 2.2: Identifies Basic Boolean Operators

Time: 1 periods

Learning outcomes:

- Draws Truth Tables for basic Boolean operators
- Draws Truth Tables for given Boolean expressions

Contents:

- Basic Boolean Operators
  - AND
  - OR
  - NOT

Concepts and terms to be highlighted:

- Basic operators and their relevant truth tables
- Use maximum two inputs

Guidance for lesson plans:

- Explanation of the concepts of basic Boolean operators using day–to-day examples

Quality inputs:

- **Internet connection**
- **http://ryanstutorials.net/boolean-algebra-tutorial/boolean-algebra.php**

Guidance for assessments and evaluations:

- Drawing truth tables to given basic Boolean operators
- Exercises on basic Boolean operators

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Competency level: 2.3 Describes different character representation and their usage
Time: 1 period

Learning outcomes:

- Briefly describes the need for encoding systems in computer
- Explains and compares ASCII and Unicode encoding systems

Contents:

- Encoding systems used in computers
  - ASCII
  - UNICODE

Concepts and terms to be highlighted:

- Need of encoding systems
- Use of ASCII and UNICODE encoding systems

Guidance for lesson plans:

- Explanation of ASCII code with word processor (example: type 65 with Alter key for letter “A”)
- Explanation of UNICODE and show the use of Sinhala or Tamil Unicode to extend the standard symbols

Quality inputs:

- Computers with Sinhala and Tamil language kit (IME)

Documents in Sinhala/Tamil

Guidance for assessments and evaluations:

- Ask students to convert given words into ASCII code
- Provide exercise on (Sinhala or Tamil) typing using Unicode

Reading materials

Number system: A system that naming or representing numbers is known as Number System.

Some number systems related with computer

- Decimal
- Binary
- Hexadecimal

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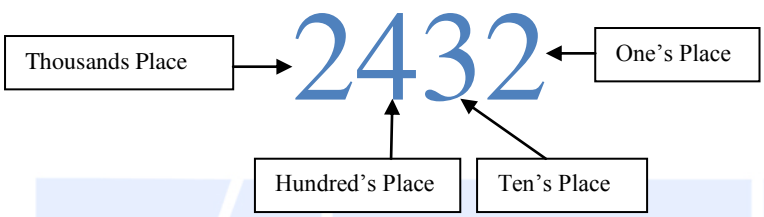
Symbols of number system

Number system	Base value	Number of symbols	Symbols
Decimal	10	10	0,1,2,3,4,5,6,7,8,9
Binary	2	2	0,1
Hexadecimal	16	16	0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F

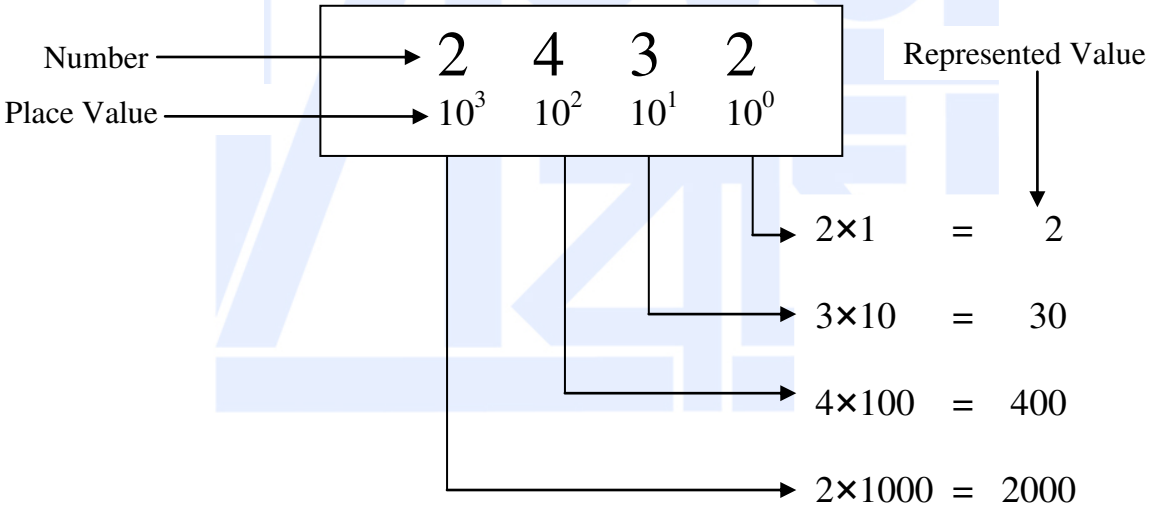
- The total number of symbols in a number system is called its **base value**

Place value:

Example 1: In 2432, the 3 is in the "ten's" place, where the place value is ten. Therefore, 3 represents the value 30.



Eg. Decimal numbers are 'base-10 numbers therefore the place value of each digit is a power of 10. Consider decimal number 2432:



In Binary Number System:

- Each bit in the binary system has a place value. Binary is a base-2 number system, therefore the place value of each bit is the power of two.

e.g. Consider binary number 11101:

Number	1	1	1	0	1
Place value	2^4	2^3	2^2	2^1	2^0
	16	8	4	2	1

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In hexadecimal Number System:

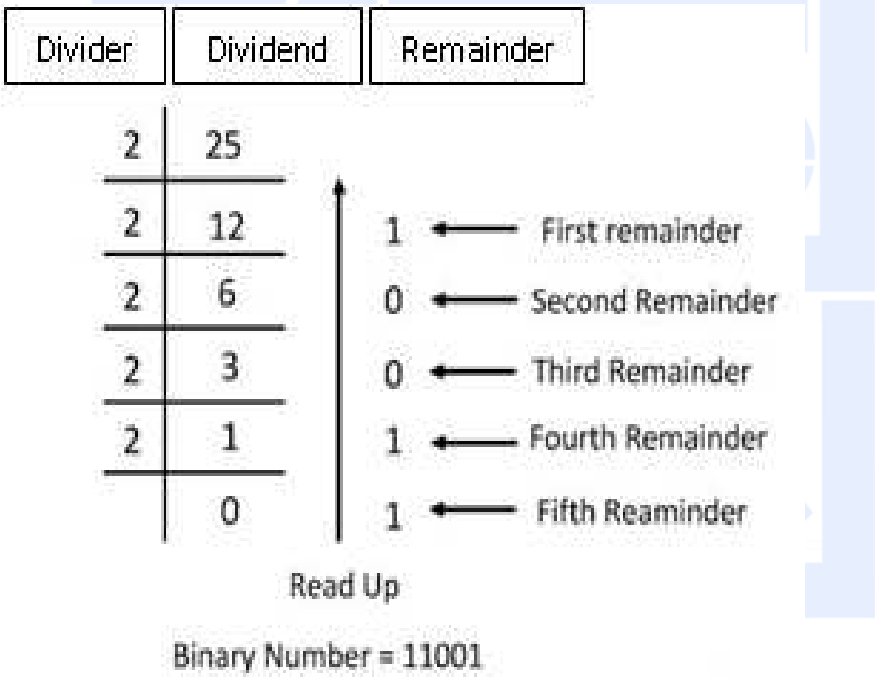
- Each digit in the hexadecimal system has a place value. Hexadecimal is a base-16 number system, therefore the place value of each digit is the power of 16.

Eg. Consider Hexadecimal number 3B2C:

Number	3	B	2	C
Place value	16^3	16^2	16^1	16^0
	4096	256	16	1

Number Conversions
Decimal to Binary

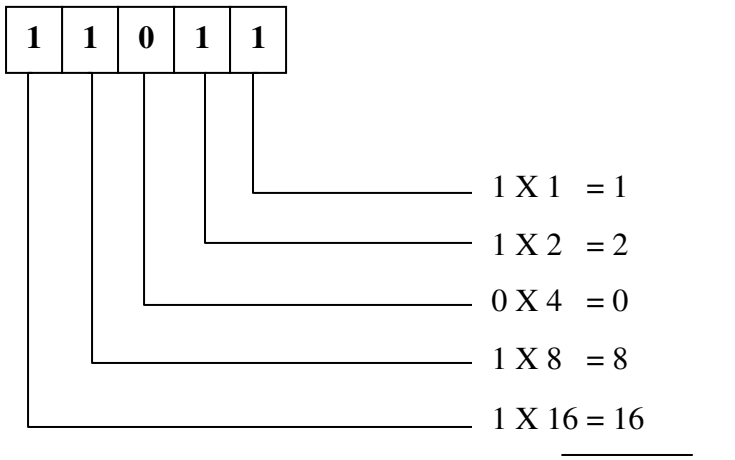
e.g. Convert decimal number 25 to binary:



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Binary to Decimal

Eg. 11011_2



Answer : 11011 = 27

Boolean Operators

- AND
- OR
- NOT

AND Operator

Used to perform a logical conjunction on two Boolean expressions.

Truth table of AND operation (Two Inputs)

Inputs		Output(Result)
A	B	(A AND B) / (A.B)
0	0	0
0	1	0
1	0	0
1	1	1

OR Operator

Used to perform a logical disjunction on two expressions.

Truth table of OR operation

Inputs		Output(Result)
A	B	(A+B)
0	0	0
0	1	1
1	0	1
1	1	1

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NOT Operator
Used to perform logical negation on an expression

Truth table of NOT operation

Input	Output(Result)
A	**(A)'**
0	**1**
1	**0**

NOT operator that gives 0 as the output when input is 1 and vice versa.

Truth Tables for given Boolean expressions

Example: **F= (A+B) .(A'.B)+(A+B)'**

Assume Variables A and B are inputs and final output is stored in variable F

Inputs		Intermediate combinations					Final Output (F)
A	B	A'	(A'.B)	(A+B)	(A+B)'	(A'.B)+(A+B)'	(A+B).(A'.B)+(A+B)'
0	0	1	0	0	1	1	0
0	1	1	1	1	0	1	1
1	0	0	0	1	0	0	0
1	1	0	0	1	0	0	0

Need for encoding systems in computer

- A bit is the smallest unit used to represent characters, images, audio and video in a computer system.
- A bit can either be a 1 or a 0
- This means that with a single bit, only 2 different symbols can be represented.
- By using 'n' bits, a maximum of 2^n unique bit combinations can be obtained.

ASCII encoding System:

- ASCII is an eight bits encoding system.
- Using ASCII, a maximum of 256 symbols can be represented uniquely.
- Every single character in the keyboard has an associated ASCII code.
- ASCII code of character A- 01000001

UNICODE

- Since ASCII is an eight bit code, a maximum of 256 characters can be represented uniquely.
- When it comes to international languages there is a need for a bigger coding system to represent the characters of these languages.
- Unicode is a sixteen bit encoding system Therefore it is used to represent a maximum of 65536 (2^{16}) characters uniquely.
- Unicode of Character අ - 0000 1101 1000 0101
- Unicode of Character அ - 0101 1000 1011 0000

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Competency 3: Uses computers efficiently and effectively with awareness of operating system

Competency level 3.1: Investigates the contribution of OS to the functioning of computer

Time: 1 periods

Learning outcomes:

- Briefly describes the use of OS in PC's
- Lists the basic functions of an OS
- Distinguishes CLI and GUI

Contents:

- Introduction to operating system
- Basic functions of an OS

Concepts and terms to be highlighted:

- Examples of personal computer operating system
- Functions of operating system

Guidance for lesson plans:

- Demonstration of CLI and GUI
- Brief discussion on functions of operating system

Quality inputs:

- Computers, internet connection, operating systems CDs/DVDs

Guidance for assessments and evaluations:

- Provide structured questions based on the functions of operating system and types of pc operating system

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Competency level 3.2: Uses functions of operating systems

Time: **2** periods

Learning outcomes:

- Creates folders and files with proper names
- Identifies the file types by their extensions
- Demonstrates the following operations for the existing files and folders:
  - rename
  - copy and move
  - delete
- Adjusts the settings in setting panel when necessary
- Identifies and uses the appropriate system tools for relevant tasks

Contents:

- Managing Folders and Files (creating, naming, renaming, deleting, copying and moving)
- File names and extensions
- Making changes in setting Panel
  - Backup
  - Fonts
  - Mouse Settings
  - Date and Time, Regional and Language Settings
  - Add Remove Programs
  - User Accounts
- Tools in OS
  - Character Map
  - Disk optimization
  - Disk Checking
  - Disk Cleaning

Concepts and terms to be highlighted:

- Focus on creating, naming, renaming, deleting, copying, moving folders and files
- Focus on following configurations in setting panel: backup, fonts, mouse settings, date and time, regional and language settings, add remove programs, user accounts
- Usage of tools in OS: character map, disk optimization, checking disk and cleaning disk

Guidance for lesson plans:

- Provide worksheet to carry out folder and file management tasks
- Provide worksheet to carry out setting panel configuration tasks
- Discuss and demonstrate the use of tools in operating system

Quality inputs:

- Computers, Multimedia projector

Guidance for assessments and evaluations:

- Conduct practical assessment on folders and file management and setting panel configuration tasks
- Provide MCQ questions

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Reading Material

System Software

System software is a collection of programs that consists of:

- Operating systems
- Utilities
- Device drivers

Introduction to Operating System

- Manages computing resources, provides an interface for users and user applications to interact with computer and executes applications.
- It handles and conceals many of the technical details related to using a computer.
- Without an operating system, a computer would be useless.
- Some utility programs are available with operating systems as tools.

Basic functions of an OS

Every computer has an operating system, and every operating system performs a variety of functions.

1. **Managing resources:** manages all the computer's resources including memory, processor time, storage, and I/O devices such as printers and monitors, etc.
2. **Providing user interface:** Allows users to interact with application programs and computer hardware through an interface.
   There are two type of user interface,
   1. Command Line Interface (CLI) in which users communicates with the computer using commands.
   2. Graphical User Interface (GUI) in which users communicates with the computer using graphical elements such as icons and windows. A new feature available with many operating systems is voice recognition. This allows users to interact with the computer using voice commands.

Categories of operating systems:

1. **Stand-alone operating systems**: also called desktop operating systems, control a single desktop or laptop computer. These operating systems are located on the computer's hard disk. Often desktop computers and laptops are part of a network. In these cases, the desktop operating system works with the network to share and coordinate resources.

2. **Network operating systems (NOS)**: are used to control and coordinate computers that are networked or linked together. Network operating systems are typically located on one of the connected computers' hard disk called the network server; this computer coordinates all communication between the other computers.

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3. **Embedded operating systems:** also known as real-time operating systems and are entirely stored within (i.e., embedded in) a device. They control smart watches, smart-phones, video game systems, and thousands of other small electronic devices.

Managing Folders and Files

- **Files:** There are many different types of files available.
  Example: Audio files, Video files, Text files, Image Files, etc.
- A File is usually represented with a name and an extension.
- **Folder:** folders are containers used to organize files and other folders.
- Common file and folder operations
  - Creation
  - Renaming
  - Deletion
  - Copy
  - Move

The methods of above operations depend on operating systems.

File names and extensions

- File name is made up with two parts, separated by full stop.
  - Name (given by user)
  - Extension

  Example: "memo.txt"
  In this example 'memo' is the name part and 'txt' is the file extension part.
- The file extension is used to identify the file type and subsequently determines which software application is associated with it.

Making changes in Settings Panel

- Setting panel is the centralized configuration area of an operating system. In windows operating system it is called as 'Control panel' and in Mac operating system called as 'System Preferences'.

- Configuration examples: functionality of keyboard and mouse, User accounts and passwords, network settings, power management, sound settings, hardware settings, software installation and removal, etc.

Tools in OS

Following utility programs are usually comes with operating systems as tools.

1. **Cleaning Disk:** It is a troubleshooting utility that identifies and eliminates nonessential files. This frees up valuable disk space and improves system performance.
   Example: In MS Windows OS – 'Disk Clean-up'.
2. **Optimize drives:** Locates and eliminates file fragments by rearranging them.
   Example: In MS Windows OS – 'Disk Defragmentation'.

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3. **Checking Disk:** verifies the file system integrity of a disk volume and fixes logical file system errors.
   Example: In MS Windows OS – 'Check disk'.
   In UNIX – 'fsck'.
4. **Character Map:** Used to get all the characters of fonts installed in the computer into applications.
   Example: In MS Windows OS – 'Character Map'.
   In UNIX – 'fsymbols'.

