TOPIC ONE: ALGORITHM AND FLOWCHART

Algorithm can also be defined as a procedure consisting of a series of steps which specify a sequence of operations that provides the solution to a problem.

An algorithm is a finite set of an instruction that specifies a sequence of operations to be carried out in order to solve a specific problem. It is a detailed sequence of simple steps that are needed to solve a problem.

Pseudocode is a detailed yet readable description of an algorithm, expressed in a formally-styled natural language rather than in a programming language. It is very similar to everyday English.

A flowchart is a pictorial representation of an algorithm in which the steps are drawn in the form of different shapes of boxes and the logical flow is indicated by interconnecting arrows. The boxes represent operations and the arrows represent the sequence in which the operations are implemented.

A flowchart is a diagrammatical representation of an algorithm.

FUNCTIONS OF ALGORITHM

1. It provides a step-by-step solution to a problem
2. It is used to prove that a problem has a solution
3. It is used to give a sense of direction to the steps of solving a problem
4. It may also be used to show that a problem does not have a solution

CHARACTERISTICS OF AN ALGORITHM

1. Finiteness: it specifies an exact number of steps to be taken and has an end
2. Absence of ambiguity: it shows that every instruction is clearly and precisely specified
3. Sequence of execution: it shows how the instructions are performed from top to bottom
4. Effectiveness: it ensures that the solution prescribed is guaranteed to give a correct answer and that the specified process is faithfully carried out.
5. Input and output: these defines the unknowns of the problem specified and the expected output
6. Scope definition: it specifies precisely the problem or class of problem
7. Independence: algorithm is language independent

ALGORITHM Examples

Example 1: Calculate the Interest of a Bank Deposit

Algorithm:

Step 1: Start
Step 2: Read amount
Step 3: Read years,
Step 4: Read rate,
Step 5: Calculate the interest with formula “Interest=Amount*Years*Rate/100
Step 6: Print interest
Step 7: Stop

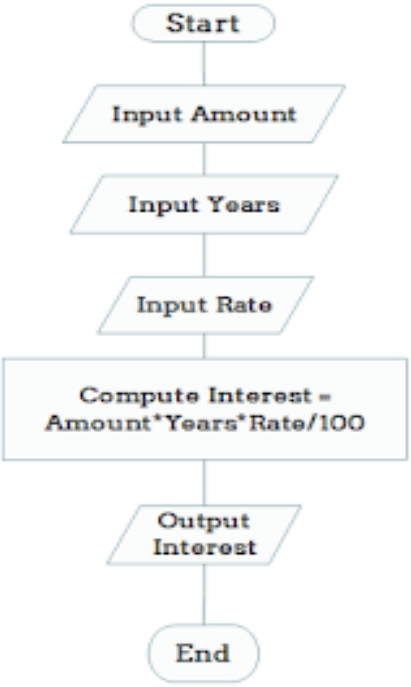
Example 2: Algorithm to Determine and Output Whether Number N is Even or Odd
Algorithm:
Step 1: Start
Step 2: Read number N,
Step 3: Set remainder as N modulo (divide) 2,
Step 4: If remainder is equal to 0 then number N is even, else number N is odd,
Step 5: Print output.
Step 6: Stop
Example 3: Algorithm to Print 1 to 20:
Algorithm:
Step 1: Start
Step 2: Initialize X as 0,
Step 3: Increment X by 1,
Step 4: Print X,
Step 5: If X is less than 20 then go back to step 2.
Step 6: Stop

FLOWCHART SYMBOLS, NAME AND USES

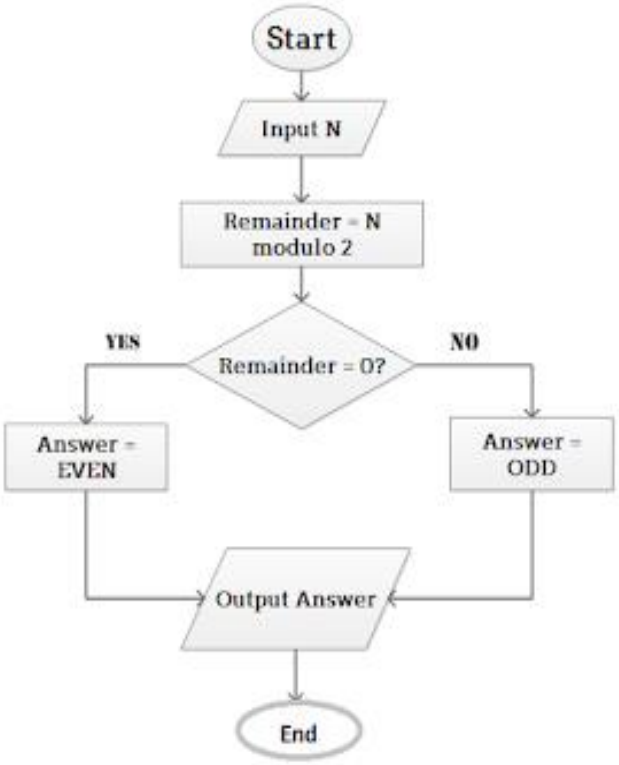
Symbol	Name	Meaning/use
	Oval	start/end of the flowchart
	Rectangle	Indicate processing or instruction
	Parallelogram	Input and output
	Diamond	Decision
	Circle	Connector
	Flow lines	Show direction of flow
	Open rectangle	Comments, explanation or definition
	Hexagon	Preparation and loops

Below are the corresponding flowcharts

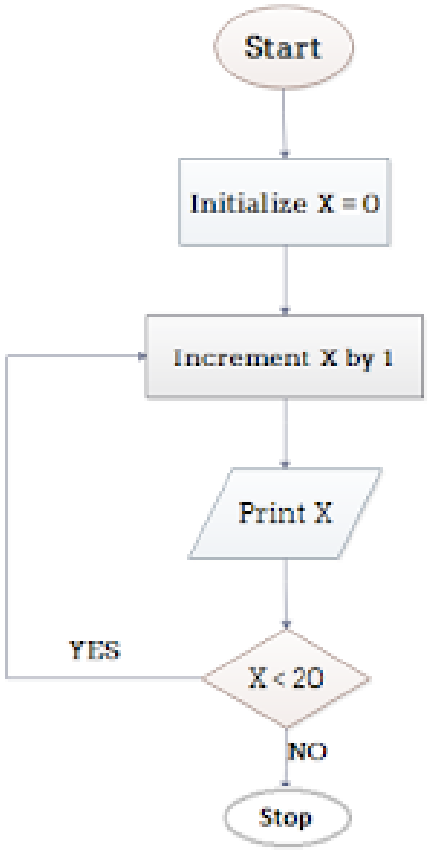
Flowchart for example 1: Calculate the Interest of a Bank Deposit



Flowchart for example 2: Determine and Output Whether Number N is Even or Odd



Flowchart for example3: Print 1 to 20



Assignment One

1. Define the following (a)System Flowchart (b)Program Flowchart
2. State three characteristics of Algorithm.
3. Write an algorithm to compute the difference of three numbers a, b, & c.
4. Draw a flowchart to calculate the area of a triangle with base b and height h.

TOPIC TWO: BASIC PROGRAMMING (II)

The BASIC built-in library functions

i. The BASIC built-in functions are also referred to as the built-in library functions or standard functions or library functions.
ii. Built-in functions provide quick and easy way to evaluate many mathematical functions
iii. These functions are pre-written routine that are included as an integral part of the BASIC programming language. Therefore, SQR and the other function names are keywords in BASIC
iv. Each function is accessed simply by stating its name followed by the value to be evaluated which is enclosed in parentheses e.g. LET A = SQR (25). The value of A is 5.
v. The value enclosed in parentheses in front of the function name is called an "argument". So, in SQR (K), "K" is the argument.
vi. When the built-in function is used, the desired operation will be carried out automatically.

BASIC notations of Mathematical Expressions

This involves converting mathematical expressions to BASIC expressions. The following examples should be studied one after the other

S/N	Mathematical Expression	BASIC Expression
1	x-y / cos (x + y)	ABS (x - y) / COS (x + y)
2	(a + b) + c/sin d	(a + b) + c/SIN (d)
3	e^{x+y} – sin (x + ny)	EXP (x+y) – SIN (x + n * y)
4	z = cos (x + artan y)	z = COS (x + ATN (y))
5	$y = ae^{kb}$ sin ch	Y = a * EXP (k * b) * SIN (c * h)
6	$k = \log_e v$	k = LOG (v)
7	$M = \log_{10} y$	M = LOG10 (y)