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Competency 4: Uses application software in day to day activities

Competency level 4.1: Uses the word processing software in day to day activities

Time: 06 periods

Learning outcomes:

- Briefly explains the word processing software
- Briefly explains the usage of word processing software
- Discusses the features of word processing software
- Lists the components available in GUI of a word processing software
- Creates a new document
- Applies proper text formats
- Applies proper paragraph formats
- Uses editing features to edit a document if necessary
- Uses grammar and spell checker tool
- Inserts relevant graphic objects and edits those using relevant editing tools
- Inserts equations, symbols, links, breaks, date and time if necessary
- Uses relevant short cut keys
- Creates tables using a preferred method
- Inserts columns, rows to an existing table
- Deletes unnecessary columns and rows
- Applies cell formats to a table
- Merges and splits cells
- Changes height and width of rows and columns according to requirements
- Saves document in different formats according to the needs
- Previews the document before printing
- Prints a document after applying necessary print setups

Contents:

- Introduction to word processing software
- Features of word processing software
- GUI components in word processing software
  - Title Bar
  - Formatting Tools
  - Editing Tools
  - Page Setup Tools
  - View Tools
  - Designing Tools
  - Scroll bars
  - Editing Area
  - Insertion Point, Cursor
  - Status Bar
- Creating a new document
  - Page layout and page borders
  - Header, footer and page numbers
  - Typing text, formatting text
- Editing a document
  - Find and replace

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- Grammar and spell checker
- Cut / Copy / Paste

- Inserting objects and usage of relevant editing tools
  - Pictures/charts/shapes/clip art /word art /text box etc.
- Inserting equations, symbols, links, breaks, date and time
- Short cut keys
  - open/new/save/select all/cut /copy/paste/undo/redo/print
- Creating and formatting tables
  - Methods of creating a table
    - Selecting rows and columns with mouse /insert table/draw table
    - Insert and delete rows and columns
    - Merge and split cells
    - Change row height/column width
    - Table borders
    - Styles
- Formatting paragraphs
- Saving documents in different formats
- Printing documents
  - Print preview
  - Print setup
  - Printer properties
  - Print

Concepts and terms to be highlighted:

- Focus on the purpose of word processing software (creation, editing, sharing, use of graphics, copies)
- Different ways of opening a word processing software
- Familiarization of the user interface
- Focus on page setup, editing, inserting, formatting (text, paragraph), table operations, saving the document, printing the document

Guidance for lesson plans:

- Discussion and demonstration of the purpose and the features of word processing software
- Demonstrate the ways of opening a word processing software
- Discuss and demonstrate of GUI components
- Demonstration of the tools for formatting, page setup, editing, inserting objects, table operations, saving the document and printing the document
- Provide separate worksheets created to cover each word processing operations (formatting, page setup, editing, inserting objects, table operations and printing the document)
- Provide exercises to enable them to learn in context

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Quality inputs:

- Computers with word processing software, multimedia projector, soft and hard copies of practical worksheets, printer and printing papers
- https://www.gcflearnfree.org/word2016/formatting-text/1/

Guidance for assessments and evaluations:

- Let students to list the features of word processing software
- Ask student to name the GUI components of a given screen shot word processing
- Provide soft copy of unformatted document to carry out specified formatting
- Provide soft copy of document with spelling and grammar mistakes to be corrected using relevant tools
- Provide soft copies of documents to carry out, *find and replace* operations
- Provide a hard copy of a tabulated data (table) with formatting like merge cells etc. and ask students to create it using word processing software
- Ask students to save the document in a given formats
- Ask students to print the document according to a given layout

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Reading material:

Word processing software
Word processing software is a software application that performs the task of composing, editing, formatting, and printing of documents.

Usage of word processing software
- Word processing software is used to create and manipulate a text document, such as a letter, a resume, a brochure, or a report.

Common word processing packages available:
Microsoft Word, Open Office Writer, Libre Office Writer etc.

Components in GUI of a word processing software

Title Bar - The topmost horizontal bar indicating the name of the file and the application.

Formatting Tools – Collection of tools used to perform formatting to the text in a document.

Editing Tools - Used to make changes to a document (Undo, Redo, Cut, Copy, Paste, Clear, Select All, Find and Replace)

Page Setup Tools – To set the page layout (Margins, Orientation, Paper size, Columns etc.)

View Tools – To display the document in different views (Print Layout, Full Screen, Outline, Rulers, Zoom (in/out) etc.)

Editing Area – The area where you can type text or insert any other content and edit them

Insertion Point, Cursor –Cursor is usually a small, vertical, blinking line. It indicates the movement of mouse. You can change the insertion point by clicking mouse when the cursor is at a specific position.

Status Bar - The Status Bar is usually available at the bottom of the document window and displays information about document

Creates a new document – When you open word processing software, you directly create a new document.

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Typing and deleting text in a document

- You can type text using keyboard and also can insert symbols.
- Deleting can be done using Delete key or Backspace key (←).
    - Delete key
        - used to delete the text right to the cursor
    - Backspace key
        - used to delete text left to the cursor.
    - Selected text or objects can be deleted using either delete or Backspace key.

Text formats

To apply particular text formatting before typing of a text, click on the relevant tool (button) and type the text

To apply formatting after typing the text, select the text first and click on the relevant tool (button).

Types of formatting

Bold, Italic, Underline, Text colour, Text background colour, Styles etc.

Paragraph formats

To format a paragraph, select the paragraph and click on the tool(button) available in the Paragraph tool box

Ex. Indentation, Alignment, Line spacing etc.

Edit a document

Undo – you can undo the previous action/s. This is helpful in case of unnecessary action/s happened.

Redo – This can be applied to repeat the actions which was undone, in sequential order

Cut - used to move a text or object to another place. Selected text or object is moved to the clipboard

Copy- used to copy a text or object to another place. Selected text or object is moved to the clipboard

Paste- Paste command places the copied or cut, text or object in the new position. Once you copy or cut a particular text or object, it can be pasted any required times, as far as it is in the clip board.

Find and Replace– Find and replace tool allows finding a text in the document and replacing it with another text wherever it appears in the document.

Grammar and spell checker - This feature allows user to check spelling and grammatical errors and correct them

Inserting and editing objects – Objects such as shapes, pictures, charts, Clip arts can be inserted into a document and edit them as required

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Inserts equations, symbols, links, breaks, date and time if necessary –

- Equations, Symbols, Hyperlinks and bookmarks, page breaks, Date and time, can be added to the document using relevant tool

Shortcut keys

Instead of using menu and tools, different shortcut keys can be used to perform functions. Some frequently using shortcut keys are:

Control + N – to open a new document at once
Control + p – to open print dialog box
Control + C – to copy selected text or object
Control + X – to move selected text or object
Control + V – to paste copy/cut text or object in another place
Control + Z - Undo
Control + Y - Redo

Working with tables

Tables can be used to enter data in tabular form.
Ex. Creating a time table.

Tables can be created in following ways.

1. Inserting a table by defining number of rows and columns.
2. Drawing a table as required

After creating a table we can alter it.

- Insert or delete rows and columns.
- Cells can be merged
- Cells can be split into many rows or columns as required

Table format: Thickness of the borders, styles can be applied to a created table

Saving a document: A document can be saved in different formats such as different versions of same application, web page, PDF etc.

Print preview

Before printing, the way of document would print can be seen through Print Preview.

Print setup

Printing can be customized as required: such as whether printing entire document or selected pages, number of copies, selection of printer.

Printer properties

In this option, single or double side printing, printing watermarks etc. can be set

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Competency level 4.2: Uses spreadsheet software to solve simple mathematical problems

Time: 6 periods

Learning outcomes:

- Briefly explains the electronic spreadsheet software
- Lists available spreadsheet software
- Lists the functions of spreadsheet software
- Identifies the components and features of GUI of spreadsheet software
- Moves around the worksheet
- Lists the types of data entered into a cell
- Applies relevant formats to the cells according to the requirement
- Inserts rows and columns according to requirement
- Deletes unnecessary rows and columns within the data range
- Inserts deletes and renames worksheets according to requirement
- Selects and names a range
- Copies and moves cell contents according to requirements
- Performs simple calculations using numbers and basic operators
- Performs simple calculations using relative cell references and absolute cell references
- Uses inbuilt functions to perform simple calculations
- Identifies relevant chart types according to the requirement
- Creates charts
- Uses filter tool to query information
- Uses sorting tool to organise data in an orderly manner
- Sets the page according to the requirement
- Preview and prints worksheet

Contents:

- Introduction to spreadsheet software
- GUI of spreadsheet software
  - Work Book
  - Work Sheet
  - Columns
  - Rows
  - Cells
  - Formula bar
  - Function of cell pointer based on its appearance
- Moving around the worksheet
- Types of Data Entries in a cell
  - Text
  - Numbers
  - Formula
- Formatting cells
  - Number
  - Alignment
  - Font
- Inserting rows and columns

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- Deleting cells, rows and columns
- Worksheet
  - Rename
  - Insert
  - Delete
- Naming and selecting cell ranges
- Copying and moving cell contents
  - Cut /copy/paste/paste special
- Simple calculations
  - arithmetic operations with basic operators (+ , - , * , /)
  - calculations using cell references and operators
    - Relative cell references
    - Absolute cell references
- Inbuilt functions
  Sum, average, max, min, count and rank
- Types of charts
  - Column, Bar, Line and Pie
- Chart tools
  - Design, layout and format
- Data filtering
- Data sorting
- Printing worksheets
  - Page setup
    - Page options
    - Margin options
    - Sheet options
  - Print preview
  - Print

Concepts and terms to be highlighted:

- Focus on the purpose of spreadsheet software
- Familiarization of the user interface
- Focus on moving around the worksheet
- Ensure that all students should be able to handle the worksheet
- Simple arithmetic operations using basic operators
- Focus on the difference between relative cell references and absolute cell references
- Behaviour of cell references when copying formulas
- Simple calculations using cell references
- Apply the auto fill facility to copy the same calculation
- Appropriate usage of inbuilt functions and formulas
- Focus on selection of relevant chart type and suitable formatting
- Focus on filtering facility to display specific data
- Focus on specific criteria order to sort
- Focus on page setup and print setup according to the requirements
- Make students use the print preview feature before printing as a habit

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Guidance for lesson plans:

- Discussion and demonstration of the features of spreadsheet software
- Let the students to prepare a simple mark sheet to get hand on experience (minimum 10 students and three subjects)
- Discussion and demonstration on moving around the worksheet
- Provide a worksheet to students to perform worksheet operations (worksheet should be prepared prior to a particular lesson)
- Discussion and demonstration on simple arithmetic operations using basic operators with test data
- Discussion and demonstration on use of functions with test data
- Ask students to find out the behaviour of functions when relative and absolute cell references are used
- Provide a worksheet to perform mathematical calculations on spreadsheet software (The worksheet should include simple arithmetic operations using basic operators, calculations with cell references and formula and inbuilt functions)
- Demonstration on creating and formatting charts using test data
- Discussion and demonstration on page setup, print preview and print

Quality inputs:

Computers with spreadsheet software, Multimedia projector, Printer and printing papers, Soft and hard copies of practical sheets, Internet connection

Guidance for assessments and evaluations:

- Provide a hard copy of a simple mark sheet to students and let them type it in spreadsheet
- Let students do the worksheet operations according to given exercise (Moving around the worksheet)
- Provide exercises to perform specified calculations on spreadsheet
- Provide worksheets with specifications and let students to create suitable charts
- Provide sample electronic worksheets and criteria specifications
- Then let students to sort and filter the given data according to the specifications
- Ask students to save it in a specified folder
- Provide worksheets with printing specifications
- Then ask the students to prepare and print the worksheet according to the given specifications

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Reading material:

Spreadsheet Software

A **spreadsheet** is an interactive electronic computer application to performing mathematical calculations. It is also used to store, organize, analyze and graphically represent numeric data.

Examples of spreadsheet programs

- Google Sheets - (Online and free)
- Apple Numbers - Apple iWork Suite.
- Libre Office - Calc (Free)
- Microsoft Excel – Microsoft Office suite
- Open Office - Calc (Free)

Work book
A file of a spreadsheet is called a workbook

Work sheet:-
A page of a workbook is called a worksheet

Column
A **column** is a vertical series of **cells** in a **work sheet. Columns** are identified by English letters.
Ex: A, B, C, …….AA, AB, AC,……

Row
A **row** is a horizontal series of **cells** in a **work sheet**. **Rows** are identified by numbers
Ex: 1,2,3,....

Cell
Cell is the intersection of a row and a column on a **work sheet**. It is identified by column letter and row number. Ex. A1, B10

Range
A **range** is a group of selected cells which can be adjacent or non-adjacent.

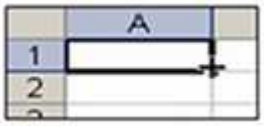
Formula Bar
The formula bar is a toolbar at the top of the spreadsheet applications. It shows the contents of the active cell and allows to create and view formulas.

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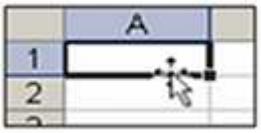
Function of cell pointer based on its appearance



Cross Pointer – Used to select cells (a cell or a range)



The fill handle – used to copy formula or extend a data series.



Cross arrow - Used to move the selected cell or range content

Moving around the worksheet

- In a work sheet cell pointer can be moved
  - Cell, column, row, last column, last row,
  - Screen left, right, up, down
    by using go to key(F5), Name box, arrow keys or key combinations .

Data types
Text, Numbers and Formulas.

Text
Any non-numeric entry is treated as characters.
E.g.:- name, 10A ,5km, “2000”
Texts are aligned left in a cell.

Numbers
Any numeric values are used for calculations treat as numbers
E.g.:- 0,1,4,233,1000
Numbers are aligned right in a cell.

Formula
Formulas are used to perform calculations.
A Formula starts with = or + sign
E.g. =C1+D2, +A1+B2*5

Formatting Cells
Cell formats allow you to change the appearance of cells and their contents.
Examples:

- Font
  - Font face, Font size ,Bold, Italic ,Underline, Font colour
- Alignment (horizontal, Vertical and Orientation), Text wrapping, Merge and centre
- Number Formatting
  - Currency, Percentage, Date and Time, Comma, Scientific formats and Increase/Decrease decimal places
- Borders

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Insert Column/Row/Cell/ Sheet
You can insert columns, rows and cells when you need to insert new data in between existing rows or columns and worksheets can also be inserted into a workbook.

Deleting Rows / Columns / Sheet
You can delete existing unnecessary rows, columns, cells or sheets.

Rename a sheet
Right click/ Double click on the sheet tab→select Rename → Type the new name
You can rename sheets with suitable names to identify them easily.

Calculations
In spread sheet, calculations can be done easily.
e.g. Mathematical, Logical, Financial, Statistical, Engineering etc,
Mathematical calculations

Calculation	Example
Addition	=B2+D2
Subtraction	=C3-B3
Multiplication	=D9*D10
Division	=G9/G10
Raise to a power (exponent)	=D14^2

Relative and Absolute Cell References

Relative cell references
A cell **references** without prefix in each dimension is **relative cell reference.** By default, all cell references are relative references. Eg. A1, B4

For example, when you copy the formula **=A2+B2+C2** from row2 to row3, the formula automatically change as **=A3+B3+C3.** It is convenient if need to **repeat** the same calculation across multiple rows or columns.

Absolute cell references
A cell **references** with the prefix ($) in each dimension is **absolute cell reference.**

A1	The column and row do not change when copied
A$1	The row does not change when copied
$A1	The column does not change when copied

Eg.

	A	B	C	D
1			Discount rate	5%
2	Price	Discount		
3	100	=A3*D$1		
4	200	=A4*D$1		
5	300	=A5*D$1		

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Function

Predefined formulas are called functions. Spreadsheets generally have a large number of integrated functions.

Each function has a name followed by parentheses (). Inside the parentheses we can pass the parameters according to the specific function.

Syntax:

= *Function_name(parameters)*

Eg:1 Find the total of range B2 to B7 into cell B8

	A	B
1		Marks
2		42
3		50
4		40
5		81
6		64
7		76
8	Total	
9	Average	
10	Maximum	
11	Minimum	
12	Count	

= Sum (Range)

Adds all numbers in the given range

= sum(B2:B7) → 353

Eg:2 Find the Average of range B2 to B7 into cell B9

= Average (Range)

Returns the average of all numbers in the given range

=Average(B2:B7) → 58.83

Eg:3 Find the maximum value in range B2 to B7 into cell B10

=Max(Range)

Returns the largest value from the given range

=max (B2:B7) →81

Eg:4 Find the minimum value in range B2 to B7 into cell B11

=Min(Range)

Returns the smallest value from the given range

=min (B2:B7)→ 40

Eg:4 Find the number of cells that contain numbers in range A1 to B7 into cell B12

=Count(Range)

Counts the number of cells in a range that contain numbers.

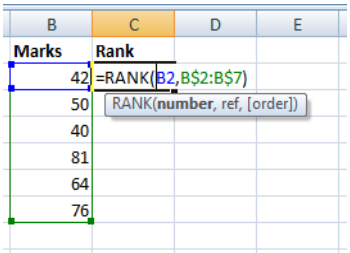
=count (A1:B7)→ 6

=Rank(number, ref, order)

Return the rank of a number in the given list of numbers. Its size relative to other numbers in the list.

Parameters

- **Number** : the number for the rank.
- **Ref** : the range of the numbers to find ranks.
- **Order** : a number. If It is zero or omitted when the list is sorted in descending order. If it is none zero value the list is sorted in ascending order.



B	C
Marks	Rank
42	5
50	4
40	6
81	1
64	3
76	2

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Charts

Charts are visual representations of worksheet data. Charts often make it easier to understand the data in a worksheet. Different types of charts serve different purposes.

Some common chart types are follows

- Column chart
- Bar Chart
- Line chart
- Pie Chart

Sorting and Filtering Spreadsheet Data

Sorting
You can sort data in your spreadsheets pretty much anyway you want: by one or more columns, ascending or descending, or even by specific sort orders you set up yourself.

Filtering
You can also filter spreadsheet data. Filters retrieve a specific subset of the spreadsheet data based on specific constraints (or filters) that you set.

Print a worksheet
You can print entire or partial worksheets.
Before you print the sheet you can change following page setup option.

- Page options like orientation, page size etc.
- Top, bottom, left and right margins and aligning
- Sheet options like print area, grid lines, row to repeat, column to repeat etc.