Basic Programs using Built-in Library Functions

5. Find the square root of numbers from 9 to 12.

```
10 REM program to find the square root of a range of number
15 PRINT "NUMBER", "SQUARE ROOT"
20 A = 9
30 S = SQR (A)
40 PRINT A, S
45 A = A + 1
50 IF A < = 12 THEN GOTO 30
60 END
   RUN
```

NUMBER	**SQUARE ROOT**
9	3
10	3.162
11	3.317
12	3.464

6. Find the square root S and round it up to an integer.

```
10 REM square root of 26 rounded up to an integer.
20 A = 26
30 S = SQR (A)
40 K = INT (S)
50 PRINT K
60 END
   RUN
```

7. Find the cosine of three numbers.

```
10 REM find the cosine of three numbers
20 INPUT "Enter 1st number"; A
30 INPUT "Enter 2nd number"; B
40 INPUT "Enter 3rd number"; C
50 x = COS (A)
60 y = COS (B)
70 z = COS (C)
80 PRINT x
90 PRINT y
100 PRINT z
110 END
```

Note: When you run this program, the computer allows you to enter the three values you want to find their cosine one after the other

8. Find the tangent of an angle.

```
10 REM Tangent of angle.
20 INPUT "Enter an angle"; A
30 x = TAN (A)
```

```
40 PRINT x
50 END
```

Built-in Functions used in string processing

A string is a character or a combination of characters, which may be made up of letters, number, or special characters. A string could be of any length i.e. could be made up of any number of characters.

Some examples of string include the following:

i. JOHNSON
ii. THOUSAND
iii. NAME$
iv. CHE223
v. IBADAN GRAMMAR SCHOOL
vi. 5, BINTA AVENUE, IKEJA, LAGOS.

STRING PROCESSING

1. **CONCATENATION:** This refers to the "addition" of two or more strings to form a new string
2. **RIGHT$ and LEFT$ FUNCTIONS:** The RIGHT$ function takes a specified number of letters or characters from the right side of a string and constructs a separate or new string with them. The LEFT$ function takes a specified number of characters from the left side of a string and constructs a separate or a new string with them. In both cases, you have to specify how many characters from the designated side you want to use the new strings.
3. **MID$ FUNCTION:** MID$ function takes a specified number of characters starting from any part of a string and constructs a separate or new string with them.
4. **LEN FUNCTION:** The LEN function returns a numeric value equal to the length in characters of a string. That is, the LEN function counts the number of character in a string
5. **VAL, STR$ and INSTR FUNCTIONS:** The VAL statement converts a number in a string format into its numeric equivalent. The STR$ statement does the reverse i.e. it takes a numeric value and converts it into a string. The INSTR function searches one designated string for the occurrence of another string. It then yields a value that designates the place by the number of characters form the left most character of the string where the second string occurs in the first string. If the second string does not occur in the first, it yields a value of 0.

Assignment Two

1. List five built-in functions
2. State the use of the following built-in library functions (i)RND (ii)ABS (iii)LOG(x)
3. Write BASIC notation for: (i)C=5/9x(F-32) (ii)F=9c/5+32
4. Write a BASIC program to compute the square root of numbers 10 to40

TOPIC THREE: INTERNET

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link billions of devices worldwide. It is an international network for communication, where millions of computers are connected together. It is the largest computer network in the world.

Definition of some basic terms

1. Home page: is an introductory page of a website, typically serving as a table of contents for the site. It is an initial page or point of entry to all information stored within.
2. Web page: is a single page of information on a website.
3. Website: is a collection of related web pages (document that are accessed through the internet), typically identified with a common web address or domain name or URL (Uniform Resource Locator), published on at least one web server. Examples are https://google.com, https://isi.ui.edu.ng, https://facebook.com etc.
4. Hyper Text Markup Language, commonly referred to as *HTML*, is the standard markup language used to create web pages. Web browsers can read HTML files and render them into visible and audible web pages.
5. A protocol can be defined as set of rules and regulations that determine how data is transmitted in telecommunications and computer networking
6. H*yper* T*ext* T*ransfer* P*rotocol*, HTTP is the underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.
7. Upload: this is the process of transferring files from a local computer to another (remote) computer on the World Wide Web.
8. Cyber cafe: this is a place to use computer to access the internet, create document, chat with friends using voice and video as well as a number of other computer related tasks.
9. Browser: A browser or a web browser is an application program with a graphical user interface for displaying HTML files, used to navigate the World Wide Web. Technically, a Web browser is a client program that uses HTTP (Hypertext Transfer Protocol) to make requests of Web servers throughout the Internet on behalf of the browser user. Examples include Mozilla Firefox, Apple safari, Opera Mini, Lynx , Flock, Microsoft Internet Explorer, Netscape Navigator, UC browser, Google Chrome, Microsoft Edge etc.
10. Internet Service Provider (ISP): an organization that provides individuals and other companies' access to the internet. Examples include MTN, Airtel, 9mobile, Smile etc.