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Competency level 4.3: Uses electronic presentation software to enhance presentation

Time: **4** periods

Learning outcomes:

- Briefly explains the electronic presentation software
- Lists and explains the attributes of an effective presentation
- Briefly explains the usage of presentation software
- Discusses the features of presentation software
- Creates a presentation attractively using a presentation software
- Selects appropriate layout relevant to the content
- Inserts texts, pictures, sounds, videos, graphics, shapes, clip arts, tables, smart art, header and footer, page numbers, hyperlinks, action buttons etc
- Applies slide transition
- Applies background
- Applies suitable animations to the content
- Saves presentation in required format
- Presents the presentation
- Uses relevant shortcut keys
- Previews the documents before printing
- Prints the presentation to suit different needs

Contents:

- Introduction to electronic presentation
- Attributes of an effective presentation
- Features of presentation software
- Usage of presentation software
- Selecting slide layout
- Selecting background
- Inserting text and multimedia contents
- Applying slide transition and animation
- short cut keys specific to the presentation
- Saving a presentation in different formats
- Printing slides with different options

Concepts and terms to be highlighted:

- Focus on the purpose of presentation software and the attributes of an effective presentation
- Meaningful use of animations in presentations
- Meaningful use of multimedia contents in presentations
- Focus on effective slide layout, background and transition
- Focus on saving files with different formats and printing files with different options

Guidance for lesson plans:

- Discussion and demonstration of effective presentation, presentation software and an effective electronic presentation
- Organise a pair work and ask the students to design a story board based on the topics given with conditions (slide limits)
- Let students select the layout, theme and multimedia contents on their own choice

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- Then ask the students to convert the story board design to presentation software
- Guide the students to save the presentation in different formats (Editable, Video, PDF, Show etc.)
- Guide the students to print the presentation with different options (slides, hand-outs, slide notes)

Quality inputs:

- Computers with presentation software and speakers, Multimedia projector, Prepared presentations, Printer and printer papers,

Guidance for assessments and evaluations:

- Prior to the lesson, teacher should prepare a presentation with good features and some short comings. Divide the class into two groups and ask the first group to identify the good features of the presentation and the other group to identify the short comings of the presentation
- Let them to present their findings
- Divide the students into groups (maximum 4 members in a group)
- Assign one topic to each group (ensure the presentation includes appropriate slide layout, background, multimedia content, slide transition and animation)
- Let each group prepare the presentation based on the given topic
- Let each group present their presentations
- Carry out a discussion with the whole class about their presentations and let them modify the presentations as necessary

Reading Material:

A presentation: Normally refers a way of presenting a topic to an audience to adapt various speaking situations such as talking to a group, addressing a meeting or briefing a team etc.

Characteristics of a Good/Effective Presentation

- A good presentation should have the potential to convey the required information.
- To communicate the desired information, use more visual aids such as, diagrams, pictures, charts, etc.
- A good presentation should be planned in such a way without losing audience interests at any point of time.
- Provide the outline of the presentation at the beginning and summarize the presentation at the end. Give final comments where necessary. Leave a positive impact upon the audience.

Presentation software and its Common features

- Presentation software is specifically used to create and edit slideshows for presentation

Examples: MS PowerPoint, Impress, Prezi, Apple Keynote

- Multimedia contents such as text, images, video, audio, animations, and hyperlinks can be integrated to a presentation

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- Animation and Transition Effects are available to enhance the presentation
- Pre-defined styles and layouts and the pattern of slides are available to quickly create professional looking presentations

Creating a presentation using a relevant software

- Familiarize with the IDE of the presentation software
    - Menu bar, Tool bars, Scroll bars, working area (Slide) etc.
- Creating slides
    - Slide layout
        - The slide layout is the arrangement of all the items that make up your slide, such as title, graphics or textboxes.
    - Slide background
        - Templates provide an excellent way to quickly create a presentation by providing predesigned styles and layouts as well as suggested content based on the type of template you select.
    - Text and Objects
        - Different font formats can be applied to text in slides.
        - Pictures, Graphics, Animations, Audio, Video, charts, Hyperlinks etc., can be added to the slides as necessary
        - If required Headers, Footers and slide numbers can also be added
    - Applying animations and Transition styles
        - Adding motion effects to the objects in slides commonly called animation
        - To emphasize the information on a slide in phases, you may add animation
        - Slide transition effect can be used to transit from one slide to another
- Slide notes
    - “Slide notes” is a tool for presentation to add notes as a reference for the presenter when presenting. These notes are hidden to the audience.
    - Presentation Views
        - There are few ways of viewing the presentation on screen: Slide view, Normal view, Outline view, Slide Sorter view and Slide Show view.
- Saving a presentation
        - A presentation can be saved as usual Eg. In MS PowerPoint with ppt, pptx or ppsx extensions, In Open Document Presentation with odp extension etc.
        - As the user requirement a presentation can be saved with different file formats such as JPEGs (.jpg), Portable Document Format files (.pdf), web pages (.html), and even as a video or movie and more.
- Printing slides
        - Slides can print with different layouts
            - Slides
            - Slides with presenter notes
            - As an outline
            - Hand-outs of the presentation with one or more slides on a page.

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Competency level 4.4: Uses Database Management System (DBMS) Software to manage data in a database

Time: 6 periods

Learning outcomes:

- Briefly explains the database
- Distinguishes manual from automated database
- Defines DBMS
- Identifies the need of DBMS
- List the objects of DBMS
- Uses the fields and creates a table
- Selects appropriate data types in creating tables
- Briefly describes the usage of the primary key and the foreign key
- Selects and sets the most suitable field as the primary key
- Applies the relevant field properties according to the requirements
- Retrieves required information by using queries
- Sorts records as required
- Creates form using form wizard
- Creates reports using report wizard

Contents:

- Introduction to database
- Comparison of manual database and automated database
- Introduction to DBMS software
- Objects of DBMS software
  - Table
  - Query
  - Form
  - Report
- Field names
- Primary key and foreign key
- Data types
  - Text
  - Number
  - Date / Time
  - Currency
  - Yes / No
- Field properties
  - Field size
  - Format
- Designing queries
  - Filter fields
  - Filter records
- Sort records
- Form wizard
- Report wizard

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Concepts and terms to be highlighted:

- Identification of manual databases in day to day life
- Disadvantages of manual databases
- Need of automated database
- Need of DBMS software
- Identification of objects in DBMS software
- Need of designing a table
- Focus on field names and their data types
- Focus on field properties
- Need of primary key and foreign key
- Focus on retrieving required records using queries
- Focus on creating forms using tables with form wizards
- Focus on creating reports using tables and queries with report wizards

Guidance for lesson plans:

- Discussion on identification of manual databases in day to day life
- Discussion on disadvantages of manual databases
- Compare and contrast of manual and automated databases
- Discussion and demonstration of sample DBMS
- Discussion and demonstration on creating a table with relevant field names, data types and their properties
- Selecting the most suitable field as primary key
- Discussion on the use of foreign key
- Discussion and demonstration on designing a query from a given table
- Discussion and demonstration on saving the designed queries
- Discussion and demonstration on designing a form using a form wizard
- Discussion and demonstration on designing a report using a report wizard

Quality inputs:

- Computers with DBMS software, Multimedia projector, Printer and printing papers, Soft and hard copies of practical sheets, Internet connection

Guidance for assessments and evaluations:

- Provide an incomplete table, based on comparison of manual and automated databases
- Then ask the students to fill the blanks in the table
- Provide structured question to briefly describe the objects of DBMS
- Engage students to create a table using given instructions
- Engage students to create and save queries using given instructions
- Engage students to create and save forms using form wizards as instructions given
- Engage students to create, save and print reports using report wizards as instructions given

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Reading Material:

Database

A database is an organized collection of related data so that information can be retrieved easily.

Comparison of manual database and electronic database

Manual Database	Electronic Database
Less efficient	More efficient
Less accurate	More accurate
Less credible	More credible
Difficult to analyse data	Easy to analyze data
Order of data input cannot be changed	Order of data input can be changed
Difficult to delete unnecessary data	Easy to delete unnecessary data
Difficult to update data	Easy to update data
More storage space	Less storage space
More man power is needed	Less man power is needed

Defines DBMS

A **DataBase Management System** (**DBMS**) is a single software application for creating, organizing, managing and storing large amount of data in a database. The **DBMS** provides users and programmers with a systematic way to create, retrieve, update and manage data.

Examples: MySQL, Microsoft Access, SQL Server, Oracle

Need of DBMS

- Enforces integrity constraints
- Enables backup and recovery
- Effective data sharing
- Enables security

DBMS Objects

Database objects are used to input, edit, retrieve, display and print data

1. Tables
2. Queries
3. Forms
4. Report

Table

Table is a collection of related data stored in tabular form.

Field

A field is a column of a table

Record

A record is a row of a table

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Primary key

One or more fields designated to uniquely identify all records in a table

Foreign key

If a field (or a combination of fields) of one table can be used to uniquely identify rows of another table, this/these field/s is/are called the foreign key.

Data types

Depending on the values to be stored, a field is defined with a suitable data type. Some data types are: Text/Char/Varchar, Number/Int/Integer/Float/Decimal, Boolean/Yes No/Bit, Currency/Money, Date Time etc.

Field Properties

Field properties are the attributes of a field type such as Field size, Format

Query

Queries are used to obtain necessary information from the data of related tables.

Forms

Forms are used to enter data to a table and view data from a table in a Database Management Systems. To create forms easily, some DBMS systems provide Form Wizard facility.

Reports

Reports are used to obtain printed copies of information retrieved from the data of related tables. To create reports easily, some DBMS systems provide Report Wizard facility.

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Competency 5: Creates Multimedia contents to express ideas effectively

Competency level 5.1: Designs still graphics using graphic software

Time: 3 periods

Learning outcomes:

- Describes the properties of digital still images
- Creates attractive graphics using graphics software tools
- Edits digital graphics as required
- Uses basic text effects to enhance the appearance

Contents:

- Types of graphics
  - Raster
  - Vector
- Properties of a digital image: pixel, resolution, size, color
- Graphic file formats and their features
  - Jpg, png, gif, bmp etc.
- Image capacity and compression: lossy formats and lossless formats
- Basic operations of a graphic software
  - Open, save and edit
  - Importing images
  - Sizing and transformation
  - Selections, cut, crop, replace
  - Working with layers
  - Working with Text

Concepts and terms to be highlighted:

- Identification of Types of Graphics
- Identification of a Digital Image
- Focus on the properties of a digital image
- Focus on the different graphic file formats
- Need of different graphic file types
- Focus on basic operations of a graphic software
- Editing an image
- Sizing and transformation
- Working with layers
- Working with text
- Saving an image with a required file format

Guidance for lesson plans:

- Discussion on Graphics and digital images
- Compare and contrast the Raster graphics and Vector graphics

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- Discussion and demonstration,
    - the properties of a digital image
    - graphic file formats and their features
    - Image capacity and compression
    - open, Editing and saving a graphic file
    - sizing and transformation of an image
    - selections, cut, crop, replace
    - working with layers and text effects

Quality inputs:

- Computers with Graphic editing software, Multimedia projector, , Soft and hard copies of practical sheets, Internet connection

Guidance for assessments and evaluations:

- Provide a digital graphic file to student and ask them to open it with associated graphic software
- Then ask the students to save it in given formats
- Engage students to notice and write-down the differences between the saved formats
- Engage students to create given modifications to the image (compress, resize, crop and transform etc.)
- Engage students to create an image using different layers.
- Engage students to create an innovative image by their own.

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Competency level 5.2: Edits audio contents using an audio editing software

Time: 2 periods

Learning outcomes:

- Records audio as required using audio editing software
- Edits a relevant segment of audio from original
- Converts audio files to other formats as required

Contents:

- Recording audio contents
- Editing (editing a relevant segment from original content)
- Audio file formats
    - Mp3, wav, au etc.

Concepts and terms to be highlighted:

- Identification of Types of Audio file formats
- Identification of the features of audio editing software
- Focus on the properties of an audio file
- Focus on the recording of an audio
- Focus on the editing of an audio file segments selected from the original file

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Guidance for lesson plans:

- Discussion on audio files and their features
- Discussion on audio editing software to explore its tools
- Discussion and demonstration of deferent audio file formats
- Discussion and demonstration of editing a segment of an audio file
- Discussion and demonstration on conversions of audio file formats using audio editing software

Quality inputs:

- Computers with Audio editing software, Multimedia projector, Soft and hard copies of practical sheets, Internet connection, Headphones with Microphone.

Guidance for assessments and evaluations:

- Ask students to record an audio file with an associated audio editing software
- Then ask the students to save it in given formats
- Engage students to notice and write-down the differences between the saved formats
- Engage students to edit a segment of a given audio file

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Competency level 5.3: Edits videos using an video editing software

Time: 2 periods

Learning outcomes:

- Edits videos as required
- Converts video files to other formats as required

Contents:
- Manipulating and rearranging video
- Video file formats
    - Mp4, avi, wmv etc

Concepts and terms to be highlighted:

- Identification of Types of Video file formats
- Identification of the features of Video editing software
- Focus on the properties of a Video file
- Focus on Manipulating video files and rearranging them
- Focus on the conversions of video file formats
- Saving a video with a required file format

Guidance for lesson plans:
- Discussion on video files and their features
- Discussion on video editing software to explore its tools
- Discussion and demonstration of different video file formats
- Discussion and demonstration of editing a video file
- Discussion and demonstration on conversions of video file formats using video editing software
- Discussion and demonstration importance of saving a video with different file formats

Quality inputs:

- Computers with video editing software, Multimedia projector, Soft and hard copies of practical sheets, Internet connection

Guidance for assessments and evaluations:
- Provide a video files with different formats to students and ask them to check the ability to open them with the given video editing software
- Then ask the students to identify the formats can be run with the software
- Engage students to notice and write-down the differences between the video formats
- Engage students to manipulate and rearrange the given video using the instructions given
- Engage students to convert given video file to another formats as instructed using video editing software

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Reading Materials

Graphics

Images or graphics created using graphic software are known as digital graphics.
Basic elements of a digital graphic are pixel, resolution, size and color
There are two types of colour models

- RGB Model (Red, Green and Blue)
- CMYK (Cyan, Magenta, Yellow and Black)

There are two forms for graphic compression;

- Lossy
- Lossless

There are two types of graphic

- Raster Graphic
- Vector Graphic

Pixel is the basic element of a digital graphic.
Digital graphics are made up of thousands of pixels Pixel is composed of bits.
Single colour pixel is made up of 8 bits while a color pixel is made up of 24 (8x3) bits
The unit to measure the physical dimension of a digital graphic is pixel and physical dimension is known as image resolution
A high resolution digital graphic has higher quality

Audio Contents

Files that are created using recorded sounds or voices are known as audio content. These files can be edited as necessary using computer software. Some such software are as follows,

- Audacity
- Power Sound Editor
- Music Editor Free
- Wavosaur
- Ardour
- WavePad Sound Editor
- Sound Engine

Audio editing

Audacity

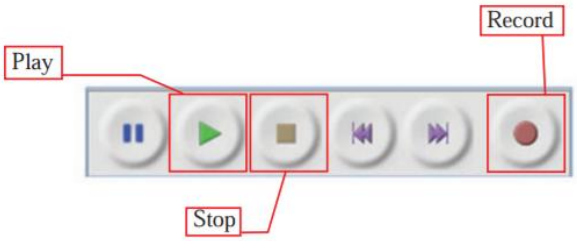
Audacity is a free software that can be installed in Windows, Mac and Linux operating systems. Audacity can be used for both editing and recording purposes. It consists of multi layers.

Audacity has functions for;

- Recording live audio proceedings
- Recording music being played in the computer
- Inserting sound effects on recorded digital graphics write on CDs/DVDs content.
- Editing file formats such as WAV, AIFF, FLAC, MP2, MP3
- Copying sound, trimming, mixing, or joining together for editing purposes
- Changing speed and pitch in recordings

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Audio Recording with Audacity



Step 1 – Click **File** → **New**

Step 2 - Click **Record** on Transport Toolbar.

Step 3 - Using the microphone Built into the computer, record the required audio content.

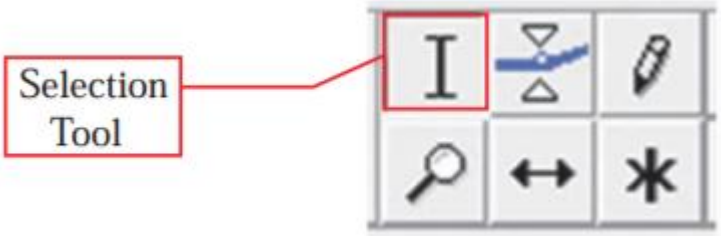
Step 4 - Click **Stop** on Transport Toolbar to end recording.

Step 5 - Click **Play** and listen to the recording done.

Editing recorded sound track to remove unnecessary section

Step 1 - Open created file saved using – aup (Audacity project) file format

Step 2 - Using Selection tool on Transport Toolbar select the necessary sections in the audio content.



Step 3 - Click Trim Audio on Edit Toolbar. This helps remove unnecessary sections.

Step 4 – On completion of editing, save edited file.

Creating a video clip

A video created using a series of images is called a video clip. For this, a recorded video, or still pictures and audio content can be used. Software can be used to create and edit video content.

Some software that are used to create video clips and edit as follows;

- Photo Bucket
- YouTube Remixer
- Movie Masher
- One True Media
- Motion Box
- Stash Space
- Windows Movie Maker

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- AVI Edit
- Super DVD Video Editor

Use of video editing software to create video

Windows Movie Maker
Windows Movie Maker is a free software provided by the Microsoft cooperation. This software can be used to create and edit video clips.

Making a video clip with Windows Movie Maker

Step 1 - Open Windows Movie Maker software.
Step 2 – Using Home → Add video & Photos open video clips for the creation.

Apply Transition
Transition is used to show the relationship between two image frames and the manner in which the frames appear.

Step 1 - Open menu `Animations'.
Step 2 - Click on the first frame.
Step 3 - Take the mouse along each transition. The selected image is displayed in various forms. Then, click on the suitable transition.

Saving an animation

File → Save Project
Select a location for saving. Give file a suitable name. Click save to save the file.
Saving and distribution of video content as a video clip

Method of saving a video content as a video clip to be watched on a computer, television, mobile phone or to open in social medias as follows

Step 1 – Select the medium to save by File → save movie
Step 2 – Select location to save, give the file a name and click Save.

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Competency 6: Uses the Internet efficiently and effectively to access and communicate information in day to day life

Competency level 6.1: Explores the architecture of the internet

Time: 2 periods

Learning outcomes:

- Describes the requirements of a computer network
- Names and describes the network types
- Lists and briefly describes the communication devices of a network
- Distinguishes between guided and unguided media
- Briefly describes
    - Client server model
    - Peer to peer
    - Hybrid
- Distinguishes between wired and wireless networks

Contents:

- Purpose of computer network
    - Data communication
    - Sharing resources
- Network types
    - PAN (Personal Area Network)
    - LAN (Local Area Network)
    - WAN (Wide Area Network)
- Communication devices of a network
    - Modem
    - Router
    - Network Interface Card(NIC)
    - Switch
    - Wireless Base Station etc.
- Connectivity types
    - Guided
    - Unguided
- Wired and wireless networks
- Client server model
- Peer to peer
- Hybrid

Concepts and terms to be highlighted:

- Existing networks in various organizations: banks, school computer labs
- Highlight on PAN, LAN and WAN with suitable examples
- Communication devices of a network
- Guided and unguided media

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Guidance for lesson plans:

- Physical observation of a network in school computer lab
- Discussion of network types (PAN, LAN and WAN)
- Physical observation of various types of guided media
- Discussion of unguided media types
- Physical observation of communication devices of a network

Quality inputs:

- Networked computers, Guided media (Twisted pair, Co-axial and Fibre optics), Networking devices, Devices for PAN setup (Smart phone, Tab etc.), Multimedia projector

Guidance for assessments and evaluations:

- Ask students to submit an assignment to list out the network devices after observing the network in an institute
- Debate on guided and unguided media
- Ask students to compare and contrast the network types according to given features using a table

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Competency level 6.2: Uses the internet services to access relevant information

Time: 3 periods

Learning outcomes:

- Briefly describes URL and URI
- Briefly describes Internet and its services
- Uses web browsers and search engines for accessing Information
- Creates an email account
- Uses emails in communication
- Downloads required information
- Describes instant messaging and its types
- Uses internet based IRC, SMS, video calls etc. for communication
- Defines blogging and micro blogging
- Creates and uses blog to share information
- Defines cloud computing
- Uses cloud computing to store, manage and process data or information
- Defines IoT
- Briefly describes the characteristics of IoT
- Identifies need of IoT
- Discusses the applications of IoT
- Identifies Enabling Technologies for IoT

Contents:

- Uniform resource locator (URL) / Uniform resource identifier(URI)
- Web browsers and search engines
- Internet services
  - WWW
    - Information sharing and electronic transactions
  - Email
  - Social Media
    - internet based text and video based communication (Internet relay chat (IRC) / SMS / video calls etc.)
    - Blogging and micro blogging
  - Cloud Computing
  - Cloud based services
- Internet of Things(IoT)
  - Definition
  - Characteristics
  - Needs
  - Applications
  - Enabling Technologies

Concepts and terms to be highlighted:

- Internet and its services
- Focus on client, server and their relationships
- Relationships between the URL and URI
- Focus on web browsers and search engines
- Creating an email with suitable username and password, sending and receiving,

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CC, Bcc, forwarding, replying and attachment
- Chatting, sending Short Message Service (SMS), video based communications
- Blogging and micro blogging, difference between them, creation of simple blogs
- Focus on cloud computing and its services
- Introduction to concept of IoT, needs, applications and enabling technologies

Guidance for lesson plans:
- Definition of internet
- Discussion with demonstrations on internet, its services, web browsers, search engines and downloading
- Explanation and demonstration of URL and URI
- Discussion with demonstration creating an email with suitable user name and password, sending and receiving emails (Bcc / Cc / Forwarding and replying/ attachments)
- Discussion and use of IRC / SMS / Video based communication
- Creation of simple blogs and share information
- Getting hand on experience in using cloud computing
- Discussion on Internet of Things (introduction)
- Demonstrate a video on IoT (using YouTube etc.)

Quality inputs:
- Computers with internet connectivity, Multimedia projector

Guidance for assessments and evaluations:
- Let students check the address bar and identify the URL and URI
- Let students to identify the URL and URI of a given web address
- Let students get hand on experience by giving more tasks using different search engines
- Let students search and download according to the given information
- Let students use email including sending, receiving, attachments, Bcc, Cc, forwarding and replying among them
- Let students create simple blogs and share information among them
- Let students use internet based text and video communication
- Let students list the available micro blogging sites
- Let students to use cloud-computing facility (store, use software etc.)
- Provide group or individual assignments on IoT

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Reading material:

Computer network

Two or more computer systems and other computing devices that are linked together to facilitate communication and resource-sharing is called computer network.

Network types

Generally, Computer networks can be classified based on their geographical span.

Some Network types

- PAN
- LAN
- WAN

PAN - Personal Area Network

A PAN is a type of wireless network that works within a very small area (around 10 meters) your immediate surroundings. PANs connect cell phones, headsets, keyboards, camera, laptop and so on.

LAN - Local Area Network

Networks with nodes that are in close physical proximity—within the same building, for instance—are called local area networks (LANs). LANs are widely used by Schools, universities, and other organizations.

WAN -Wide area networks

WANs are countrywide and worldwide networks. These networks spans a relatively large geographical area.

Communication Devices of a Network



Modem

The modem is used to convert digital signal to analog and analog signal to digital. It enables digital personal computers to communicate over existing worldwide analog telephone network.



Router

Router is used to forward or direct messages from one network to their destination in another network.

Network Interface Card (NIC)

A NIC provides the hardware interface between a computer and a network.



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Switch 

source: Google Images

Switch — Central device that coordinates the flow of data by sending messages directly between sender and receiver

Wireless Base Station
A base station is a fixed communications location and is part of a network's wireless communication system. It relays information to and from a transmitting/receiving device, such as a mobile phone.

Mobile communication
Communication over a wireless network.

GSM (Global System for Mobile communication): Is a digital mobile telephony system.

GPRS (General Packet Radio Services): packet-based communication technology that enables data transfers through cellular networks and use for mobile Internet, MMS and other data communications

Guided and Unguided media

Transmission media is a pathway that transmits the information from sender to receiver.

Transmission media can be classified as

- Guided media
- Unguided media

Guided media are more commonly known as wired media whereas unguided media are more commonly known as wireless media.

Guided media

- Twisted-pair
- Coaxial cable
- Fiber-optic

Unguided media

- Radio waves
- Microwaves
- Infrared

Client server model

Client and server computers communicate with each other over a network. Computers that provide services (like Web servers or FTP servers) to other machines are servers. The Computers that consume services are clients.

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Peer to peer

In peer-to-peer (P2P) network model each computer has the same capabilities. That means each nodes function sever as well as client

A hybrid network

A hybrid network is a network with both client server and peer to peer relationship.

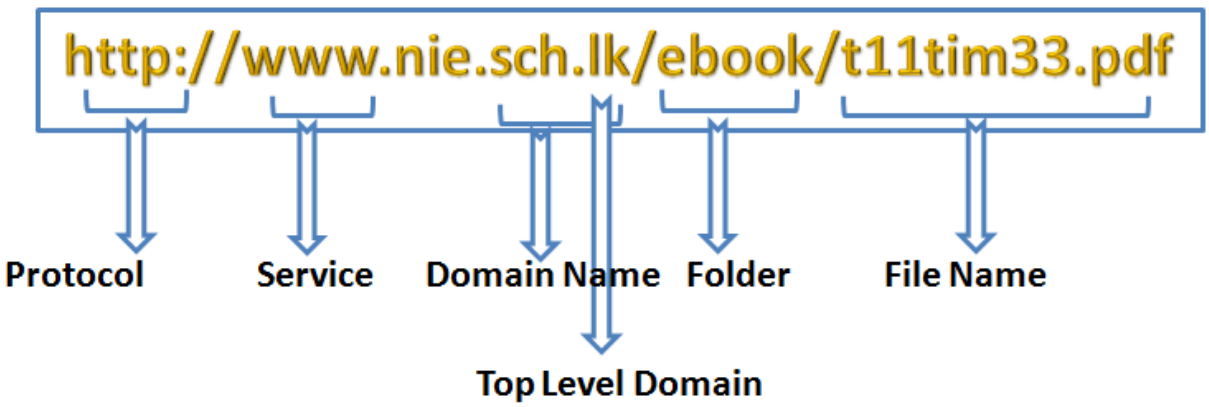
Wired and wireless networks

Wired networks	Wireless networks
Suitable for fixed communication devices	Suitable for mobile communication devices
More secure	Less secure than wired
Uses copper wires, optical fiber cables for transmission	Uses radio waves or infrared for transmission
requires hubs or switches	More area is covered by wireless base stations which are connected to one another.
Mostly uses in LAN (Ethernet)	Mostly uses in WLAN, WPAN(blue tooth), Cellular(GSM, CDMA, LTE)

URL

Every Website has a unique address. This address is known as **U**niform **R**esource **L**ocator (URL).

Parts of an URL



URI- Uniform **R**esource **I**dentifier

URI is a strings used to identify a resource in World Wide Web using specific protocols.

Internet

Internet is network of networks that use the internet protocol suite to link devices all over the world.

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Basic requirements needed to access the internet

- Device (Computer etc.)
- ISP - Internet Service Provider E.g. SLT
- Connecting device (NIC, Modem /Router etc.)
- Web browser software

Services provided by internet

- WWW (World Wide Web)
- Electronic Mail (E-mail)
- News Groups
- FTP (File Transfer Protocol)
- Voice / Video Communication
- IRC (Internet Relay Chat)
- Streaming media

Web browser

Browsers are programs that are used to access, navigate and view websites.

Ex. Apple Safari, Google Chrome, Microsoft Edge, and Mozilla Firefox.



Source: Google Images

Search Engine

Search engines, search and list particular sites in the World Wide Web according to a specified keyword or phrase given by user.

E-mails in communication

E-mail or electronic mail is a method used to exchange electronic messages over the Internet. An email ID (Address) is needed to communicate by email.
You can create free email accounts in websites like goole.com, yahoo.com, hotmail.com etc.

Headers in an email

To- Is used to enter the main recipients email addresses.

Cc - Stands for Carbon Copy. The Cc field is for people who want to aware about the message, but are not directly involved.

Bcc - Stands for Blind Carbon Copy: Which is similar to Cc, but the recipients in the To or Cc fields cannot see that a copy sent to these addresses in the Bcc field.

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Subject
Used to insert the topic for the message.

Attachments
Allows attaching files such as documents or images with emails.

Reply
To reply a someone's email message, without composing a new message, using “Reply" facility a replay can be sent.

Forward
To forward a someone's email message to another person "Forward" facility can be used.

Social Networking
Social networking sites focus on connecting people and organizations that share a common interest or activity. Facebook, Google+, and LinkedIn are some of them.

Text messaging: Also known as texting or SMS (short message service), is the process of sending a short electronic message.

Instant messaging (IM): Allows two or more people to chat online with each other via text transmission over the internet.

Blogs and Micro blogs
Helps people to communicate across the web. These communication offer greater flexibility and security. It allows the users to publish short text and updates.

Cloud Computing
Cloud computing is using the Internet remote servers to store, manage and process data rather than using local servers or personal computers.

Internet of things (IoT)
The Internet of things (IoT) is the inter-networking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data

The Internet of Things (IoT) refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems

Characteristics of IOT
Interconnectivity:
Anything can be interconnected with the global information and communication infrastructure

Architecture:

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Based on different hardware platforms and networks. They can interact with other devices or service platforms through different networks
Dynamic changes:
The state of devices change dynamically

Everything-as-a-service:
Consuming resources as a service

Time considerations:
Billions of parallel and simultaneous events

Intelligence:
Knowledge extraction from the generated data

Need of IOT
Automation
Everything in home need to monitor and control
e.g.:- air condition, security lock, refrigerator, heating, ventilation, telephone etc.

Infrastructure Management
Infrastructures such as railway, bridge etc., have to monitor and track for reduce risk of failure and danger.

Environmental Monitoring
e.g.:- We can prevent damages and losses with the support of earthquake or tsunami warning systems

IOT Enabling Technologies

- **RFID (radio-frequency identification)**
  To identify and track the data of things
- **Sensor**
  To Collect and process the data to detect the changes in the physical status of things
- **Smart technology**
  To enhance the power of the network by developing processing capabilities to different part of the network
- **Nano Technology**
  To make the smaller things have the ability to connect and interact

IoT Applications

- **Smart** Cities
- Smart Energy and the Smart Grid
- Smart Transportation and Mobility
  - IoT enabling traffic management and control:
  - IoT enabling new transport scenarios (multi-modal transport):
- Smart Home, Smart Buildings and Infrastructure
- Smart Factory and Smart Manufacturing
- Smart Health
- Food and Water Tracking and Security

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Competency 7: Develops websites incorporating multi-media components

Competency level 7.1: Explores the arrangement and the composition of websites to organize pages and contents

Time: 1 period

Learning outcomes:

- Identifies the web pages of a website
- Identifies the contents of a web page
- Analyses the arrangement of contents of a web page

Contents:

- Contents of a website
  - Home page
  - Link page
- Building blocks of a web page
  - Text, graphics, audio, video, animation
  - Hyperlink
- Organization of contents
  Layout, frames, lists, tables

Concepts and terms to be highlighted:

- Difference between web page and website
- Contents of a web page and their arrangements

Guidance for lesson plans:

- Discussion on web page and website
- Demonstration of web page and website
- Divide the class into groups and provide a website URL to each group
- Then ask the groups to visit the site and analyse it to identify the building blocks and arrangement of the contents of it
- Let each groups to prepare a presentation with their findings and present it

Quality inputs:

- Computers with internet connectivity, Multimedia projector

Guidance for assessments and evaluations:

- Ask students to find a URL of a website
- Then ask them to visit and analyse the website to identify the contents and their arrangements
- Let them to fill the following table.
- (Example)

Content	Arrangement
E.g.:- Text	List

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Competency level 7.2: Analyses user requirements (multimedia contents) for web pages

Time: 1 period

Learning outcomes:

- creates effective and appropriate information layout of a web page

Contents:

- Defining the objectives of a website
- Contents to be displayed

Concepts and terms to be highlighted:

- Focus on specific goals, along with measurable objectives of a website
- Focus on the information provide by a website

Guidance for lesson plans:

- Demonstrate a website and discuss on the information available in it
- Discuss the objectives of that website according to the information available
- Then discuss and define objectives to the website that wish to develop
- Discuss and list the contents to the website that wish to develop according to the objectives

Quality inputs:

Computers with internet connectivity, Multimedia projector

Guidance for assessments and evaluations:

- Divide the class into groups and provide topics to each group to develop website
- Ask each group to define objectives to the given topics
- Then let them to list the contents to be displayed according to their defined objectives
- Let the each group to present their findings

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Competency level 7.3: Uses HTML to create web pages

Time: 6 periods

Learning outcomes:

- Explains Hyper Text Mark-up Language
- Saves the source document with suitable extensions
- Designs the web page by inserting appropriate multimedia objects according to user requirements
- Organizes data using lists in web page

Contents:

- Introduction to Hyper Text Mark-up Language
- Basic HTML tags of a web page
  - Page definition
    - <html>, </html>
  - Head section,
    - <head></head>
    - <title></title>
  - Body section
    - <body></body>
  - Background color
  - Text formatting
    - <h1>…<h6>tags
    -
    -
    - Underline, bold, italic
    - <font:>
  - Size and color
  - Adding comments
  - Lists
    - Ordered lists
    - Unordered lists
  - Multimedia objects
    - Image
    - Audio
    - Video

Concepts and terms to be highlighted:

- Introduction to HTML
- Basic HTML tags
- HTML tags for multimedia objects

Guidance for lesson plans:

- Let students to visit a webpage and view source code
- Guide the students to identify the main components in terms of HTML tags

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- Ask them to view the source code of teacher developed simple webpage
- Let them to make changes to source code as the instruction given by the teacher
- Let students to develop HTML codes to make a webpage according to the defined specification

Quality inputs:

- Computers with internet connectivity, Multimedia projector
- https://www.w3schools.com/html/

Guidance for assessments and evaluations:

- Provide a printout of a simple webpage to students and ask them to write the required HTML codes to create such a page.