Internet services

1. E-mail (Electronic mail): this is a message sent from one person to another, or many others through the internet connected computers.
2. Telnet is a user command and an underlying TCP/IP protocol for accessing remote computers.

3. Usenet (Users network) is an early non-centralized computer network for the discussion of particular topics and the sharing of files via newsgroups. *Newsgroups* are Internet discussion forums where groups of users with common interests gather to talk about everything from software to comic books to politics.
4. File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files from one host to another host over a TCP-based network, such as the Internet.
5. World Wide Web (WWW) is a network of online content that is formatted in HTML (connected by hyperlinks and URL) and accessed via HTTP. A system of Internet servers that support specially formatted documents. The documents are formatted in a markup language called HTML.
6. Search engine: this is a computer program that retrieves documents or data from a database or from a computer network (especially from the internet). It is an utility for finding information on the internet.

Benefits of the internet

- It provides quick access to almost any kind of information.
- It is a fast, cheap and effective means of communicating and exchanging information all over the world
- E-commerce: buying and selling has been made possible through the internet
- Job opportunities such as graphic designing, blogging, freelance writing etc. have been made possible
- It is an avenue for advertisement of goods and services.
- Online training and seminar called WEBINARS are made possible
- Online degree/E-learning: the internet provides us the opportunity to learn and earn degree/certificates by taking online classes.
- Online banking

Abuse of the internet

1. Hacking: using the internet to gain unauthorized access to people's computers
2. Fraud: fraudulent activity involves any attempt to unlawfully obtain money from unsuspecting users
3. Copyright violation: someone's electronic content can be copied without due reference or permission
4. Virus distribution: internet users are prone to downloading virus and other malicious program when downloading software/files from illegitimate website on the internet.
5. Pornography: the internet is flooded with websites that are pornographic in nature
6. Cyber bullying: using the internet to threaten and bully someone
7. Spamming: sending unsolicited messages to individual or network groups through the internet.

Assignment Three

1. List three common internet main browser
2. List three services available on internet
3. List Four benefits of internet to our society
4. List four problem of the internet to our society

TOPIC FOUR: ELECTRONIC MAIL (E-MAIL) SERVICES

Definition of E-mail

Electronic mail, e-mail or email is a text message that may contain files, images, or other attachments sent through a network to a specified individual or group of individuals

E-mail Services

The major e-mail services include the following:

i. Sending and Receiving e-mail
ii. Chatting

Steps involved in creating E-mail Address/Account

There are several companies which offer services free of charge. All that are needed to register are:

i. Choosing an e-mail ID (or username)
ii. Entering a password.

Creating E-mail account with yahoo.com

Step 1: Enter www.yahoomail.com into your browser address bar and press the enter key.

Step 2: Click on "Create New Account"

Step 3: Fill in the online form and click on "Create My Account"

Note: Click on "I agree" when you are prompted to agree or disagree with the company's policy on the usage of the e-mail facility.

Sending/Receiving/Checking of mail box

i. Sending an e-mail involves of an e-mail.
ii. Receiving an e-mail involves the opening of a mail box to check for a mail

Receiving / Checking of mail box at yahoo.com

Step 1: Log in to your e-mail account

Step 2: Opening of e-mail box

Step 3: Displaying the mail listing

Step 4: Opening the mail to read it.

Sending an e-mail from yahoo.com

i. Click compose
ii. Enter the e-mail address of the receiver
iii. Type the title of your message
iv. Type your message in the document windows
v. Click send

Writing E-mail Addresses

The e-mail address is the address code through which an electronic mail (e-mail) can be sent or received. The basic structure or feature of an email address is as follows: username@domain

Examples of e-mail addresses:

i. Binta@yahoo.com
ii. Emeka@gmail.com
iii. boye@hotmail.com

Differences between Email and Website address features

S/N	Website Address	Email Address
1	Has no @ sign	Contains @ sign
2	Contains www	Has no www
3	Its protocol includes http and ftp	Its protocol include smtp and pop3
4	Website address can be used as a hyperlink to get to the site	Email address can be used to send and receive emails