Display a webpage and ask students to create a similar webpage using HTML

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Competency level 7.4: Uses authoring tool to create web pages

Time: 2 periods

Learning outcomes:

- Uses web authoring tools to create a simple web page

Contents:

- Introduction to web authoring tools

Concepts and terms to be highlighted:

- Needs of web authoring tools
- Software that use to create web pages
- Use of software to create websites

Guidance for lesson plans:

- Demonstrate the use of a web authoring software
- Let students to develop websites with at least 2-3 pages

Quality inputs:

Computers with internet connectivity, Multimedia projector

Guidance for assessments and evaluations:

- Provide defined specifications to develop a simple web page using a web authoring tool
- Let the students to present their developed websites

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Reading material:

- Identifies the web pages of a website
    - Introduction
        - The Internet is a worldwide collection of interconnected computer networks.
        - Internet enables businesses, organizations, governments, and individuals to communicate in a variety of ways.
        - One of the most popular ways users communicate on the Internet is by publishing and interacting with Web pages.
    - Web Browsers:
        - A Web browser is software that allows users to view and interact with Web pages.
          e.g.:- Microsoft Internet Explorer, Mozilla Firefox, Apple Safari and etc.
        - There are two main functions in the web Browser.
            1. Read and interpret the Hypertext Mark-up Language (HTML) used for creating the Web pages and then converts to a format to display on the Web.
            2. Allow users to navigate Web pages.
        - Each program has developed through a number of versions, with newer versions supporting more recent Web features.
          e.g.:- Newer version web browser supported for HTML-5 and some other new feature.
    - Web Page:
        - A Web page is just one single HTML file within Web site.
        - It has a unique name on a Web site.
        - It may have multimedia contents such as text, images, graphics, animations, sounds, videos and hyperlinks etc.
    - Home Page/Index Page:
        - The main page of any Web site is called the home page.
        - It is usually the first page a visitor sees when visiting a Web site.
        - Usually it contains general information about the Web site and related links.
    - Link Page:
        - There are some links on web pages. They are used to open pages in same website or other web sites. These pages are called link pages.
    - Web Site:
        - It is a collection of related Web pages under one domain name.
          e.g.:- National Institute of Education: www.nie.lk
          Department of Education Department: www.moe.gov.lk
          Google Web Site: www.google.com

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- Building blocks/ Basic elements of a Web Page.
  - Web pages consist of different elements.
  - Each of these elements is used to communicate information in different ways.
  - The common elements are,
    1. **Text:** It consists of words, letters, numbers, and other symbols.
    2. **Graphics:** include drawings, charts, diagrams, paintings, photographs, and navigational buttons.
    3. **Audio:** It is live or recorded sound.
    4. **Video:** It is live or recorded movies.
    5. **Animation:** It refers to the movement of text or graphics.
    6. **Hyperlinks:** These are used to link webpage of the same web site, other web sites and another section of same web page.
- Organization of contents:
  - The layout of a web page determines the arrangement of the various elements and sections.
  - The following are some examples for organization of a Web page.
    1. **Frames**: Frame divides a Web page into sections and allows users to access different pages and sites.
    2. **Lists**: Lists are block formatting elements that define a block structure.
    3. **Tables**: HTML tables enable users to effectively present large amounts of data in rows and columns.

Website Requirement analysis

- 'Website Requirement analysis' is a process that assists in analysing challenges and opportunities with respect to the business model of the website
- The 'requirement description' should be contained the user requirements to be satisfied
- Key elements that should be included in the requirement description
  - Purpose of the website
  - User interface design
  - Subscription and Registration process
  - User specific tools and pages
  - Security requirements
  - Future Enhancements
  - Technical options available (e.g.: Java script, PHP, ASP etc.)

Hypertext mark-up language.

- Introduction:
  - You can create your own Web site using HTML
  - HTML is the core technology in which all Web pages are written

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- What is HTML?
  HTML is a language for describing Web pages.
  - HTML stands for 'Hyper Text Mark-up Language'.
  - HTML is a mark-up language; it's not a programming language.
  - A mark-up language is a collection of mark-up tags.
  - It is not case sensitive.
- What are Tags?
  - HTML mark-up tags are usually called HTML tags or just tags.
  - HTML tags are keywords surrounded by angle brackets like <html>.
  - There are two different types of tags:-
    1. Container Element:-
       Container Tags contains start tag/opening tags& end tag /closing tags i.e. <HTML>… </HTML>
    2. Empty Element:-
       Empty Tags contains start tag i.e.
- HTML Editor
  - HTML documents are plain text documents so you can use any text-editing program to code HTML and create a web page.
    Eg:- Notepad++, Notepad, PSPad
  - You can also use a verity of web specific coding environments.
    Eg:- Brackets, Microsoft FrontPage, Microsoft DreamViewer
- Save the source code.
  - When you save an HTML file, you can use either the ".htm" or the ".html" extension.
  - We use ".htm" is a habit from the past when the software only allowed three letters in file extensions.
  - In most cases, it is perfectly safe to use ".html".
- Web pages can differ widely in terms of content and layout; all pages have certain HTML tags that give them the same basic structure.
- HTML Structure

Name of HTML Component	Meaning	Example
Delimiters	Delimiters surround the tag and inform the parser that it should read the enclosed information as an HTML element.	<,>,/
Tags	Tags contain elements which provide instructions for how information will be processed or displayed	<html> . . </html>
Elements	A basic unit of an HTML	<HR> - The tag

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	document. The name of the element is given in the name of the tag.	contain the Horizontal Ruler element.
Attribute	Defines a special property of an HTML element.	<IMG SRC="image.jpg"> It means that the element 'IMG' has an attribute 'SRC'. which specifies the name of the image file, which is assigned the value "image.jpg"

- HTML Tags (<html> and </html>) :-
  - When a browser encounters these tags, it knows that anything within the two tags defines a Web page.
  - Older Web browsers expect to see the HTML tags; with the latest version of HTML and newer versions of browsers, the tags are not always necessary, but adding them is good form.

- Head Section (<head> and </head>):-
  - This tag adds descriptive and accessory information to your Web page.
  - The document header contains information that does not appear in the browser window.
  - It's including title information and so on.

- Body Section (<body> and </body>):-
  - The visible content that makes up your Web page, including paragraphs, lists, tables, and images, lives in the body of your HTML document.

    e.g.:- Basic Structure of HTML file

```
<html>
        <head>

        ……..
        </head>

        <body>

        ……..
        </body>
</html>
```


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- Adding Comments :
  You can use comments to write notes to yourself within an HTML document. Comments do not appear when a browser displays a Web page.
  e.g. :- <! --Enter the comments -->

- Background color
  - The body tag attribute 'bgcolor' specifies the background color of a document.
    Eg:-<body bgcolor="Red">, or Color Value codes use for the attribute values.

- HEAD element.
  - <TITLE>...</TITLE> :Indicates the title of the document and appears in a browser's bookmark file.

- BODY elements

1. Text Formatting:

Elements	What is it?	How to use it?
Heading Tag	There are six heading elements (<H1>,<H2>,<H3>,<H4>, <H5>,<H6>). All the six heading elements are container tag and require a closing tag. <h1> will print the largest heading. <h6> will print the smallest heading.	This is a heading
Paragraph Tag	HTML documents can be divided into paragraphs. Paragraphs are defined with the tag. You can control the horizontal positioning, or alignment, of your paragraphs using the ALIGN attribute. You can choose to align a paragraph to the left, right, center, or justify.	This is the tag for paragraph National Institute of Education, Magaragama
Line Break and Horizontal Line Tag	For a line break or a new line without starting a new paragraph Use the tag. Defines a horizontal line use <hr>tag. elements are empty HTML elements, It has no end tag.	National Institute of Education <hr> National of Education.
BoldTag	Bold is symbolized by a in front of the text you want bold, and a at the end of the area you want bold.	This is BOLD Area

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	This tag mostly used for text formatting.	
ItalicTag	This causes the text to slant. The tag is a simple in front of the text that you want italicized and a at the end of the text you want italicized. This tag mostly used for text formatting.	This is Italic Area
Underline Tag	This is <u></u> and is used similar to the bold and italics. This tag mostly use for text formatting.	<u> This is underline</u>
Font Tag	This element is used to format the size, typeface/Font type (Eg:- 'Times New Roman') and color of the enclosed text. 1. You can change the appearance of your text using the tags and, along with the 'FACE' attribute. 2. You can change the font size of your Web page text using the SIZE attribute. It takes the size from 1 to 7, here 1 create small size. 3. You can enhance your text by adding color. The COLOR attribute works with the tag to change text on a page from the default black to a color.	This text font is ARIAL This text font size is 5 This text font size is 5 National Institute of Education

2. Lists

Lists provide methods to show item or element sequences in document content.

There are three main types available:-

Ordered lists

1. Unordered lists
2. Definition lists

List Name	What is it?	Example
Ordered lists Elements	You can use numbered lists on your Web page to display all kinds of ordered lists.	<ol type="a"> - Apple - Orange

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	You use two kinds of elements for a numbered list: 1. The ordered list element ( ) specifies that this is a numbered list. 2. List item elements ( ) mark each item in the list. Two attributes control the appearance of ordered lists 1. Start : Specifies the first number in the list 2. Type : Specifies the numbering style from the list E.g.:- 1, A, a, i, I are type attribute values.	- Banana - Mango
Unordered List	You can add a bulleted list to your document to set a list of items apart from the rest of the page of text. A bulleted list requires the following elements: 1. The unordered list element ( ) specifies that you're creating a bulleted list. 2. A list item element ( ) marks each item in the list 'Type' attribute specifies the style of bullet list. Eg:- disc, square, circle	<ul type= "square"> - Apple - Orange - Banana - Mango

3. Multimedia Objects

Multimedia features in HTML allow users to include images, video clips, Audios and other HTML documents in their web pages.

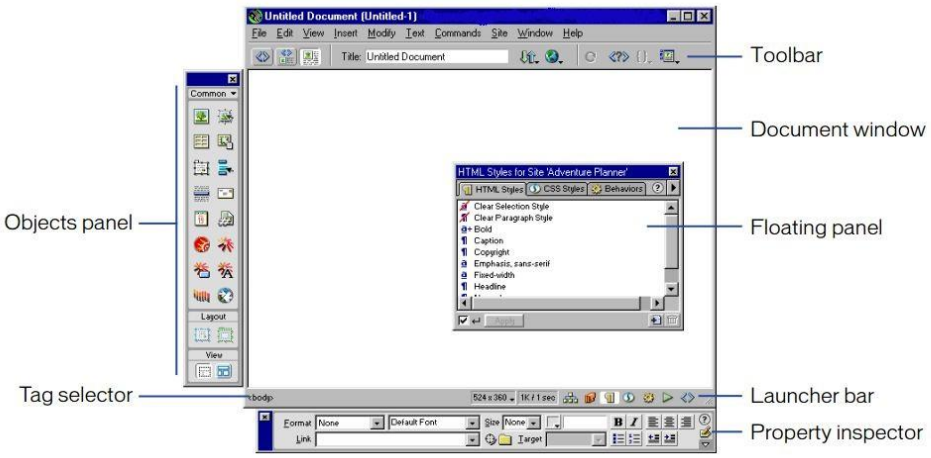
Tag	What is it?	How to use it?
Image Tag	In HTML, images are defined with the <img>tag. The image tag is empty, which means that it contains attributes only and it has no closing tag. Attributes for image tag: 1. **Src:**It's used to display an image on a page, you need to use this attribute and the 'src' stands for "source". The value of the src attribute is full path of image	 <

	file you want to insert. If the image saved in the same folder as the HTML file, you reference it with just the file name 2. **Width**: You can set the image width in pixels or percentage. 3. **Height**: You can set the image height in pixels or percentage.	 <imgsrc= “img1.jpg”> <imgsrc= “img1.jpg” height=150 width=175>
Audio Tag	HTML5 introduced the <audio> element to include audio files in web pages. Attributes for Audio tags: 1. **Src:** specifies the path to the audio file. 2. **Controls:** indicates whether the player should display controls. No controls will be shown by default. 3. **Autoplay:** indicates that the audio should start playing automatically.	<audio src="audio/test-audio.ogg" controls auto play></audio>
Video Tag	The <video>element has a number of attributes which allow you to control video playback: 1. **Src:** specifies the path to the audio file. 2. **Width, Height:** specify the size of the player in pixels. 3. **Controls:** indicates that the browser should supply its own controls for playback. 4. **Auto play:** indicates that the video should start playing automatically.	<video src="video/puppy.mp4" width="400" height="300" controls></video>

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Authoring tool to create web pages

- Introduction
  - "Web page Authoring tools" used to design, code, and create professional-looking Web pages, Web sites, and Web Applications.
  - The visual-editing features of Authoring tools allow you to create pages without writing a line of code.
  - It is easier to create a Web site than HTML editor such as Notepad, Notepad++ and etc.
  - Although writing web pages using HTML editor is more powerful, it's lot slower than using a web authoring tool.
  - The IDE of Web page authoring tools consists of **toolbars, windows, objects, panels, inspectors, and tools etc.** Those are used to create your Web pages attractively and manage your Web site efficiently.
  - In Integrated Development Environment (IDE) the Document window and panels are incorporated into one larger application window.



- Some Parts of the Workspace:

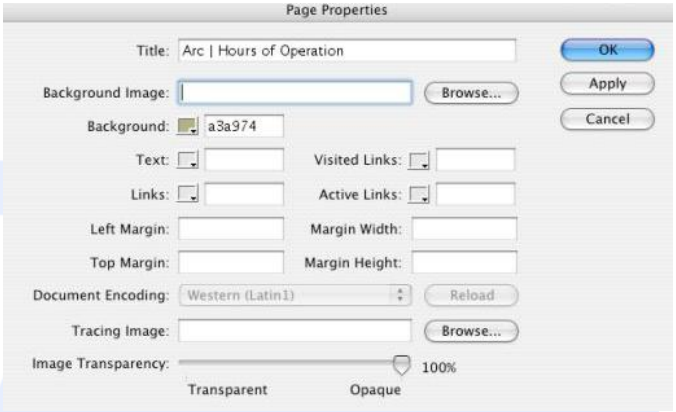
Component	Details
Document Tab	Displays the name of the Web page and default name is Untitled-1.
Document Window	Displays the current document, or Web page, including text, tables, graphics, etc.
Design view	Use to assemble your Web page elements to design your page.
Code view	It is a hand-coding environment for writing and editing code.
Split view	It allows you to see both Code view and Design view in the same window.
Panel groups	These are sets of related panels docked together under one heading and control over a wide range of commands and functions.
Insert Bar	It allows quick access to frequently used commands to create and insert various types of objects-such as images, tables, links and dates.
Status Bar	It provides additional information about the document you are creating.

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- Create a New Web Page
  - Enter a title in the "Title:" textbox at the top of the document window. This is the title that will appear in the title bar of the browser window when people view your page; it is also the text that will be used when someone creates a bookmark to your page.

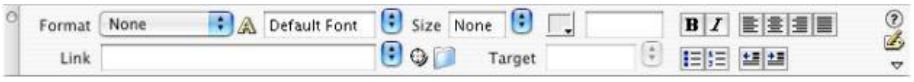
  - Save the document: Make sure the main page (in the root folder and any subfolders) is named ‘index.htm’ or ‘index.html’.

- Page Properties
  - To set properties that affect the entire page, choose Page Properties from the Modify



    - **Title:** Name of your web page.
    - **Background Image**: You can specify a relative or absolute path to an image to appear in the background of every page. Also you can browse and select an image.
    - **Background:** You can set the background color for the page by using the color palate.
    - **Text:** You can set the text color.
    - **Links, Visited Links, Active Links**: You can assign a color for these link texts.
    - **Left Margin, Top Margin, Margin Width and Margin Height:** you can place your graphics and images by setting the margins.
    - **Tracing Image and Image Transparency:** This setting allows you to select a background image and adjust the transparency of the image according to their importance.

- Text
  - Text can be typed or cut and paste from another source.
  - Properties panel allows you to format the typed text. Text options are also available from the Text menu.



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- **Format:** To choose heading levels and other formatting styles from the dropdown menu.
- **Size:** When specifying a size, you can use font size (1, 2, 3, etc.) or (+) and (-) sizes (+1, +2, +3, etc.), Default size is 3.
- **Color:** To choose color for the selected text from dropdown color palette.
- **Ordered and Unordered Lists:** To create an ordered (numbered) or unordered (bulleted) list use the appropriate button.
- **Increase or Decrease Indent Buttons:** To increase or decrease Indent of the selected paragraph.

- Inserting Common Objects
  - Image
    - Insert > Image. Locate and select an image
    - Use Alt component to add the alternative text that describes the image.
    - You can also change image alignment (Align) and make the image a Link. You can also set vertical and horizontal space (V Space or H Space) and add a border (Border) around the image.



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Competency 8: Uses ICT efficiently and effectively to be successful in life

Competency level 8.1: Explains the contribution of ICT towards national development

Time: 2 periods

Learning outcomes:

- Discusses advantages and disadvantages of ICT
- Lists and briefly describes the applications of ICT in various fields
- Appreciates the contribution of ICT in national development

Contents:

- Application of ICT
  - **Education**
    - Learning / Teaching Process
    - Learning Management System
    - School Management System
  - **Health**
    - Investigation tools such as MRI scan, CAT scan etc
    - Simulations in medical education
    - Tele-medicine
  - **Agriculture**
    - Linking rural agricultural communities
    - Communicating with the administration
    - Meteorological Information
    - Computer controlled devices
  - **E- Business**
    - Travel
    - Online shopping
    - Bank (ATM, Credit Card)
    - On-line Employment
  - **E – Governance**
    - Issuing of identity cards, driving licence and passports
    - Issuing birth, marriage, death certificates

Concepts and terms to be highlighted:

- Focus on advantages and disadvantages of ICT
- Focus on the fields where ICT is used
- Highlight the contribution of ICT in national development

Guidance for lesson plans:

- Discussion on advantages and disadvantages of ICT
- Divide the class into four groups and assign each group a field where ICT is used and ask them to prepare a presentation on usage of ICT in the given field
- Arrange a debate, Ex.: “Is ICT contribute to national development?”

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Quality inputs:

- Computers with internet connectivity, Multimedia projector

Guidance for assessments and evaluations:

- Ask students to prepare and submit an assignment on ICT usage with following aspects
  - The fields and applications
  - Contribution of ICT in national development

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Competency level 8.2: Seeks ICT career opportunities and paths to suit one's life

Time: 1 period

Learning outcomes:

- Identifies the career paths and opportunities related to ICT
- Identifies the tasks related to each ICT profession

Contents:

- Career opportunities and paths, related to ICT profession
  - Software Engineer
  - Software Quality Assurance Engineer
  - Business Analyst
  - IT Project Manager
  - Graphic Designer
  - Software Architect
  - Quality Assurance Leader
  - Technical Leader
  - Network Administrator
  - Database Administrator
  - Computer Application Assistant
  - IT Manager etc.

Concepts and terms to be highlighted:

- Focus that there are many career paths in ICT field
- Make aware that there are various ICT skills related to different disciplines
- Highlight how to find the places where these career paths are available (online, offline, local and foreign)
- Focus on the benefits and remuneration in these careers

Guidance for lesson plans:

- Group the students and assign each group a topic on ICT career paths and ask them to prepare a presentation and present it

Quality inputs:

- Computers with internet facility, Multimedia projector, Paper advertisements on ICT related job opportunities, Catalogues on ICT related career paths
- http://www.careerpilot.org.uk/jobs/information-communications-techn/jobs

Guidance for assessments and evaluations:

- Ask students to prepare and submit an assignment on ICT career paths according to the following aspects
  - Skills
  - Experience
  - Jobs available places (local / foreign)
  - others

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Competency level 8.3: Makes safe use of ICT with awareness on relevant issues

Time: 3 periods

Learning outcomes:

- Identifies and briefly describes ethical and legal issues related to ICT
- Gets aware of e-laws and SLCERT
- Lists the good and bad impacts of social media
- Identifies the threats to computer system
- Take precautionary measures to protects the computer hardware and software
- Identifies the issues arise from unsafe use of internet and takes precautionary measures to prevent them
- Identifies the health issues arise from using computer
- Takes precautionary measures to avoid health issues when using computers
- understands about good and unfavourable computer habits
- Defines e-waste
- Briefly describes the adverse effects of improper disposal of E-waste
- Disposes e-waste in a proper way
- Recognizes and appreciates green computing
- Adapts relevant workplace practices to minimize the health issues when working for a long hours with computers

Contents:

- Ethical and legal Issues
  - Cyber crime
  - Privacy
  - Piracy
  - E- Laws
  - Sri Lanka Computer Emergency Readiness Team (SLCERT)
  - Unauthorised access
  - Ethical behaviour on cyberspace
    - Cyber stalking
    - Intellectual property (patent, copyright)
    - Plagiarism
    - Blackmail
- Ethical and legal issues in social media
  - Inappropriate materials
- Security
  - Hardware protection
    - Physical protection
      - UPS
      - Surge arresters
    - Environmental protection
      - Dust, Humidity, Sunlight, Heat
      - Protection from natural disasters
  - Software protection
    - Anti-threat software
    - Firewall
- Precautions in using internet
- Health and safety

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- Repetitive Strain Injury (RSI)
- E-Waste and green computing

Concepts and terms to be highlighted:

- Focus on ethical and legal issues and security
- Focus on precautions in using internet
- Focus on ethical and legal issues in social media
- Focus on safe use of ICT
- Focus on the importance of work place practices

Guidance for lesson plans:

- Demonstration and discussion on ethical and legal Issues, ethical and legal issues in social media, security, safe use of ICT and work place practices

Quality inputs:

- Computers with internet facility, Multimedia projector
- http://www.slcert.gov.lk/

Guidance for assessments and evaluations:

- Divide the class into groups and assign each group one of the above topics and ask them to prepare a presentation and present it

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Reading material:

Advantages of ICT

- makes peoples' life easier and comfortable in modern society
- Using ICT, We can perform our day to day activities more efficiently and effectively than earlier
- Bridge distance(Global village)
- Creates entertainment opportunities
- Creates new employment opportunities
- Share information globally with quick and easy access
- Makes learning more interesting

Disadvantages of ICT

- People have become mechanical with ICT tools. Therefore losing their human qualities
- Addiction to ICT related activities
- Digital divide
- Computer crimes
- Computer related health hazards
- Losing privacy
- Legal Issues
- E-waste
- Social and Cultural Issues

Fields where ICT is used?

1. **Education**
    - ICT in Teaching and Learning
        - Collection of subject related information to widen teacher's knowledge
        - Using audio-visual lessons and animations to explain difficult subject matters
        - Presentations to introduce lessons
        - Assessment, Examinations and Evaluation
        - Collection of Subject related information through internet
        - Self-Learning (Anywhere any time)
        - Distance Learning
        - Exchange information among peers through email and discussion forums etc.
        - Using CD/DVDs
        - Educational games
    - Learning Management System
        - Educational organizations can maintain LMSs to deliver course content, materials, and instructions and conduct tests and evaluations etc.
    - School Management System
        - Time table and bell system
        - School Information System (Exam result analysis, Staff and Students information etc.)
        - Library systems

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2. **Health**
    - Medical Testing (MRI scan, CAT scan, ECG, EEG etc.)
    - Patient monitoring system
    - Health education
    - Tele medicine
    - E channelling
    - Health Information System etc.

3. **Agriculture**
    - Link rural agricultural communities through internet
    - Communicating with relevant authorities to get necessary information
    - Meteorological information
    - Computer controlled equipment
        - Pest controlling system
        - Milking system
        - Security system

4. **E-Business**
    - Travel and Transport
        - Traffic control system
        - Seat reservation system etc.
    - Online shopping
        - E Bay, Alibaba, etc.
    - Electronic transaction
        - ATM
        - Credit/Debit cards
    - Online employment
        - Freelance etc.

5. **E-Governance**
    - Official web portal of Sri Lanka Government (www.gov.lk)
    - Information and Communication Technology Agency(ICTA)
    - Issuing NICs, Driving license, passport
    - Issuing of birth, marriage and death certificates etc.

Career opportunities and paths

- Software Engineer
- Software Quality Assurance Engineer
- Business Analyst
- IT Project Manager
- Software Architect
- Graphic Designer
- Quality Assurance Leader
- Technical Leader

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- Network Administrator
- Database Administrator
- Computer Application Assistant
- IT Manager
- Web developer etc.

Job Category	Basic Tasks to be performed
• Software Engineer • Software Architect • Software QA Engineer	Analysing and Developing Software Assure quality of the software
• Business Analyst • Quality Assurance Leader • Technical Leader • IT Manager	Analyse the business Responsible to the quality of the Software
• Graphic Designer • Web developer	Developing applications using graphics software /web authoring tools
• Computer Applications Assistant	Office related applications
• Network Administrator	Design and maintain computer network
• Database Administrator	Responsible for the proper functioning of the database

1. Ethical and Legal Issues

- Cybercrime – criminal activities using computers or the Internet such as fraud, blackmail etc.
- Privacy – Producer of a software has rights to prevent it from being used or unauthorized access by others without permission(Rights and Patent)
- Piracy – Copying and distributing of Licensed software without permission (Licensed software should not be copied and distributed without permission)
- Laws – There are rules and regulations to prevent illegal usage of software
- Sri Lanka Emergency Readiness Team(SLERT) – An organization to provide help in computer and internet related issues

2. Ethical and Legal Issues in Social Media

- Hacking of others accounts detail and misuse their information
- Irresponsible use of social media which leads to misconducts in the society in known as cyber crimes
- Spreading viruses
- Spreading rumours through social media sites

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3. **Security**
   - Hardware security (Physical Security)
     - Keep computers in secured place (In a building with proper doors and locks etc.)
     - Installing surge protectors, UPS etc. to protect computers from electrical problems
     - Fixing air conditioners to protect computers from heat, humidity and dust
     - Prevention from natural disasters (Floods, Earthquakes etc.)
   - Software security (Logical Security)
     - Installing and upgrading virus guards
     - Installing firewalls
     - Using separate user accounts with effective passwords

4. **Precautions in using internet**
   - Prevent downloading from unknown web sites
   - Do not provide your personal information unnecessarily
   - Use secure user names and pass words etc.

5. **Health and Safety**
   - Repetitive Stress Injuries (RSI)
     - Do not use computer for longer hours (Take breaks in between)
     - Follow work shop practices (Walking briskly, moving head, arms and legs in small exercises)
   - Computer Vision Syndrome (CVS)
     - Keep proper distance between eye and the computer (45-70cm)
     - Do not keep on looking at the computer monitor continuously for a long time(Look around and blink your eyes regularly)
   - Carpal Tunnel Syndrome (CTS)
     - Keep your wrist and elbow proper manner when using keyboard and mouse
   - What are E-waste?
     - Any discarded material related to ICT (computers and peripherals , cables, CD/DVDs, printer cartridges, phones, batteries etc.)
   - How to minimize the harmful effects of e-wastes?
     - Recycle – handover to suitable recycling or collecting centres
     - Reuse – Give your device to be used by someone else
     - Reduced use – Use your device only when essential
   - Green computing

     Green computing is the environmentally responsible and eco-friendly use of computers and their resources. In broader terms, it is also defined as the study of designing, manufacturing/ engineering, using and disposing of computing devices in a way that reduces their environmental impact.

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උසස් පෙළ විද්‍යා/ගණිත/කලා/වාණිජ හා තාක්ෂණ විෂය ධාරාවන්ට අදාළ සියලුම ප්‍රශ්න පත්‍ර/සටහන් හා තවත් බොහෝ දෑ ලබා ගැනීමට පිවිසෙන්න www.AlevelApi.com වෙත ...

English-Sinhala-Tamil Glossary			
No	**English**	**Sinhala**	**Tamil**
1.	abstract model	වියුක්ත ආකෘතිය	கருத்தியல் மாதிரி
2.	acceptance testing	ප්‍රතිග්‍රහණ පරීක්ෂාව	ஏற்புச் சோதனை
3.	access privilege	ප්‍රවේශවීමේ වරප්‍රසාදය	அணுகல் உரிமை
4.	agile model	සුචල්‍ය ආකෘතිය	சுறுசுறுப்பு மாதிரி
5.	alternate key	විකල්ප යතුර	மாற்றுச் சாவி
6.	American Standard Code for Information Interchange (ASCII)	තොරතුරු හුවමාරුව සඳහා වූ ඇමරිකානු සම්මත කේතය	தகவல் இடைமாற்றுக்கான அமெரிக்க நியம விதிக்கோவை
7.	amplitude	විස්තාරය	வீச்சம்
8.	amplitude modulation	විස්තාර මූර්ඡනාව	வீச்சப் பண்பேற்றம்
9.	analog	ප්‍රතිසම	ஒப்புமை
10.	anchor	රැඳවුම	நிலை நிறுத்தி
11.	application layer	අනුප්‍රයෝග ස්ථරය	பிரயோக அடுக்கு
12.	architecture	නිර්මිතය	கட்டமைப்பு
13.	arithmetic and logical unit (ALU)	අංක ගණිත හා තාර්කික ඒකකය	எண்கணித மற்றும் தர்க்க அலகு
14.	array	අරාව	அணி
15.	artificial intelligence	කෘතිම බුද්ධිය	செயற்கை நுண்ணறிவு
16.	Affective computing	බුද්ධිමත් සහ චිත්තවේගී පරිගණනය	நுண்ணறிவு உணர்திறன்மிக்க கணித்தல்
17.	associative law	සංඝටන න්‍යාය	கூட்டு விதி
18.	attenuation	වැහැරීම/හායනය	நொய்மை
19.	attribute	උපලැකිය /ගුණය/ උපලක්ෂණය	பண்புகள்
20.	authoring tool	සම්පාදන මෙවලම	படைப்பாக்கக் கருவி
21.	Automated Teller Machine (ATM)	ස්වයංකෘත මුදල් ගනුදෙනු යන්ත්‍රය	தானியங்கிப் பணம் கையாள் இயந்திரம்
22.	autonomous	ස්වයංපාලක/ ස්වතන්ත්‍ර/ස්වායත්ත	சுயாதீன
23.	axiom	ස්වසිද්ධිය/ප්‍රත්‍යක්ෂය	வெளிப்படை உண்மை
24.	backups	උපස්ථ	காப்பெடுத்தல்
25.	bandwidth	කලාප පළල/බඳස් පළල	பட்டை அகலம்
26.	batch processing	කාණ්ඩ සැකසුම	தொகுதி முறைவழியாக்கம்
27.	big data	මහා දත්ත	பெரிய தரவு
28.	binary	ද්විමය	துவிதம், இருமம்
29.	binary coded decimal (BCD)	ද්විමය කේතික දශමය	இருமக் குறிமுறை தசமம்
30.	bio-inspired computing	ජෛව ප්‍රේරිත පරිගණනය/ ජෛව අනුප්‍රේරිත පරිගණනය	உயிரியல் உள்ளீர்ப்புக் கணிப்பு
31.	bit coin	බිට් කාසි	நுண்கடன் பணம் செலுத்தல்
32.	bitwise	බිට් අනුසාරිත	பிட் வாரி
33.	bitwise logical	බිට් අනුසාරිත තාර්කික	பிட் வாரி தர்க்கச்

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	operation	මෙහෙයුම්	செயற்பாடு
34.	black box testing	කාල මංජුසා පරීක්ෂාව	கறுப்புப்பெட்டிச் சோதிப்பு
35.	blogging	වෙබ් සටහනය	வலைப்பதிவிடல்
36.	boot–up	ප්‍රවේශනය	தொடங்குதல்
37.	broadcasting	විකාශනය	தொலைபரப்பல்
38.	browsing	අතරික්සීම	மேலோடல்
39.	bubble sort	බුබුළු තේරීම/ යා-සැසඳුම් තේරීම	குமிழி வகைப்படுத்தல்
40.	built-in	තුළබැඳි / තිළැලි	உட்பொதிந்த
41.	business process re-engineering (BPR)	ව්‍යාපාර ක්‍රියාවලියේ ප්‍රති ඉංජිනේරුකරණය	வணிக செயல்முறை மீள்கட்டமைப்பு
42.	candidate key	නිරූපය යතුර	பிரதிநிதித்துவச் சாவி
43.	cardinality	ගණනීයතාව	எண்ணளவை
44.	cathode ray tube (CRT)	කැතෝඩ කිරණ නලය	கதோட்டுக் கதிர் குழாய்
45.	central processing unit (CPU)	මධ්‍ය සැකසුම් ඒකකය	மத்திய செயற்பாட்டு அலகு
46.	characteristics	ගති ලක්ෂණ / ස්වලක්ෂණ	சிறப்பியல்புகள்
47.	check box	සලකුණු කොටුව	சரிபார்ப்புப் பெட்டி
48.	client-server model	සේවා යෝජක-සේවා දායක ආකෘතිය	சேவைப் பயனர் மாதிரி
49.	clock	ස්පන්දකය	கடிகாரம்
50.	cloud computing	වලාකුළු පරිගණනය	மேகக் கணிமை
51.	coaxial cable	සමක්ෂක කේබලය	ஓரச்சு வடம்
52.	code editor	කේත සංස්කාරක	குறிமுறை தொகுப்பி
53.	comment	විවරණය	விளக்கக் குறிப்பு
54.	commutative law	න්‍යායදේශ න්‍යාය	பரிமாற்று விதி
55.	compact disc	සුසංහිත ඩිස්කය	ஒளியியல் வட்டு
56.	compatibility	ගැළපුම	பொருந்துகை
57.	compiler	සම්පාදකය	தொகுப்பான்
58.	component	සංරචකය	கூறு
59.	composite key	සංයුක්ත යතුර	கூட்டுச் சாவி
60.	constant	නියතය	மாறிலி
61.	content management system (CMS)	අන්තර්ගත කළමනාකරණ පද්ධතිය	உள்ளடக்க முகாமைத்துவ முறைமை
62.	context switching	සන්දර්භ සුවිචනය	சந்தர்ப்ப நிலைமாற்றல்
63.	contiguous allocation	යාබද විභාජනය	அடுத்தடுத்தான ஒதுக்கீடு
64.	control structure	පාලන ව්‍යූහය	கட்டுப்பாட்டுக் கட்டமைப்பு
65.	control unit (CU)	පාලන ඒකකය	கட்டுப்பாட்டலகு
66.	credit card	ණයපත	கடனட்டை
67.	customization	අභිරුචිකරණය	தனிப்பயனாக்கல்
68.	data	දත්ත	தரவு
69.	data and control bus	දත්ත සහ පාලන පථ	தரவும் கட்டுப்பாட்டுப் பாட்டையும்
70.	database management system (DBMS)	දත්ත සමුදාය කළමනාකරණ පද්ධති	தரவுத்தள முகாமைத்துவ முறைமை

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71.	data definition language (DDL)	දත්ත නිර්වචන භාෂාව	தரவு வரையறை மொழி
72.	data dictionary	දත්ත ශබ්දකෝෂය	தரவு அகராதி
73.	data flow diagram	දත්ත ගැලීම් සටහන	தரவு பாய்ச்சல் வரைபடம்
74.	data flow model (DFM)	දත්ත ගැලීම් ආකෘතිය	தரவு பாய்ச்சல் மாதிரி
75.	data link layer	දත්ත සබැඳි ස්ථරය	தரவு இணைப்பு அடுக்கு
76.	data manipulating language (DML)	දත්ත හැසුරුම් බස	தரவு கையாளல் மொழி
77.	data migration	දත්ත පර්යටනය	தரவு பெயர்ச்சி
78.	debugging	නිදොස් කිරීම	வழு நீக்கல்
79.	decision support system (DSS)	තීරණ සහාය පද්ධති	தீர்மான உதவு முறைமை
80.	declarative	ප්‍රකාශාත්මක	அறிவிப்பு
81.	default values	පෙරනිමි අගය	இயல்புநிலை மதிப்பு
82.	defragmentation	ප්‍රතිඛණ්ඩනය	துணிக்கை நீக்கல்
83.	demodulation	විමූර්ජනය	பண்பிறக்கம்
84.	device	උපාංගය / උපක්‍රමය	சாதனம்
85.	device driver	උපාංග ධාවක මෘදුකාංග	சாதனச் செலுத்தி
86.	digital	අංකිත	இலக்க முறை
87.	digital camera	අංකිත කැමරාව	இலக்கமுறைப் படக்கருவி
88.	digital economy	අංකිත ආර්ථිකය	இலக்கமுறைப் பொருளாதாரம்
89.	digitizer	සංඛ්‍යාංකකය	இலக்கமாக்கி
90.	direct implementation	සෘජුස්ථාපනය	நேரடி அமுலாக்கம்
91.	disk formatting	තැටි/ඩිසක හැඩසව් ගැන්වීම	வட்டு வடிவமைப்பு
92.	distortion	විකෘතිය	திரிபு
93.	distributive law	විෂටන න්‍යාය	பங்கீட்டு விதி
94.	document flow diagram	ලේඛන ගැලීම් සටහන	ஆவணப் பாய்ச்சல் வரைபடம்
95.	domain	වසම	ஆள்களம்
96.	domain name server (DNS)	වසම් නාම සේවාදායකය	ஆள்களப் பெயர் சேவையகம்
97.	domain name system (DNS)	වසම් නාම පද්ධතිය	ஆள்களப் பெயர் முறைமை
98.	dynamic host configuration protocol (DHCP)	ගතික ධාරක පාලන නියමාවලිය	மாறும் விருந்தோம்பி உள்ளமைவு நெறிமுறை
99.	dynamic web page	ගතික වෙබ් පිටු	இயக்குநிலை வலைப்பக்கம்
100.	e-commerce	විද්‍යුත් වාණිජ්‍යය	மின் வர்த்தகம்
101.	economical feasibility	ආර්ථික ශක්‍යතාව	பொருளாதாரச் சாத்தியப்பாடு
102.	elementary process description(EPD)	මූලික ක්‍රියාවලි විස්තරය	அடிப்படைச் செய்முறை விபரிப்பு
103.	e-market place	ඉ-වෙළඳ පොළ	இலத்திரனியல் சந்தை இடம்

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104.	encryption	ගුප්ත කේතනය	மறைகுறியாக்கம்
105.	enterprise resource planning system (ERPS)	ව්‍යවසාය සම්පත් සැලසුම් පද්ධතිය	நிறுவன மூலவள திட்டமிடல் முறைமை
106.	entity	භූතාර්ථය/අභිභූතත්වය/සත්තාව	நிலைபொருள்
107.	entity identifier	භූතාර්ථ/අභිභූතත්වය හඳුන්වනය	நிலைபொருள் அடையாளங்காட்டி
108.	entity relationship(ER) diagram	භූතාර්ථ සම්බන්ධතා රූපසටහන	நிலைபொருள் உறவுமுறை அட்டவணை
109.	executable	ක්‍රියාත්මක කළ හැකි	இயக்கத்தகு
110.	executive support system (ESS)	විධායක සහාය පද්ධතිය	நிறைவேற்று உதவு முறைமை
111.	expert system	විශේෂඥ පද්ධතිය	நிபுணத்துவ முறைமை
112.	extended binary coded decimal interchange cod (EBCDIC)	විස්තෘත ද්විමය කේතක දශම	நீடித்த துவித குறிமுறை தசம இடமாற்றக் குறி
113.	extended entity relationship (ER) diagram	විස්තෘත භූතාර්ථ සම්බන්ධතා රූප සටහන	விரிவாக்கப்பட்ட நிலைபொருள் உறவுமுறை அட்டவணை
114.	feasibility study	ශක්‍යතා අධ්‍යයනය	சாத்தியப்பாடு கற்கை
115.	feedback loop	ප්‍රතිපෝෂණ ලූපය	பின்னூட்டல் வளையம்
116.	fetch-execute cycle	ආහරණ-ක්‍රියාකරවුම් චක්‍රය	தருவிப்பு நிறைவேற்றுச் சுழற்சி
117.	fiber optic	ප්‍රකාශ තන්තු	இழை ஒளியியல்
118.	file	ගොනුව	கோப்பு
119.	file hierarchy	ගොනු ධුරාවලිය	கோப்பு படிநிலை
120.	firewall	ගිනි පවුර	தீச்சுவர்
121.	normal form	ප්‍රථම ප්‍රමත අවස්ථාව	இயல்பாக்கல் வடிவம்
122.	fixed internal hard disk	අචල අභ්‍යන්තර දෘඪ තැටි	நிலையான உள்ளக வன்தட்டு
123.	flash memory	සැණ/ ක්ෂණික මතකය	பளிச்சீட்டு நினைவகம்
124.	flash memory card	සැණ/ ක්ෂණික මතක පත	பளீச்சிட்டு நினைவக அட்டை
125.	flat file system	චීක ගොනු පද්ධතිය	சமதளக் கோப்பு முறைமை
126.	flip-flop	පිළි-පොළ	எழு-விழு
127.	float	ඉපුලිම/ඉපිලීම	மிதவை
128.	floppy disk	නම්‍ය තැටිය	நெகிழ் வட்டு
129.	flow chart	ගැලීම් සටහන	பாய்ச்சற் கோட்டுப்படம்
130.	folder	ගොනු බහලුම	கோப்புறை
131.	foreign key	ආගන්තුක යතුර	அந்நியச்சாவி
132.	formatting	හැඩසවි ගැන්වීම	வடிவமைத்தல்
133.	frame	රාමුව	சட்டகம்
134.	frequency modulation	සංඛ්‍යාත මූර්ජනය	அதிர்வெண் பண்பேற்றல்
135.	full adder	පූර්ණාකලකය	முழுமைக் கூட்டி
136.	function	ශ්‍රිතය / කාර්යය	சார்பு

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137.	functional dependency	කාර්ය බද්ධ පරායත්තතාව	செயல் சார்புநிலை
138.	functional requirement	කාර්ය බද්ධ අවශ්‍යතාව	செயல்படு தேவை
139.	quantum computing	ක්වොන්ටම් පරිගණනය	சொட்டு கணிப்பு அடிப்படை
140.	gateway	දොරටු මඟ / වාසල් ද්වාරය /වාහල්දොර	நுழைவாயில்
141.	genetic algorithm	සහජ ඇල්ගොරිදමය	மரபணு வழிமுறை
142.	geographical information system(GIS)	භූගෝලීය තොරතුරු පද්ධතිය /මිහිතැන් තොරතුරු පද්ධතිය	புவியியல் தகவல் முறைமை
143.	graph plotter	ප්‍රස්තාර ලකුණුකරණය	படவரையி
144.	graphic tablet	චිත්‍රකළලකය	வரைவியல் விவரமாக்கி
145.	grid computing	ජාලක පරිගණනය	கோட்டுச்சட்டகக் கணிமை
146.	guided media	නියමු මාධ්‍ය	வழிபடுத்தப்பட்ட ஊடகம்
147.	half adder	අර්ධාකලකය	அரை கூட்டி
148.	hand trace	හස්තානුරේඛනය	கைச் சுவடுகள்
149.	hard disk	දැඩි තැටිය / දෘඪ ඩිස්කය	வன்தட்டு
150.	hardware	දෘඪාංග	வன்பொருள்
151.	hexadecimal	ෂඩ් දශමය	பதினறுமம்
152.	hierarchical model	ධූරාවලි ආකෘතිය	படிநிலை மாதிரி
153.	host	සත්කාරකය	விருந்தோம்பி
154.	hub	නාභිය	குவியன்
155.	human operator	මිනිස්ක්‍රියාකරුවෝ	மனித இயக்குபவர்
156.	hybrid approach	දෙමුහුන් ප්‍රවේශය	கலப்பு அணுகல்
157.	hyperlink	අධිසම්බන්ධකය	மீ இணைப்பு
158.	Integrated circuits (IC)	අනුකලිත පරිපථ	ஒருங்கிணைந்த சுற்று
159.	icon	නිරූපකය	சிறு படம்
160.	identity	සර්වසාම්‍ය	அடையாளம்
161.	image	රූපය	படிமம்
162.	imperative	විධානාත්මක	கட்டளை
163.	incremental	වර්ධනාත්මක	ஏறுமான, அதிகரிப்பு
164.	indexed allocation	අනුක්‍රමික විභාජනය	சுட்டி ஒதுக்கீடு
165.	information	තොරතුරු	தகவல்
166.	inkjet printer	තීන්ත විදුම් මුද්‍රකය	மைத்-தாரைஅச்சுப்பொறி
167.	instant messaging	ක්ෂනික පණිවුඩ යැවීම	உடனடிச் செய்தியிடல்
168.	integrated development environment(IDE)	සමෝධානික සංවර්ධන පරිසරය	ஒருங்கிணைந்த விருத்தி சூழல்
169.	integration test	අනුකලන පරීක්ෂණය	ஒருங்கிணைந்த சோதிப்பு
170.	intelligent and emotional computing	බුද්ධිමත් සහ චිත්තවේගී පරිගණනය	நுண்ணறிவும் உணர்திறனுமிக்க கணித்தல்
171.	interface	අතුරු මුහුණ	இடைமுகம்
172.	internet service	අන්තර්ජාල සේවය සපයන්නා	இணையச் சேவை வழங்குனர்

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	provider(ISP)		
173.	interpreter	අර්ථවිනිශ්චායකය	மொழிமாற்றி
174.	interrupt	අතුරු බිඳුම	இடையூறு
175.	intranet	අන්ත:ජාලය/ අන්තෝජාල	அகவிணையம்
176.	internet of things (IoT)	**සාර්ව ද්‍රව්‍ය අන්තර්ජාලය**/ සබැඳි ද්‍රව්‍ය අන්තර්ජාලය	பொருட்களின் இணையம்
177.	iteration	පුනර්කරණය	மீள் செயல்
178.	karnaugh map	කානෝ සිතියම	கானோ வரைபடம்
179.	knowledge management system(KMS)	දැනුම් කළමනාකරණ පද්ධතිය	அறிவு முகாமைத்துவ முறைமை
180.	large scale integration (LSI)	විශාල පරිමාණයේ අණුකලනය	பாரிய அளவு ஒருங்கிணைப்பு
181.	latency	පමාව/ගුප්තතාව	மறைநிலை
182.	least significant	අඩුමවෙසෙසි	சிறும மதிப்பு
183.	legend	විස්තර පාඨය	குறி விளக்கம்
184.	life cycle of data	දත්ත ජීවන චක්‍රය	தரவு வாழ்க்கை வட்டம்
185.	light emitting diode(LED) display	ආලෝක විමෝචක දියෝඩ සන්දර්ශකය	ஒளிகாலும் இருவாயித் திரை / ஒளி உமிழும் இரு முனையம்
186.	linked allocation	සබැඳි විභාජනය	இணைப்பு ஒதுக்கீடு
187.	linker	සන්ධාරකය	இணைப்பி
188.	liquid crystal display(LCD)	ද්‍රවස්ඵටික සන්දර්ශකය	திரவப்பளிங்குக் கணினித் திரை
189.	list	ලැයිස්තුව	பட்டியல்
190.	liveware	ජීවාංග	உயிர் பொருள்
191.	local publishing	ස්ථානීය ප්‍රසිද්ධ කිරීම	உள்ளக வெளியீடு
192.	local area network (LAN)	ස්ථානීය ප්‍රදේශ ජාලය	இடத்துரி வலையமைப்பு
193.	logic gate	තාර්කික ද්වාරය	தர்க்கப் படலை
194.	Logical Data Modeling(LDM)	තාර්කික දත්ත ආකෘතිකරණය	தர்க்கத் தரவு மாதிரியுருவாக்கல்
195.	logical data structure	තාර්කික දත්ත ව්‍යුහය	தர்க்கத் தரவுக் கட்டமைப்பு
196.	logical design tools	තාර්කික සැලසුම් මෙවලම්	தர்க்க வடிவமைப்புக் கருவி
197.	looping	ලූපනය	வளைய வரல்
198.	machine code	යන්ත්‍ර කේතය	இயந்திரக் குறியீடு
199.	machine-machine coexistence	යන්ත්‍ර-යන්ත්‍ර සහපැවැත්ම	இயந்திர- இயந்திர ஒருங்கிருத்தல்
200.	magnetic ink character reader(MICR)	චුම්බකිත තීන්ත අනු ලකුණු කියවනය	காந்த மை எழுத்துரு வாசிப்பான்
201.	magnetic stripe reader	චුම්බක තීරු කියවනය	காந்தப்பட்டி வாசிப்பான்
202.	magnetic tape	චුම්භක පටිය	காந்த நாடா
203.	malware	අනිෂ්ඨ මාදුකාංග	தீம்பொருள்
204.	management information system	කළමනාකරණ තොරතුරු පද්ධතිය	முகாமைத்துவ தகவல் முறைமை

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	(MIS)		
205.	man-machine coexistence	මිනිස්-යන්ත්‍ර සහපැවැත්ම	மனிதன் - இயந்திரம் ஒருங்கிருத்தல்
206.	media access control (MAC)	මාධ්‍ය ප්‍රවේශ පාලක	ஊடக அணுகல் கட்டுப்பாடு
207.	memory management unit(MMU)	මතක කළමනාකරණ ඒකකය	நினைவக முகாமைத்துவ அலகு
208.	mesh topology	බැඳි ස්ථලකය	கண்ணி இடத்தியல்
209.	microprocessor	ක්ෂුද්‍ර සකසනය	நுண்செயலி
210.	microwave	ක්ෂුද්‍ර තරංග	நுண்ணலை
211.	mini disk	කුඩා තැටිය	சிறு வட்டு
212.	mobile computing	ජංගම පරිගණනය	செல்லிடக் கணிமை
213.	mobile marketing	ජංගම අලෙවිකරණය	செல்லிடச் சந்தைப்படுத்தல்
214.	modularization	මොඩියුලකරණය	கூறு நிலையாக்கம்
215.	modulation	මූර්ජනය	பண்பேற்றம்
216.	most significant	වැඩිම වෙසෙසි	அதியுயர் மதிப்பு
217.	mother board	මවු පුවරුව	தாய்ப்பலகை
218.	multi agent systems	බහු කාරක පද්ධති	பல்முகவர் முறைமை
219.	multi user-multi task	බහු පරිශීලක - බහු කාර්යය	பற்பயனர்-பற்பணி
220.	multi-core processors	බහු හර සකසන	பல்கரு செயலி
221.	multimedia objects	බහු මාධ්‍ය වස්තු	பல்லூடக பொருள்
222.	multiplexer	බහු පථකාරකය	பல்சேர்ப்பி
223.	multiplexing	බහු පථකරණය	பல்சேர்ப்பு
224.	multiprocessing	බහු සැකසුම	பன்முறைவழியாக்கி
225.	multitasking	බහුකාර්ය කිරීම	பற்பணி
226.	multi-threading	බහු-අනුක්‍රියායනය	பல் செயல்கூறு
227.	nature inspired computing	ප්‍රකෘති ප්‍රේරිත පරිගණනය/ ප්‍රකෘති අනුප්‍රේරිත පරිගණනය	இயற்கை உள்ளீர்ப்புக் கணிப்பு
228.	nested loop	නීඩිත ලූපය	நீடித்த வளையம்
229.	network addresses translating (NAT)	ජාල යොමු පරිවර්තනය	வலையமைப்பு முகவரி பெயர்ப்பு
230.	network architecture	ජාල නිර්මිතය	வலையமைப்புக் கட்டமைப்பு
231.	network layer	ජාල ස්ථරය	வலையமைப்பு அடுக்கு
232.	network model	ජාල ආකෘතිය	வலையமைப்பு மாதிரி
233.	neural network	ස්නායුක ජාලය	நரம்பியல் வலையமைப்பு
234.	non-functional requirement	කාර්යබද්ධ නොවන අවශ්‍යතාව	செயல்சாராத் தேவைகள்
235.	normalization	ප්‍රමතකරණය	இயல்பாக்கல்
236.	null	අභිශූන්‍ය	வெற்று
237.	object code	වස්තු කේත/	பொருள் குறி
238.	object oriented	වස්තු නැඹුරු / පාදක	பொருள் நோக்குடைய
239.	object- relational model	වස්තු-සම්බන්ධක ආකෘතිය	பொருள் உறவுநிலை மாதிரி
240.	octal	අෂ්ටමය	எண்மம்

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241.	office automation system (OAS)	කාර්යාල ස්වයංකරණ පද්ධතිය	அலுவலகத் தன்னியக்க முறைமை
242.	offline	මාර්ග අපගත/ මාර්ගගත නොවන	தொடரறு நிலை
243.	one's compliment	එකෙහි අනුපූරකය	ஒன்றின் நிரப்பி
244.	online	මාර්ගගත	தொடரறா நிலை
245.	open source	විවෘත මූලාශ්‍ර	திறந்த மூலம்
246.	operational feasibility	මෙහෙයුම් ශක්‍යතාව	செயற்பாட்டுச் சாத்தியப்பாடு
247.	operator category	කාරක ප්‍රවර්ගය	செயலி வகை
248.	operator precedence	කාරක ප්‍රමුඛතා	செயலி முன்னுரிமை
249.	optical character reader (OCR)	ප්‍රකාශ අණු ලකුණු කියවනය	ஒளியியல் எழுத்துரு வாசிப்பான்
250.	optical mark reader (OMR)	ප්‍රකාශ ලකුණු කියවනය	காந்த மை எழுத்துரு வாசிப்பான்
251.	output	ප්‍රතිදානය	வெளியீடு
252.	packet switching	පොදි හුවමාරුව	பொதி மடைமாற்றல்
253.	paging	පිටුකරනය	பக்கமிடல்
254.	paradigm	සුසමාදර්ශය/ ප්‍රතිමානය/ප්‍රතිරූපය	கோட்பாட்டுச் சட்டகம்
255.	parallel implementation	සමාන්තර ස්ථාපනය	சமாந்தர அமுலாக்கம்
256.	parameter passing	පරාමිති යැවීම	பரமானக் கடத்தல்
257.	parity	සමතාව	சமநிலை
258.	password	මුර පදය	கடவுச்சொல்
259.	payment gateway	ගෙවුම් වාසල් ද්වාරය	பணக் கொடுப்பனவு நுழைவாயில்
260.	periodic refreshing	ආවර්ත ප්‍රබෝධකරණය	காலமுறை புதுப்பித்தல்
261.	peripheral device	පර්යන්ත උපාංගය / උපක්‍රමය	புறச் சாதனம்
262.	phablet	ෆැබ්ලට්	பெப்லட்
263.	phased implementation	අවධිස්ථාපනය / පියවර ක්‍රියාත්මකකිරීම	கட்ட அமுலாக்கல்
264.	phase modulation	කලා මූර්ඡනය	நிலை பண்பேற்றம்
265.	phishing	තතුබෑම	வழிப்பறித்தல்
266.	physical layer	භෞතික ස්ථරය	பௌதீக அடுக்கு
267.	physical memory	භෞතික මතකය	பௌதீக நினைவகம்
268.	pilot implementation	නියාමක ස්ථාපනය / නියාමක ක්‍රියාත්මක කිරීම	முன்னோடி அமுலாக்கல்
269.	piracy	චෞරත්වය/ ලුණ්ඨනය	களவு
270.	pirated software	චෞර/ලුණ්ඨිත මෘදුකාංග	திருட்டு மென்பொருள்
271.	plagiarism	ග්‍රන්ථ/රචනා චෞර්යය	கருத்துத் திருட்டு
272.	point to point connection	ඍජු ලක්ෂ්‍ය සම්බන්ධතාව	ஒன்றுடனொன்று இணைப்பு
273.	pointing device	දැක්වුම් උපාංගය	சுட்டி சாதனம்
274.	port	කෙවෙනිය	வாயில், துறை
275.	portable external hard disk	ජංගම/සුවහනීය බාහිර දෘඪ තැටිය	காவத்தகு புற வன்தட்டு
276.	portal	ද්වාරය/ ආමුඛද්වාරය	வலைவாசல்

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277.	Point of sale (POS) machine	විකුණුම් පොල යන්ත්‍ර	விற்பனை இட இயந்திரம்
278.	postulate	උපකල්පනය	எடுகோள்
279.	power supply	විදුලි සැපයුම/ජව සැපයුම	மின் வழங்கி
280.	presence check	තථ්‍යතා පරීක්ෂාව	இருத்தல் சரிபார்த்தல்
281.	presentation layer	සමර්පණ/ඉදිරිපත් කිරීම් ස්ථරය	முன்வைப்பு அடுக்கு
282.	primary key	ප්‍රාථමික/මුල් යතුර	முதன்மைச் சாவி
283.	primitive data type	ප්‍රාථමික දත්ත වර්ගය	பூர்வீகத் தரவு வகை
284.	privacy	පෞද්ගලිකත්වය	அந்தரங்கம்
285.	private key	පෞද්ගලික යතුර	பிரத்தியேகச் சாவி
286.	process	ක්‍රියාවලිය/ක්‍රියායනය/ සැකසුම	செயல்/ முறைவழியாக்கல
287.	process control block(PCB)	ක්‍රියායන පාලන ඛණ්ඩය	செயல் கட்டுப்பாட்டுத் தொகுதி
288.	process management	ක්‍රියායන කළමනාකරණය	செயல் முகாமைத்துவம்
289.	process states	ක්‍රියායන තත්ත්ව	செயல் நிலை
290.	process transition	ක්‍රියායන සංක්‍රමණය	செயல் நிலைமாறல்
291.	product commercialization	නිෂ්පාදන වාණිජ්‍යකරණය	தயாரிப்பு வர்த்தகமயமாக்கல்
292.	product of sum (POS)	චෙක්‍යයන්ගේ ගුණිතය	கூட்டுத்தொகையின் பெருக்கம்
293.	program translator	ක්‍රමලේඛ පරිවර්තක	செய்நிரல் மொழிபெயர்ப்பான்
294.	proprietary	හිමිකම් සහිත	தனியுரிமை
295.	protocol	නියමාවලිය	நடப்பொழுங்கு
296.	prototyping	මූලාකෘතිකරණය	மூலவகை மாதிரி
297.	proxy server	නියෝජන සේවාදායකය	பதிலாள் சேவையகம்
298.	pseudo code	ව්‍යාජ කේතය	போலிக்குறி
299.	public switch telephone network (PSTN)	පොදු ස්විච් දූරකථන ජාලය	பொது ஆளியிடப்பட்ட தொலைபேசி வலையமைப்பு
300.	public key	පොදු යතුර	பொதுச் சாவி
301.	pulse code modulation	ස්පන්ද කේත මූර්ජනය	துடிப்புக்குறி பண்பேற்றம்
302.	pulse width modulation	ස්පන්ද විතර මූර්ජනය	துடிப்பு அகலப் பண்பேற்றம்
303.	radio button	විකල්ප තේරීම	ரேடியோ பொத்தான்
304.	random access memory (RAM)	සසම්භාවී ප්‍රවේශ මතකය	தற்போக்கு அணுகல் நினைவகம்
305.	range check	පරාස පරීක්ෂාව	வீச்சு சரிபார்த்தல்
306.	rapid application development (RAD)	ශීඝ්‍ර යෙදවුම් සංවර්ධනය	துரித பிரயோக விருத்தி
307.	read only memory (ROM)	පඨන මාත්‍ර මතකය	வாசிப்பு மட்டும் நினைவகம்
308.	real time	තථ්‍ය කාලික	நிகழ்நேரம்
309.	record	උපලැකියාන	பதிவு
310.	redo	නැවත කිරීම	மீளச் செய்

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311.	redundancy	සමතිරික්තතාව	மிகைமை
312.	reference model	යොමු ආකෘතිය	வலையமைப்பின் கட்டமைப்பு
313.	refreshing	පුබුදු කිරීම	புத்துயிர்ப்பித்தல்
314.	register memory	රෙජිස්තර මතකය	பதிவகம்
315.	relational	සම්බන්ධක	தொடர்பு, உறவுநிலை
316.	relational model	සම්බන්ධක ආකෘතිය	உறவுநிலை மாதிரி
317.	relational database	සම්බන්ධක දත්ත සමුදාය	உறவுநிலை தரவுத்தளம்
318.	relational instance	සම්බන්ධතා නිදර්ශනය	தொடர்பு முறை எடுத்துக்காட்டு
319.	relational schema	සම්බන්ධතා පරිපාටික සටහන	தொடர்பு முறைத் திட்டம்
320.	relationship	සම්බන්ධතාවය	தொடர்புமுறை
321.	remote	දූරස්ථ	தொலை, தூர
322.	render	විදැහු	வழங்கு
323.	repeater	පුනර්කථකය	மீளி, மீட்டி
324.	repetition	පුනරුක්තිය	மீள் செயல்
325.	reset button	ප්‍රත්‍යාරම්භ බොත්තම	மீளமைப்புப் பொத்தான்
326.	retrieve	සමුද්ධරණ	மீளப்பெறு
327.	return value	ප්‍රත්‍යාගමන අගය	திரும்பல் பெறுமானம்
328.	reverse auction	ප්‍රතිවෙන්දේසිය	எதிர்மாற்று ஏலம்
329.	ring topology	මුදු ස්ථලකය	வளைய இடத்தியல்
330.	router	මං හසුරුව	வழிப்படுத்தி, வழிச்செலுத்தி
331.	routing	මං හැසිරවීම	வழிச்செலுத்தல்
332.	scanner	සුපිරික්සකය	நுணுகு நோக்கி
333.	scheduler	නියමකරණය	ஒழுங்குபடுத்தி
334.	scope of variable	විචල්‍ය පරාසය	மாறி செயற்பரப்பு
335.	query	විමසුම	வினவல்
336.	selection	තේරීම	தெரிவு
337.	selector	වරකය	தேர்வி, தேர்ந்தெடுப்பி
338.	sensor	සංවේදකය	உணரி
339.	sequence	අනුක්‍රමය	தொடர்
340.	sequential circuit	අනුක්‍රමික පරිපථය	தொடர்ச் சுற்று
341.	sequential search	අනුක්‍රමික සෙවුම	வரிசைமுறைத் தேடல்
342.	server	සේවාදායකය / අනුග්‍රාහකය	சேவையகம்
343.	session layer	සැසි ස්ථරය	அமர்வு அடுக்கு
344.	sharable pool	හුවමාරු පුංජය	பகிரதகு பொது இடம்
345.	sign-magnitude	ලකුණුවත් ප්‍රමාණය / සංලක්ෂිත පරිමාණනය / අංකිත පරිමාණනය	குறியுடைய வீச்சளவு
346.	single user-multi task	ඒක පරිශීලක-බහු කාර්යය	தனிப்பயனர்-பற்பணி
347.	single user-single task	ඒක පරිශීලක-ඒක කාර්යය	தனிப்பயனர்-தனிப்பணி
348.	smart card	සුහුරු කාඩ්පත	சூட்டிகை அட்டை
349.	smart phone	සුහුරු දුරකථනය	சூட்டிகைத் தொலைபேசி
350.	smart system	සුහුරු පද්ධතිය	சூட்டிகை முறைமை
351.	social networking	සමාජ ජාලකරණය	சமூக வலையமைப்பாக்கல்

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352.	software	මෘදුකාංග	மென்பொருள்
353.	software agent	මෘදුකාංග කාරක	மென்பொருள் முகவர்
354.	sort	තේරීම	வரிசைப்படுத்து
355.	source	ප්‍රභව	மூலம்
356.	spiral model	සර්පිල ආකෘතිය	சுருளி மாதிரி
357.	spooling	එතීම	சுற்றுதல்
358.	Star topology	තාරකා ස්ථලකය	வின்மீன் இடத்தியல்
359.	stepwise refinement	පියවරාකාර පිරිපහදුව	படிமுறை நீக்கல்
360.	storage	ආචයනය	சேமிப்பு
361.	storage allocation	ආචයන විභාජනය	சேமிப்பு ஒதுக்கல்
362.	stored program concept	ආචිත ක්‍රමලේඛ සංකල්පය	சேமிக்கப்பட்ட செய்நிரல் எண்ணக்கரு
363.	structure	ව්‍යුහය	கட்டமைப்பு
364.	structure chart	ව්‍යුහ සටහන	கட்டமைப்பு வரைபு
365.	structured	ව්‍යුහගත	கட்டமைப்புடைய
366.	structured query language(SQL)	ව්‍යුහගත විමසුම් බස	கட்டமைப்பு வினவல் மொழி
367.	submit button	යොමු බොත්තම	சமர்ப்பித்தல் பொத்தான்
368.	subnet mask	උප ජාල ආවරණය	உபவலை மறைமுகம்
369.	sub-netting	උප-ජාලනය	உபவலையமைப்பு
370.	sub-program	උප-ක්‍රමලේඛය	துணைச் செய்நிரல்
371.	sum of products (SOP)	ගුණිතයන්ගේ ඓක්‍යය	பெருக்கங்களின் கூட்டுத்தொகை
372.	supply chain management	සැපයුම් දාම කළමනාකරණය	விநியோக சங்கிலித்தொடர் முகாமைத்துவம்
373.	swapping	ප්‍රතිහරණය	இடமாற்றல்
374.	switch	ස්විචය	ஆளி
375.	syntax	කාරක රීති	தொடரியல்
376.	system development life cycle(SDLC)	පද්ධති සංවර්ධන ජීවන චක්‍රය	முறைமை விருத்தி வாழ்க்கை வட்டம்
377.	table	වගුව	அட்டவணை
378.	table check constraint	වගු පරීක්ෂා සංරෝධකය	அட்டவணை சரிபார்த்தல் கட்டுப்பாடு
379.	tag	උසුලනය	ஒட்டு
380.	Technical feasibility	තාක්ෂණික ශක්‍යතාව	தொழினுட்பச் சாத்தியக் கற்கை
381.	telecommuting	දුරස්ථ සංවාදය / දුර සන්නිවේදනය	தொலைசெயல்
382.	testing strategy	පරීක්ෂණ උපක්‍රමය	பரீட்சித்தல் உபாயம்
383.	text and font	පාඨ සහ අක්ෂර	வாசகமும் எழுத்துருவும்
384.	text formatting	පාඨ හැඩසැවි ගැන්වීම	வாசக வடிவமைப்பு
385.	text input	පාඨ ආදාන	வாசக உள்ளீடு
386.	normal form	ප්‍රමත අවස්ථාව	இயல்பாக்கல் வடிவம்
387.	thumbnail	සැකෙවි රූ	குறும்படம்
388.	time division modulation (TDM)	කාල බෙදුම් මූර්ඡනය	நேரப் பிரிவுப் பண்பாக்கம்
389.	time sharing	කාල විභජනය	நேரப்பகிர்வு

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390.	timing	කාල ගණනය	நேரக்கணிப்பு
391.	top down design	මුදුන් බිම් සැලසුම	மேலிருந்து கீழான வடிவமைப்பு
392.	touch pad	ස්පර්ශක උපධානය / පාදකය	தொடு அட்டை
393.	touch screen	ස්පර්ශක තිරය	தொடுதிரை
394.	transaction processing system(TPS)	ගනුදෙනු සැකසුම් පද්ධතිය	பரிமாற்றச் செயலாக்க முறைமை
395.	transitive dependency	සංක්‍රාන්ති පරායත්තතාව	மாறும் சார்பு நிலை
396.	transport layer	ප්‍රවාහන ස්ථරය	போக்குவரத்து அடுக்கு
397.	transport protocol	ප්‍රවාහන නියමාවලිය	போக்குவரத்து நடப்பொழுங்கு
398.	tuple	උපලැකියාන/පේලිය	பதிவு/நிரை
399.	twisted pair	ඇඹරි යුගල	முறுக்கிய சோடி
400.	two's compliment	දෙකෙහි අනුපූරකය	இரண்டின் நிரப்பி
401.	type check	ප්‍රරූප පරීක්ෂාව	வகை சரிபார்த்தல்
402.	constraint	සංරෝධනය	கட்டுப்பாடு வகை
403.	ubiquitous computing	සර්වවර්ති ආගණනය	எங்கும் வியாபித்த கணிமை
404.	undo	අහෝසි කිරීම	செயல்தவிர்
405.	unguided media	නියමු නොවන මාධ්‍ය	வழிபடுத்தப்படாத ஊடகம்
406.	uni-casting	සෘජු සම්ප්‍රේෂණය	தனிப்பரப்பல்
407.	unicode	යුනිකෝඩ්/ චීකකේත	ஒற்றைக்குறி முறை
408.	unique constraint	අනන්‍ය සංරෝධකය	தனித்துவக் கட்டுப்பாடு
409.	unit testing	චීකක පරීක්ෂණය	அலகுச் சோதனை
410.	universal	සාර්වත්‍ර	பொது
411.	updating	යාවත්කාලීන කිරීම	தற்காலப்படுத்தல்
412.	user	පරිශීලක	பயனர்
413.	user defined	පරිශීලක නිර්වාචිත	பயனர் வரையறை
414.	validation	වලංගු කිරීම	செல்லுபடியாக்கல்
415.	variable	විචල්‍යය	மாறி
416.	very large scale integration (VLSI)	ඉතා විශාල පරිමාණයේ අනුකලිත	மிகப் பெரியளவிலான ஒருங்கிணைப்பு
417.	video graphic adapter (VGA)	දෘශ්‍ය චිත්‍රක අනුහුරුකුරුව	காணொளி வரையி பொருத்தி
418.	virtual community	අතථ්‍ය ප්‍රජාව	மெய்நிகர் சமூகம்
419.	virtual memory	අතථ්‍ය මතකය	மெய்நிகர் நினைவகம்
420.	virtual storefront	අතථ්‍ය වෙළඳ ප්‍රදර්ශනාගාරය	மெய்நிகர் கடைமுகப்பு
421.	waterfall model	දියඇලි ආකෘතිය	நீர் வீழ்ச்சி மாதிரி
422.	wave length	තරංග ආයාමය	அலை நீளம்
423.	web portal	වෙබ් ද්වාරය	வலை வாசல்
424.	web server	වෙබ් සේවාදායකය	இணைய சேவையகம்
425.	web service provider	වෙබ් සේවා සැපයුම්කරු	இணைய சேவை வழங்குனர்
426.	white box testing	ස්වේත මංජුසා පරීක්ෂාව	வெண்பெட்டிச் சோதிப்பு
427.	world wide	ලෝක විසිරි වියමන	உலகளாவிய வலை

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	web(WWW)		
428.	**uniform resource locator (URL)**	ඒකාකාරී සම්පත් නිශ්චායකය	சீர்மை வள இருப்பிடங்காட்டி
429.	**uniform resource identifier(URI)**	ඒකාකාරී සම්පත් හඳුන්වනය	சீர்மை வள அடையாளங்காட்டி

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